HEALTH AND LIFE OUTCOMES OF CHILDREN EXPOSED TO MATERNAL HIV INFECTION IN BELGAUM DISTRICT, KARNATAKA

Thesis Submitted to the Jawaharlal Nehru University
for the Award of the Degree of

DOCTOR OF PHILOSOPHY

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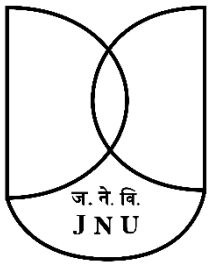

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DECLARATION

I hereby declare that this thesis entitled "**HEALTH AND LIFE OUTCOMES OF CHILDREN EXPOSED TO MATERNAL HIV INFECTION IN BELGAUM DISTRICT, KARNATAKA**" submitted to Jawaharlal Nehru University for the award of degree of **DOCTOR OF PHILOSOPHY**, is my original work. This thesis has not been previously submitted for the award of any other degree of this or any other university.

Rajeev N.S.

CERTIFICATE

We recommend that the thesis be placed before the examiners for evaluation and consideration of the award of Degree of Doctor of Philosophy.

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Rajeev N. S.

CONTENTS

INTRODUCTION

INTRODUCTION

Since the first reported Human Immuno-deficiency Virus (HIV) infection from the Democratic Republic of Congo in 1959, the infection had been reported from different parts of the world, at different points of time in the 20th century. The four main modes of transmission, and the risk associated with each, varied from country to country, based on cultural, social, economic, and health care factors. As such, globally, the epidemic was not homogeneously spread across the regions. Unprotected sexual intercourse was the commonest method of transmission across the world. Over the years, the mode of spread of HIV infection followed the pattern of 'from-the-high-risk-to-the-low-risk' and 'from-urban-to-rural'. Mother-To-Child Transmission (MTCT), the main reason for HIV infection among the children, remained an amenable matter of concern across the years; evolving strategies and scaling up of the prevention and care services reduced this risk considerably. On the whole, the burden and the trends of HIV infection showed signs of gaining human control over the epidemic, irrespective of regional and intra-country variations, by 2017.

In India, the first case of HIV infection was detected in 1986. Since then, the main mode of HIV transmission among the population was through unprotected heterosexual intercourse, and the epidemic remained concentrated among the High-Risk Groups (HRGs; include Female Sex Workers (FSW), Men who have Sex with Men (MSM), Truckers, Migrants, and Injection Drug Users (IDU)), with gradual spread towards the rural population and women. In 2017, India harbored 2.1 million of People Living with HIV (PLHIV) within its 1339 million population (5.7% of total world PLHIV population). Among the PLHIVs (Males: 59.5%; Females: 40.5%) in India, 93.7% were adults (15+ years of age) and 6.3% were children (<15 years of age). The risk of mother-to-child transmission varied by the different settings of health care facilities and practices followed in different states. In the 2010s, India harbored the largest burden of HIV infection in South and South-East Asia, and the second-largest burden of HIV infection in children in the world, next to Sub Saharan Africa.

Box 1: HIV scenario in 2017.

- While 9 out of 10000 children <15 years in the world were HIV-infected, the rate was 2 per 10000 in India and 7 per 10000 in Karnataka; and, India held
    - 3.4% of the global CLHIV and the Karnataka state held 17.8% of the India CLHIV in its territories; and,
    - 7.6% of the global AIDS orphans and 2.2% of the global HIV-EU children.
- While 1 out of 10000 children <15 years in the world were newly HIV-infected, the rate was near-zero in India and Karnataka; however,
    - India held 2.1% of the global new child HIV infections, and the Karnataka state held 6.2% of the India new child HIV infections in its territories.
- While 1 out of 10000 children <15 years in the world were dead due to HIV/AIDS annually, the rate was near-zero in India; however,
    - India held 2.4% of the global AIDS-related child deaths in its territory.
- While 52.3% CLHIV in the world were initiated on ART, the rate was nearly 77% in India and Karnataka; however,
    - India held 5.0% of the global on-ART CLHIV, the Karnataka state held 21.8% of the India on-ART CLHIV, and the Belgaum district held 8.2% of the Karnataka on-ART CLHIV in its territories; and,
    - the ART program data showed that only around two-thirds of the CLHIV were ever-initiated on ART in the Karnataka state and the Belgaum district, and only about a half of them were alive and on ART at any point of time.
- While the HIV-infected pregnancy was 186 per million population globally, the rates were 17.1 and 29.3 per million population in India and the Karnataka state respectively; and,
    - India held 1.6% of the global HIV-infected pregnancies, while Karnataka state held 8.5% of the India HIV-infected pregnancies in its territories;
    - the share of the HIV-infected pregnant women receiving the ARV/ART were nearly 80% globally and in the Karnataka state, while the Indian average was nearly 60%; and,

- the share of the HIV-exposed infants getting tested for EID was 51% and 23% in the world and India respectively

- The global, India and Karnataka HIV prevalence were 0.8%, 0.2%, and 0.4% respectively; however,
  - the antenatal HIV prevalence was 0.3%, 0.4%, and 0.6% in India, Karnataka state and Belgaum district respectively; and,
  - the observed HIV positivity among the pregnant women was 0.06% and 0.08% in Karnataka state and Belgaum district, respectively.
- The HIV incidence rate was 0.25 and 0.1 per 1000 population globally and in India, respectively.

The HIV infection was first reported from the high-prevalent state of Karnataka from Soudatti, in the Belgaum district, in 1987. In 2016, while the state of Karnataka housed 5.0% of total India population, it also harbored 9.0% (0.19 million) of total India PLHIV population; thus, the adult HIV prevalence in the state (0.43%) was above the national average (0.25%). In 2016, the Children Living with HIV (CLHIV; <15 years of age) constituted 5.9% (n=11582) of the total PLHIVs in the Karnataka state.

Grossly, the HIV epidemic scenario in the world, India, and Karnataka were similar; the difference was mainly in the magnitude of the epidemic. While India had a low-grade epidemic in the world, the Karnataka state had a graver epidemic in the country, and the Belgaum district experienced an aggravated form of epidemic in the Karnataka state, during 1990-2017. In 2017, the burden and trends of the HIV infection showed the signs of control of the epidemic, irrespective of regional and intra-country variations.

Various measures and strategies for the prevention and control of HIV infection were adopted across the world and in India, and these had evolved. In India, across the four phases of the National AIDS Control Program (NACP; 1987-2016), the prevention and control strategies were increasingly adopted and scaled up. The programs for the Prevention of Parent-To-Child Transmission (PPTCT), Early Infant Diagnosis (EID) and Care, Support and Treatment (CST) were of prime significance to ensure infection-free

children. As in the rest of the world, the MTCT was significantly reduced with the provision of Anti-Retroviral Prophylaxis (ARV)/ Anti-Retroviral Therapy (ART) to pregnant women. The efforts to curb HIV infection and its consequences had increasingly prevented the people from getting infected with the HIV, saved many lives from Acquired Immuno Deficiency Syndrome (AIDS)-related deaths, and increased the life years of the PLHIV. There was a stagnation/decline in the number of PLHIV/CLHIV, new infection, and AIDS-related deaths; the incidence, prevalence, and mortality had come down. Evidence showed that the AIDS-related mortality reduced with the higher proportion of the PLHIV/CLHIV on ART, and the new HIV infections among children reduced with the higher proportion of HIV-infected pregnant mothers receiving ARV/ART.

Grossly, the HIV-exposed and HIV-infected children were decreasing in numbers over the past years. However, as the ARV/ART had reduced the MTCT, there was a growing ratio of the HIV-exposed-but-uninfected (HIV-EU) children against the HIV-exposed-and-infected (HIV-EI) children. The ART had added to the life years of infected mothers and children; however, the quality of life years added was not adequately explored. Internationally, the morbidity and mortality among the HIV-infected children were reported as higher than the HIV non-infected and HIV unexposed, against the all-embracing backdrop of undernourishment. Thus, the under-nourishment, inadequate growth and development for age, morbidity, and mortality remained entangled among the HIV-exposed children. The issues of breastfeeding, alternative feeding, weaning, Low Birth Weight (LBW), retarded growth, malnutrition, growth retardation, less immunity, morbidity and poor response to ART were interlinked to the larger malnutrition-morbidity-mortality cycle. The share of malnourished children and category of malnutrition, the type, and frequencies of morbidity, the rate, and reasons for mortality, and the factors influencing undernourishment, morbidity, and mortality among the HIV-exposed children could depend on the larger environmental and socio-economic conditions of the country. On the whole, this could portray a vicious cycle of ‘malnutrition-growth and development abnormalities-morbidity-malnutrition’, influenced by the environmental, socio-economic, and breastfeeding factors, resulting in mortality, against each country’s scenario.

As the HIV infections in the Karnataka state was long-standing and the trends of prevalence, new infections, child infections and deaths associated were in line with the national scenario, it was a pioneer in India in creating evidence-based interventions, experimenting strategies and establishing systems for the prevention, care and support services for HIV-infected people. All these had contributed to the significant control of HIV infection in the state. For the same reason, the Indian Council of Medical Research (ICMR) had put in its efforts to build and maintain an India Pediatric HIV Cohort for research studies in the Belgaum district since 2011.

The decreasing numbers of new infections and increasing life duration of the infected people warrant the need of moving the control programs and strategies from the concept of 'quantity and coverage' of care and services to ensuring the 'quality of the life' of the affected people, towards the 'evening' of the HIV epidemic. The existing care and support services for the HIV-exposed children were predominantly offered by the government HCFs; however, the services were mostly offered for the CLHIV who reached the HCFs for whom limited information (related to treatment) was maintained. The system neither kept a track nor maintained a record of the health status of the HIV-EU (other than that related to the EID implementation, till 18 months of age) and the CLHIV unregistered at ART centres. Thus, the differentials of the life, health, and nutritional outcomes between the HIV-EI and HIV-EU groups of children were not known. With cumulatively increasing registered CLHIV population over the years, the health care system tends to be skewed more and only towards providing ART to them; this tends to ignore the needs of the unregistered and the HIV-EU children. Hence it was important to increase the scope of the target population and services, to know their issues related to nutrition, health, and life, to plan to customize the services required.

Most of the studies hitherto included the CLHIV; some compared it with the HIV-uninfected children. Most of these studies came from Africa and were mostly smaller clinic-based studies which missed the unlinked children. Only a very few had taken up the concept of HIV exposure. By adopting this concept, it would cover the significant source of HIV infection among children (MTCT), include both the (majority of) CLHIV and HIV-

EU children, and facilitate the concept of mother-child pair into the future program delivery, if any planned.

As such, this prospective community-based cohort study of the HIV-exposed children (<5 years) was proposed between 1 December 2014 to 30 November 2017; it considered the maternal, pregnancy and child-related factors in addition to the HIV exposure, to study the nutrition, morbidity and mortality aspects in a single research framework. The study was planned to piggy-back on the simultaneous ICMR (Phase 2) study in Belgaum district, as the Belgaum district HIV scenario was in line with that of the Karnataka state and India, and the investigator was familiar with the ICMR study and the district, and its sample frame was more inclusive and representative of health care and HIV scenario of the district.

This thesis includes the detailed report of the study undertaken to explore the health and life outcomes (in terms of nutrition, growth and development, morbidity and mortality) of the HIV-exposed children in the Belgaum district, Karnataka state.

The first chapter describes the basic concepts, background, and epidemic of the HIV infection in the world, India and Karnataka in general, and among the children in particular. The available literature was also reviewed to profile the nutritional, morbidity, and mortality status of the children born exposed to maternal HIV infection, and to identify the gaps in the present knowledge domain.

The second chapter describes the need, conceptual framework, and the methodology (including analysis) of the research study. This chapter also includes the procedures adopted for data collection, database management, and definitions of the variables used in the study.

The chapters 3 to 5 details the results. The third chapter characterizes the family, mother, pregnancy, and children in the study with respect to HIV exposure. It also explores the natural course of HIV infection among HIV-exposed children in the cohort study.

The fourth chapter describes the results of patterns of growth and development (by anthropometry, and physical growth and social and language development), nutrition (by anaemia status, and vitamin/mineral deficiencies), morbidity (by acute and chronic morbidity, and by presence and frequency of acute morbidity) and mortality among the children, by age, gender and HIV status, both in age cross-sections and terms of changes over time.

The fifth chapter describes the results of key factors associated with each of the outcome indicators of growth and development (anthropometry), nutrition (anaemia), morbidity (acute morbidity) and HIV infection among the HIV-exposed children. This chapter also includes the results of the characteristics and causes of mortality among HIV-exposed children.

The sixth chapter sums up the results, discusses them, and concludes the thesis with policy recommendations.

CHAPTER 1

HIV SCENARIO: WORLD, INDIA, AND KARNATAKA

This chapter includes:

CHAPTER 1
HIV SCENARIO: WORLD, INDIA, AND KARNATAKA

1.1. The index case.

Historically, the first reported case of the Human Immunodeficiency Virus (HIV) infection in human beings had been from the Democratic Republic of Congo, African continent in 1959[1]. Since then, the infection had been reported from different parts of the world, at different points of the time in the 20th century. It turned out to be a full-fledged pandemic by the 1980s when the HIV infections had been reported from the United States of America[2,3], the United Kingdom[4], Italy[5], Brazil[6], Canada[7], Australia[8], Mexico[9], and China[10]. In India, the first case of HIV infection was reported from Chennai in 1986[11,12]. The first case of HIV infection in the Karnataka state was detected in 1988, from Soudatti in the Belgaum district[13], and this had been partly attributed due to the *'devadasi'* system (a practice of 'dedicating' women in the name of God at a Hindu temple in the locality, who later turned into commercial sex work) prevalent there[14].

1.2. HIV transmission and spread.

Ever since the index cases were reported, HIV infections continued to spread across the continents. By 1987, globally, the number of reported Acquired Immuno Deficiency Syndrome (AIDS) cases rose from 711 (from 16 countries in December 1982) to 59563 (from 123 countries by 09 Sep 1987)[15]. With the epidemic on the rise, the modes of transmission and the associated risk had been researched upon, identified, and updated over the past years (Table 1)[16]. Accordingly, the highest per-exposure risk for HIV transmission was associated with blood transfusion with the HIV contaminated blood (9250 per 10000 exposures), followed by the perinatal (mother-to-child) transmission (2260 per 10000 exposures). The risk of sexual transmission ranged from 138 to near-zero per 10000 exposures, based on the various types of exposure. However, the absolute quantum and the relative proportion of the various types of exposures in a community decided the community risk rates of HIV transmission. For example, in most of the communities, the

Table 1. Estimated per-exposure risk of the modes of HIV transmission[16].

Mode of transmission	Type of exposure	Risk per 10000 exposures
Parenteral	Blood transfusion with HIV contaminated blood	9250
	Needle sharing during injection drug use	63
	Percutaneous needle stick injury	23
Sexual	Receptive anal intercourse	138
	Insertive anal intercourse	11
	Receptive penile-vaginal intercourse	8
	Insertive penile-vaginal intercourse	4
	Receptive oral intercourse	Low
	Insertive oral intercourse	Low
Vertical	Mother-to-child, Perinatal	2260

number of blood transfusions and the share of blood transfusions where the donor blood was untested for HIV infection, within the total population in any geographical region were much less than those of sexual intercourse(s) happening in that region. Hence, even though the per-exposure risk was higher for the blood transfusions, the community or public health risk of HIV transmission through the blood transfusion was much lower than that through sexual intercourse. The situation was similar for the other modes of transmission also; thus, in other words, the sexual mode was the commonest mode of HIV transmission in almost all the countries.

Sexual transmission was a major reason for HIV infection among adults. Globally, the homosexual mode of HIV transmission was higher in the West, while the heterosexual mode was commoner in the East[17]. The main mode of HIV transmission among the Indian population was through unprotected heterosexual intercourse; as such, the HIV epidemic remained concentrated among High-Risk Groups (HRGs; include Female Sex Workers (FSW), Men who have Sex with Men (MSM), Injection Drug Users (IDU), truckers, and migrants) in the early phases, and gradually spread to the rural population and women[18-21].

On the other hand, the vertical (mother-to-child) transmission was the major reason for HIV infection among the children[22]. Like the other modes of transmission, the risk of Mother-To-Child Transmission (MTCT) also varied by the differences in the health care facilities (HCFs) and pregnancy-related practices followed in the countries. According to an early source of information, worldwide, the risk of MTCT stood at 25-45% during the pregnancy and childbirth, with an additional risk of 5-15% during the breastfeeding, in the settings without any intervention[23]. However, with the scaling up of the preventive strategies over time, these risks were significantly reduced. The MTCT was also identified as the main reason for HIV infection in children in India[24], but the quantum of risk was not certain. However, a longitudinal study had shown that the MTCT was 7.8% and 6.3% by 24 months' age of the child per 100 HIV positive pregnancies, with intervention strategies in an Indian district during 2011-2014[25] and 2014-2018[26] respectively.

Over and above the derived per-exposure risk rates, micro-factors like the presence of sexually transmitted illnesses (STI), acute and late-stage HIV infection, high viral loads, breastfeeding and mixed feeding, etc. were identified to increase the HIV transmission; while those like condom use, male circumcision, antiretroviral treatment, and pre-exposure prophylaxis decreased the transmission[16]. On a larger note, macro-factors like the globalization, industrialization, events of natural disasters and social disruption, migration, international travel, multiple sexual partners, violence against women, women trafficking, street children, drug trade, associated social stigma, etc. also contributed to the spread of the HIV infection across the globe[27]. Over the years, the mode of spread of the HIV infection followed the pattern of 'from-the-high-risk-to-the-low-risk' and 'from-urban-to-rural'[28]. In short, ever since the index cases, the modes of HIV transmission and the associated public health risk varied from country to country, based on the cultural, social, economic, and health care factors. This, in turn, had also been the logic for prioritizing, customizing and designing the policies, programs, and preventive measures to contain the HIV epidemic in the countries of the world. As such, different control strategies were rolled out in different parts of the world.

1.3. HIV prevention and control measures in India[1].

In India, to contain the HIV epidemic, the National AIDS Control Program (NACP) was launched in 1987, almost simultaneous with other countries of the world. The program had constituted a National AIDS Control Organization (NACO) in 1992. Through the NACP Phase I (1992), Phase II (1999), Phase III (2007) and Phase IV (2012), the strategies to curb HIV epidemic were implemented[29]. These control measures had evolved through various priorities and policies at different point of time[21,24].

The major HIV prevention and control strategies in India included[21]:

- Targeted Interventions (TI) among HRGs.
- Needle Syringe Exchange Program.
- Link Worker Schemes for the general community.
- Management of STI.
- Condom promotion.
- Blood transfusion and safety.
- Integrated Counseling and Testing Centers (ICTC).
- Care, Support, and Treatment (CST) for People Living with HIV (PLHIV).
- Early Infant Diagnosis (EID).
- Prevention of Parent-to-Child Transmission (PPTCT).
- HIV-Tuberculosis (TB) collaboration activities.
- Information, Education and Communication (IEC).

Of these, the PPTCT, EID, and CST were of prime significance to ensure infection-free children[24]. Even the strategies of each of these programs evolved. For example, the PPTCT program that started in 2004, mainly involved providing Anti-retroviral prophylaxis (ARV); which was perinatal administration of single-dose Nevirapine (sdNVP) to HIV-infected mother till 2012, followed by long-term Nevirapine (NVP) administration to

[1] This section is included here to introduce the concept of prevention (ARV) and treatment (ART), which would be discussed in the subsequent sections.

pregnant mothers from the fifth month of pregnancy to the end of breastfeeding period till 2014, followed by long term triple-drug ARV in the same time period till 2016, followed by lifelong triple-drug ARV for an ever-pregnant HIV-infected mother. At the same time, the HIV-exposed infant received sdNVP till 2012, followed by long term NVP (till 6 weeks of age) and Co-trimoxazole Prophylactic Therapy (CPT) (during 7 weeks to 6 months of age) post 2012[21,24].

The EID program commenced in 2010 in which the children born to the HIV-infected mothers (HIV-exposed children) were tested for the HIV infection at the ages of 6 weeks, and 6, 12 and 18 months. The first three tests were virological tests based on the Deoxy ribo Nucleic Acid-(DNA) Polymerase Chain Reaction (PCR) technology, employed on the blood samples collected as Dried Blood Spot (DBS). The last HIV test (at 18 months of age) was an anti-body based test (ABT)[30]. These tests were intended to identify the HIV infection in the early life of the HIV-exposed children, to initiate them on the drugs for treatment.

The CST program commenced, with the establishment 8 Anti Retro-viral Therapy (ART) centres to roll out the first-line treatment for HIV/AIDS in 2004, and was scaled up post-2006. As of September 2016, this grew to a network of 528 ART centres, 1108 Link-ART centres and 44 Facility Integrated ART centres in India[21]. The Government of Karnataka had rolled out the NACP through the 470 stand-alone and 2433 functional ICTCs, 64 ART centres, 194 Link-ART centres, and 104 Link-Plus ART centres[31-34]. The list of the HIV care facilities under the District AIDS Prevention and Control Unit (DAPCU) in the Belgaum district in 2018 is given in table 2[35].

As the HIV infection in the Karnataka state was long-standing and in line with the national scenario, the state was a pioneer in India in experimenting the strategies and establishing the systems for the prevention, care and support services for the PLHIV[36]. For example, the Government of Karnataka had initiated reimbursing the cost of travel at the rate of Rs. 0.80 per kilometer travelled, to facilitate the ART drug collection by the PLHIV on time, every month, in January 2013, and the Children affected by AIDS (CABA) were entitled

Table 2. HIV care facilities in the Belgaum district, 2018[35].

Sl. No.	Name of facilities	No. of facilities
1	Stand-alone ICTC	31
2	Mobile Stand-alone ICTC	1
3	Public-Private Partnership Stand-alone ICTC	1
4	Functional-ICTC	133
5	Public-Private Partnership Functional-ICTC	10
6	Non-Public Private Partnership Functional-ICTC	1
7	EID Dry Blood Spot (DBS) Centre	36
8	ART Centres	6
9	Link ART Centres and Link-Plus ART centres	11
10	Designated STI/RTI Clinics	4
11	State Referral Laboratory	1
12	Designated Microscopy Centre	46
13	Blood Bank	6
14	Co-located Designated Microscopy Centre	29
15	Blood Storage Centre	11
16	Exclusive FSW Targeted Intervention (TI) Non-Government Organization (NGO)	2
17	Exclusive MSM TI NGO	1
18	Core Composite (FSW & MSM) TI NGO	1
19	Migrant TI NGO	1
20	Trucker TI NGO	1
21	Care and Support Centre	3
22	District Positive Network	1
23	Red Ribbon Club	86

for financial support of Rs. 750 per month. Table 3 enlists the welfare schemes offered by the Government of Karnataka for the PLHIV[34]. This had, in turn, contributed to enhanced control of the HIV infection in the state in the yesteryears.

Table 3. Welfare schemes for the PLHIV, Government of Karnataka[34].

Sl. No.	Scheme	Benefit	Beneficiary	Beneficiaries as in 2018
1	Anna Anthyodaya	Food: 35 kg of rice/wheat and sugar	HIV-infected family	34786
2	Children Affected by AIDS (CABA)	Financial support: Rs. 650-750 per month	HIV-infected and affected children	17518
3	Rajiv Gandhi Housing	House (Free)	HIV-infected person	2344
4	Mythri	Pension: Rs. 500 per month	Transgender/ Transsexual	999
5	Free testing	Blood tests and treatment (Free)	HIV-infected person	180002
6	Right to Education Act	Admission in private/ government schools (Free)	HIV-infected and affected children	622
7	Chetana	Refundable loan of Rs. 20000 for small business	FSW	1005
8	Higher education scholarship	Rs. 23000 per year	HIV-infected and affected children	25
9	Dhanasree Yojana	Refundable loan of Rs. 50000 with subsidy 20%.	HIV-infected women	1000
10	Free legal service	Free legal service at ART centres	HIV-infected and affected people	137

1.4. The population[2].

The global population had increased from 5288 million in 1990 to 7530 million in 2017 (Table 4)[37]. During the same period, India had retained 16-18% of the world population, the Karnataka state had retained nearly 5% of the India population, and the Belgaum district had retained nearly 8% of the Karnataka population[38].

The share of the population of children less than 15 years (under-15 children) among the total global population reduced from 32.89 to 25.93% between 1990 and 2017. A similar trend was also noted in India, when the share of under-15 children population had dropped from 37.93% to 27.78%, during the same period. However, India had consistently retained 19-20% of the world's children below 15 years[37]. The Karnataka state had retained nearly 5% of the India under-15 population, and the Belgaum district had retained nearly 8% of the Karnataka under-15 population[38].

1.5. The HIV epidemic[3].

1.5.1. HIV-infected people[4].

The trends in the number and share of HIV-infected/affected people between 1990 and 2017 are shown in table 4 and figures 1-6[20,37-39,41-43].

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[2] The HIV/AIDS epidemic could be better understood with help of population-level denominators, and hence this section was included here.

[3] The available data was compiled from various sources and is presented in Annexure 1 and 2, and hence the tables and figures included in this section would be a subset of/derived from the larger data.

[4] The UNAIDS[39] uses an Estimation and Projection Package (EPP) to estimate country-level figures on HIV/AIDS epidemic, based on fitting observed HIV surveillance data on prevalence[40]. The numbers/estimates thus generated and published were mainly used in the discussions in this section.

Table 4. Number and share of the people and children living with HIV in the total population, World, India and Karnataka, 1990-2017[20,37-39,41-43].

Criteria	Region	Description	1990	1997	1998	1999	2002	2005	2007	2008	2010	2016	2017
Total Population (All ages)[37,38]	Global	N (million)	5288	5879	5961	6041	6280	6520	6683	6766	6932	7444	7530
	India	Share wrt global total population	16.45	16.96	17.04	17.12	17.35	17.55	17.65	17.69	17.76	17.79	17.78
	Karnataka	Share wrt India total population[#]	5.07	4.97	4.96	4.95	4.92	4.90	4.89	4.89	4.89	4.96	4.98
	Belgaum	Share wrt Karnataka total population[#]	7.97	7.97	7.97	7.97	7.86	7.81	7.78	7.77	7.74	7.75	7.73
Child Population (0-14 years)[37,38]	Global	Share wrt global total population	32.89	31.18	30.87	30.52	29.30	28.03	27.46	27.22	26.82	26.05	25.93
	India	Share wrt India total population	37.93	35.95	35.57	35.16	33.99	32.79	32.07	31.70	30.89	28.20	27.78
		Share wrt global child population	18.98	19.56	19.64	19.73	20.13	20.52	20.61	20.60	20.45	19.25	19.05
	Karnataka	Share wrt India child population[#]	4.86	4.62	4.61	4.60	4.61	4.76	4.86	4.91	5.05	4.61	4.70
	Belgaum	Share wrt Karnataka child population[#]	8.01	8.26	8.30	8.34	8.41	8.36	8.33	8.31	8.28	8.45	8.43
PLHIV (All ages)[20,39,42]	Global	N (million)	8.3	23.3	25	26.3	28.9	30.1	30.8	31.3	32.4	36.3	36.9
		Share wrt global total population	0.16	0.40	0.42	0.44	0.46	0.46	0.46	0.46	0.47	0.49	0.49
	India	N (million)	0.26	2.8	3	3.1	3.1	2.8	2.5	2.4	2.3	2.2	2.1
		Share wrt India total population	0.03	0.28	0.30	0.30	0.28	0.24	0.21	0.20	0.19	0.17	0.16
		Share wrt global PLHIV population	3.13	12.02	12.00	11.79	10.73	9.30	8.12	7.67	7.10	6.06	5.69

Criteria	Region	Description	1990	1997	1998	1999	2002	2005	2007	2008	2010	2016	2017
	Karnataka	N (million)							0.25	0.23	0.21	0.19	
		Share wrt Karnataka total population							0.42	0.40	0.36	0.30	
		Share wrt India PLHIV population							9.78	9.76	9.52	8.86	
PLHIV (Adults, 15+ years)[39,41,43]	Global	Share of PLHIV (Adults, 15+ years) wrt global PLHIV population	96.14	94.85	94.80	94.30	93.77	93.02	93.18	93.29	93.52	94.77	95.12
	India	Share of PLHIV (Adults, 15+ years) wrt India PLHIV population	98.69	97.96	97.77	97.55	96.94	96.43	96.00	95.96	96.17	97.05	97.10
	Karnataka	Share of PLHIV (Adults, 15+ years) wrt Karnataka PLHIV population[$]							94.29	94.03	93.04	94.06	
PLHIV, Male: Female (Adults, 15+ years)[39]	Global	Ratio	55.0: 45.0	50.7: 49.3	50.4: 49.6	50.0: 50.0	49.5: 50.5	49.3: 50.7	49.1: 50.9	49.0: 51.0	48.8: 51.2	48.0: 52.0	47.9: 52.1
	India	Ratio	69.2: 30.8	60.7: 39.3	62.1: 37.9	63.3: 36.7	60.0: 40.0	61.5: 38.5	62.5: 37.5	60.9: 39.1	59.1: 40.9	57.0: 42.9	57.1: 42.9
CLHIV (<15 years)[39,41,42,43]	Global	N (million)	0.32	1.2	1.3	1.5	1.8	2.1	2.1	2.1	2.1	1.9	1.8
		Share wrt global child (<15 year) population	0.02	0.07	0.07	0.08	0.10	0.11	0.11	0.11	0.11	0.10	0.09
		Share wrt global PLHIV population	3.86	5.15	5.20	5.70	6.23	6.98	6.82	6.71	6.48	5.23	4.88
	India	N (thousands)	3.4	57	67	76	95	100	100	97	88	65	61

Criteria	Region	Description	1990	1997	1998	1999	2002	2005	2007	2008	2010	2016	2017
		Share wrt India child (<15 year) population	0.00	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02
		Share wrt India PLHIV population	1.31	2.04	2.23	2.45	3.06	3.57	4.00	4.04	3.83	2.95	2.90
		Share wrt global CLHIV population	1.06	4.75	5.15	5.07	5.28	4.76	4.76	4.62	4.19	3.42	3.39
	Karnataka	N[$] (thousands)							13.95	13.98	15.24	11.58	
		Share wrt Karnataka child (<15 years) population							0.08	0.08	0.08	0.07	
		Share wrt Karnataka PLHIV population							5.71	5.97	6.96	5.94	
		Share wrt India CLHIV population							13.95	14.42	17.32	17.82	
AIDS orphans[39]	Global	N (millions)	1	5.3	6.3	7.4	10.8	14	15.2	15.5	15.3	12.8	12.2
	India	N (millions)	0.007	0.22	0.31	0.43	0.85	1.3	1.4	1.5	1.4	1	0.93
HIV-EU children[39]	Global	N (millions)	1.1	4.7	5.5	6.2	8.5	10.4	11.5	11.9	12.8	14.5	14.8
	India	N (millions)	0.008	0.18	0.23	0.27	0.39	0.47	0.5	0.5	0.49	0.33	0.32

[#]Calculated data for non-Census years based on source 38. [$]Calculated value for Karnataka state (based on source: 41 for 2010, 2011; 42 for 2007, 2016). Note: 1. Values mentioned as less than 0.1 and 1000 in the database were given the dummy values of 0.05 and 500 (respectively) in the tables and figures. 2. All the shares are mentioned in percentage (%). Sources: 20 (for Karnataka 2007-2015 data), 37, 38 (for Karnataka, Belgaum data), 39, 41 (for Karnataka 2010-2011 data on CLHIV, PLHIV numbers; Karnataka 2007-2011 data on PPTCT; India 2007-2009 data on PLHIV-ART), 42 (for Karnataka 2007, 2016 data), 43.

People Living with HIV/AIDS (PLIHV) included HIV-infected people of all ages unless otherwise specified. Between 1990 and 2017, the number of PLHIV in the world increased steadily from 8.3 to 36.9 million (Fig. 1)[39], even though the progress slowed post-2000, and their share within the total population increased from 0.16% to 0.49%.

In the same period, the number of PLHIV in India also increased; however, the increase was not steady as observed for the world PLHIV population. It increased from 0.26 million in 1990 to 3.1 million in 1999-2002 and then declined to 2.1 million in 2017 (Fig. 1)[39]. Similarly, the share of PLHIV in the total Indian population increased from 0.03% in 1990 to 0.30% in 1998 and then decreased to 0.16% in 2017 (Fig. 2). Across this trend, India had harbored 3.13%, 12.02% and 5.69% of the world's PLHIV in 1990, 1997, and 2017, respectively (Fig. 3).

The limited data available for the Karnataka state from 2007 to 2016, which coincided with the declining trends in the India PLHIV population, showed that the number of PLHIV decreased from 244500 to 195000 (Fig. 1)[20,42]. The share of Karnataka's PLHIV population within the total Karnataka state population also decreased from 0.42% to 0.30% during this period (Fig. 2). Across the years, the state had retained 9-10% of PLHIV in the country. The data showed that the number of PLHIV and share of PLHIV in the total population was increasing but a slower pace in the world, but they had already started declining in India and the Karnataka state.

The adult (15+ year) PLHIV formed 96.14% of all the world's PLHIV in 1990, and the share reduced to 93.02% till 2005 and again increased to 95.12% in 2017[39]. In India, the share of the adult PLHIV was more than that of the world; but, the trend was similar. It reduced from 98.69% in 1990 to 96.00% in 2007 and then increased to 97.10% in 2017[41]. A similar trend could be inferred in the Karnataka state also, with the limited data available[42,43]. It ranged 93-94% between 2007 and 2016, with the initial decreasing trend reversing in 2010. Thus it could be inferred that a lesser number of children were getting HIV-infected across all the regions post-2010.

Fig. 1. PLHIV population by geographic region, 1990-2017.

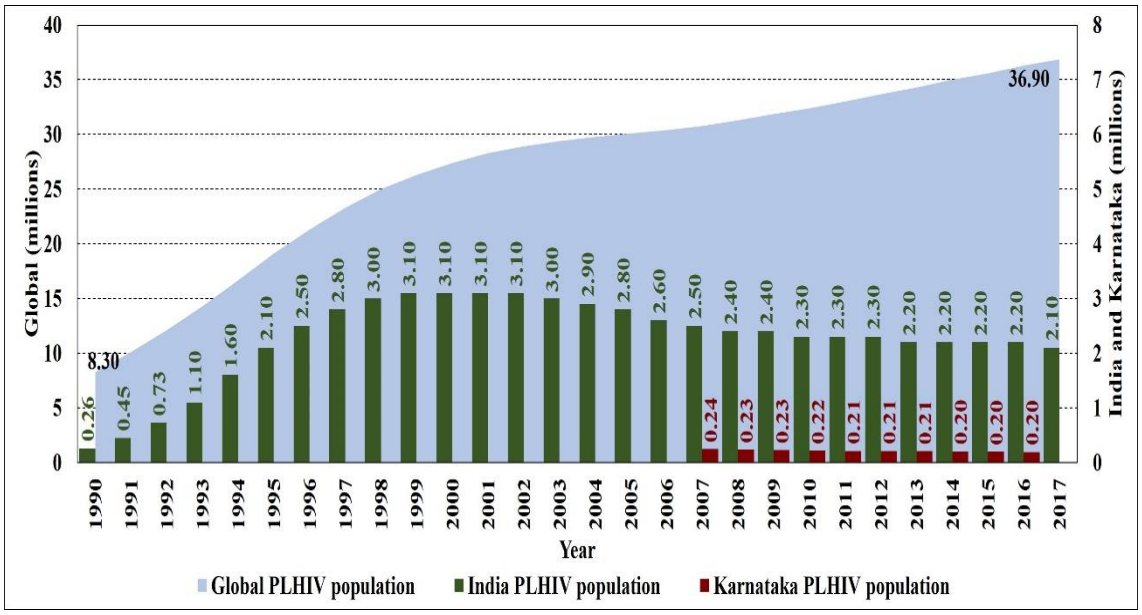
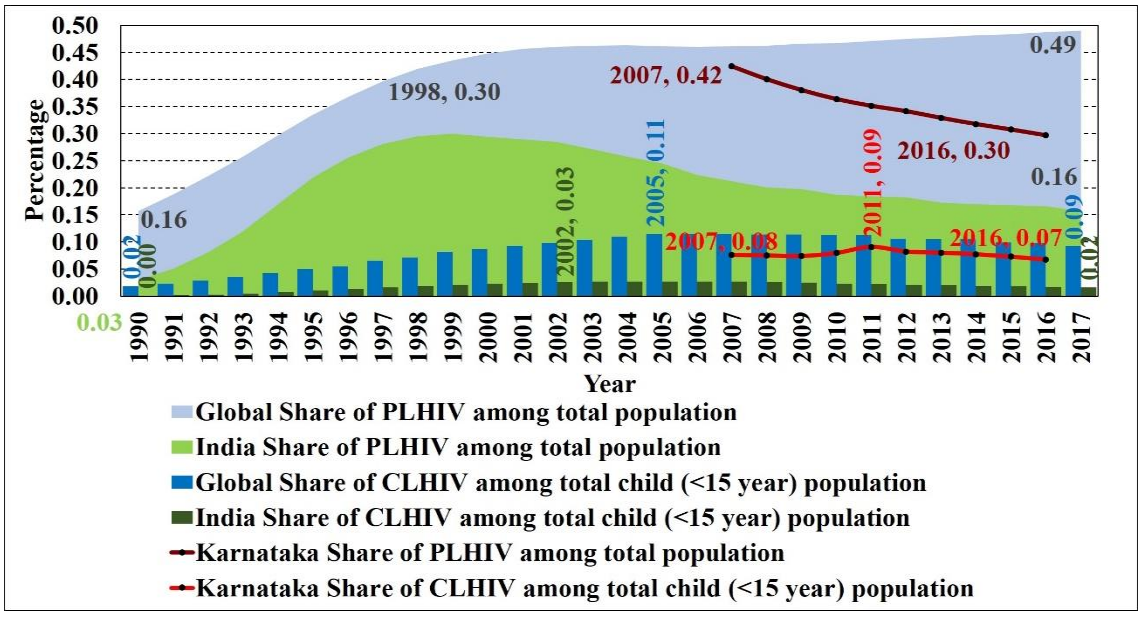
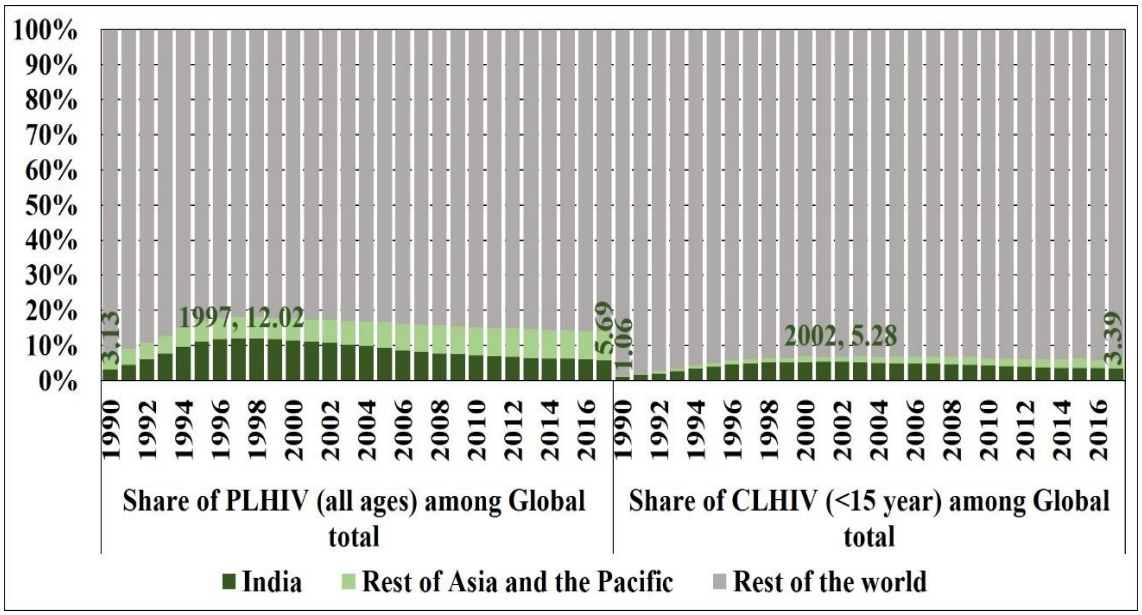


Fig. 2. Share of the HIV-infected people among the population, by age and geographical region, 1990-2017.



Between 1990 and 2017, the share of males among the adult (15+ year) PLHIV decreased from 55.0% to 47.9% globally, and from 69.2% to 57.1% in India[39]. This trend implied that there was an increasing number of women getting HIV-infected over the years in all the regions.

Fig. 3. Geographical share of the HIV-infected people among global total, by age, 1990-2017.



Based on the various scenarios of HIV infection, children were classified as 'infected children' (meant that the children were HIV-infected or were Children Living with HIV/AIDS or CLHIV)[44], 'exposed children' (when the mother was known to be HIV positive while being pregnant with the child, so that the children were born exposed to maternal HIV infection in utero)[45], 'affected children' (meant that any of the family members – father, mother or siblings – of the child were HIV-infected) and 'AIDS orphans' (when the children were rendered orphans due to the death of mother or both parents further to their HIV infection)[46]. As such, the HIV-exposed and HIV affected children and AIDS-orphans could be HIV-infected or uninfected.

Children Living with HIV/AIDS (CLHIV) included HIV-infected children <15 years of age unless otherwise specified. The number of CLHIV in the world increased from 0.32 million in 1990 to 2.1 million in 2005-2011 and then declined to 1.8 million in 2017 (Fig. 4)[39]. Their share within the total child (<15 years) population also increased from 0.02% to 0.11% in 1990-2004, remained so till 2013, and then decreased to 0.09% in 2017 (Fig. 2). Thus, the world's CLHIV formed 3.86% of all the PLHIV in the world in 1990, a peak share of 6.98% in 2005, and 4.88% in 2017 (Fig. 5).

Fig. 4. CLHIV (<15 years) population by geographical region, 1990-2017.

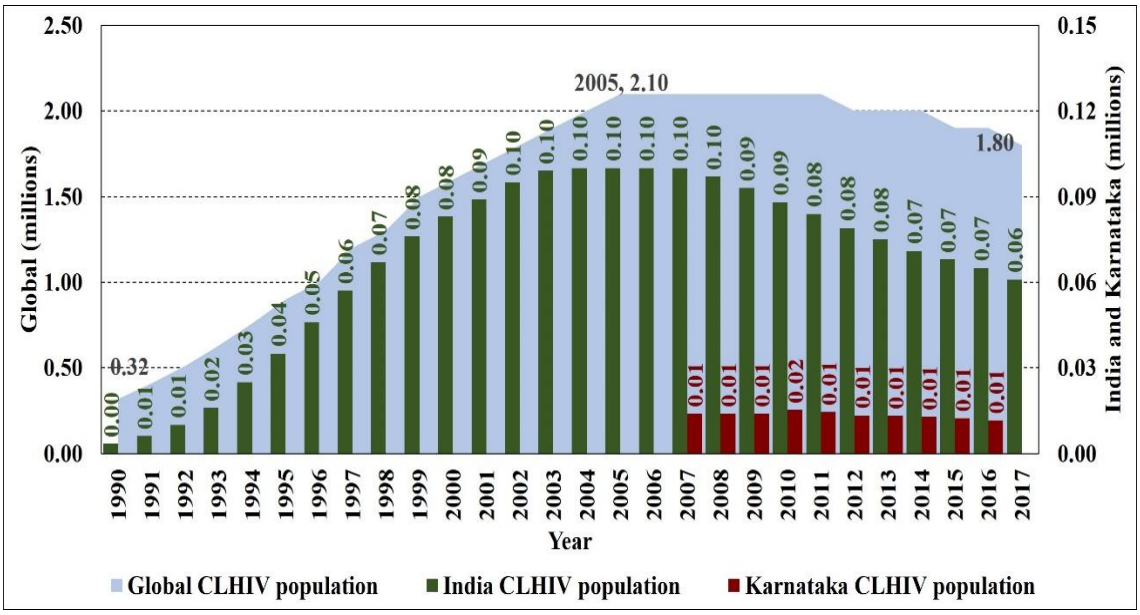
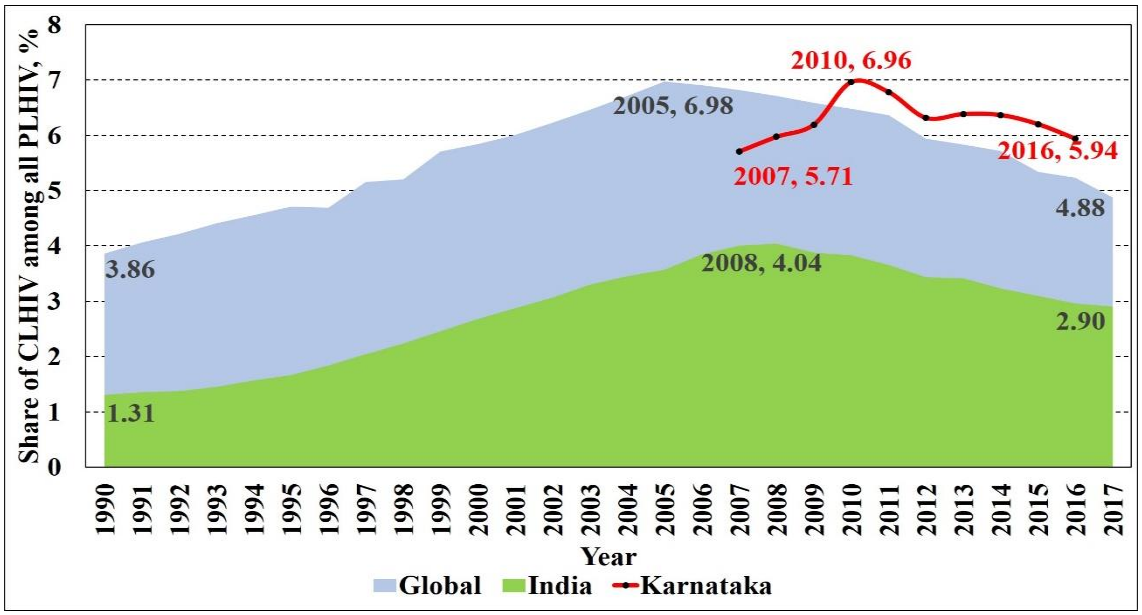


Fig. 5. Share of children (<15 years) among the HIV-infected population by geographic region, 1990-2017.



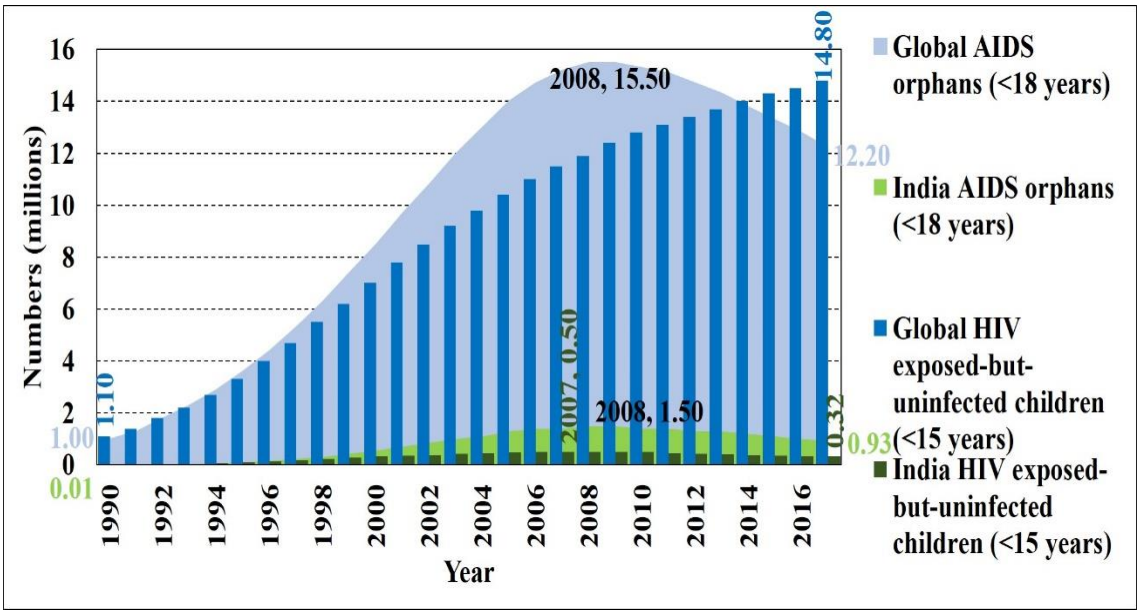
In the same period, the number of CLHIV in India also increased from 3400 to 1 lakh in 1990-2004, remained so till 2007 and then declined to 61000 in 2017 (Fig. 4)[39]. The share of India's CLHIV in both the total child (<15 years) population and the total PLHIV population in India was lesser than that of the world in the corresponding years. Thus,

similarly, the share of CLHIV in the total Indian child (<15 years) population increased from near-zero in 1990 to 0.02% in 2017, with a flattened peak at 0.03% between 2002 and 2008 (Fig. 2). As such, India's CLHIV formed 1.31% of all PLHIV in India in 1990, a peak share in 4.04% in 2008, and 2.90% in 2017 (Fig. 5). India had harbored the least (1.06%) and the maximum (5.28%) share of the world's CLHIV in 1990 and 2002 respectively, to revert to 3.39% in 2017 (Fig. 3).

The data available on the CLHIV in the Karnataka state was limited to 2007-2016, which coincided with the peaks and subsequent declining trends in India and the world[42,43]. This had put the number of CLHIV increased from 13953 in 2007 to 15239 in 2010, which further decreased to 11582 in 2016 (Fig. 4). The share of the Karnataka's CLHIV population within the total Karnataka child (<15 years) population remained at 0.07-0.08% in 2007-2016, which was higher than Indian, but lower than global shares (Fig. 2). The share of the Karnataka's CLHIV population with respect to the total PLHIV population in the state was parabolic: it was 5.71% in 1990, highest (6.96%) in 2010 and reversed to 5.94% in 2016 (Fig. 5). Across the years, the Karnataka state had retained 14-18% of the CLHIV in the country, much higher than the Indian average. In short, it could be inferred that the number and the share of the CLHIV in the total population were decreasing in all the regions. Moreover, the state of Karnataka had a higher proportion of children among the HIV-infected people, which was about a sixth of all those CLHIV in India in 2017.

Globally, the number of AIDS orphans (<18 years) increased from 1 to 15.5 million in 1990-2008 and then reverted to 12.2 million in 2017 (Fig. 6.). Similarly, in India, during the same period, this increased from 7 thousand to 15 lakh and then decreased to 9.3 lakhs. However, the HIV-exposed-but-uninfected (HIV-EU) children increased steadily from 1.1 to 14.8 million globally, and from 8 to 32 thousand in India, between 1990 and 2017[39]. This signaled that there were HIV positive pregnancies happening in the country and globally, but the children born were increasingly tested HIV negative; and that the burden of orphan care due to HIV infection, an aftermath of the epidemic peak, in the country and the world was higher.

Fig. 6. AIDS orphans and HIV-EU children by geographical region, 1990-2017.



1.5.2. The new HIV infections.

The trends in the new HIV infections among the various age groups between 1990 and 2017 are shown in table 5 and figures 7-12[20,39,42,43].

The new HIV infections included the new HIV infections among the people of all ages unless otherwise specified. Between 1990 and 1995, the number of new HIV infections in the world increased from 1.9 to 3.4 million and then decreased to 1.8 million in 2017 (Fig. 7)[39]. The share of the new HIV infections within the total global population increased from 0.04% in 1990 to 0.069% in 1995 and then dropped to 0.02% in 2017 (Fig. 8). Also, the share of the new infections with respect to the global PLHIV population dropped steadily from 22.89% in 1990 to 4.88% in 2017 (Fig. 9).

In the same period, similarly, the number of the new HIV infections in India also increased from 0.13 (1990) to 0.55 (1995) million, and then reduced to 0.08 million (Fig. 7)[39]. The share of the new HIV infections in the total Indian population increased from 0.01% in 1990 to 0.06% in 1998, and then decreased back to 0.01% in 2017 (Fig. 8). Also, the share of the new infections with respect to the India PLHIV population dropped

Table 5. Number and share of the new HIV infections, World, India, and Karnataka, 1990-2017[20,39,42,43].

Criteria	Region	Description	1990	1995	1996	1997	1999	2002	2003	2007	2016	2017
New HIV infections (All ages)[20,39]	Global	N (million)	1.9	3.4	3.4	3.2	2.9	2.6	2.6	2.4	1.9	1.8
		Share wrt global total population	0.04	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02
		Share wrt global PLHIV population	22.89	17.80	15.96	13.73	11.03	9.00	8.84	7.79	5.23	4.88
	India	N (million)	0.13	0.55	0.51	0.40	0.25	0.15	0.13	0.11	0.09	0.08
		Share wrt India total population	0.01	0.06	0.05	0.04	0.02	0.01	0.01	0.01	0.01	0.01
		Share wrt India PLHIV population	50.00	26.19	20.40	14.29	8.06	4.84	4.33	4.40	4.05	4.00
		Share wrt global new infections	6.84	16.18	15.00	12.50	8.62	5.77	5.00	4.58	4.68	4.67
	Karnataka	N[!]								7508	2261	
		Share wrt Karnataka total population								0.01	0.00	
		Share wrt Karnataka PLHIV population								3.07	1.16	
		Share wrt India new infections								6.83	2.54	
New HIV infections (Adults, 15+ years)[39,42,43]	Global	Share wrt global new infections	92.11	90.29	89.41	87.81	85.52	83.85	84.23	85.83	90.53	90.00
	India	Share wrt India new infections	98.08	96.55	95.49	94.00	90.80	88.00	87.69	91.00	95.06	95.60
	Karnataka	Share wrt Karnataka new infections								77.45	87.97	
New HIV infections, Male:	Global	Ratio	53.3: 46.7	50.0: 50.0	50.0: 50.0	48.3: 51.7	48.0: 52.0	50.0: 50.0	52.4: 47.6	50.0: 50.0	51.2: 48.8	53.1: 46.9

Criteria	Region	Description	1990	1995	1996	1997	1999	2002	2003	2007	2016	2017
Female (adults, 15+ years)[39]	India	Ratio	69.2: 30.8	61.8: 38.3	60.8: 39.2	60.0: 40.0	56.0: 44.0	58.7: 41.3	61.5: 38.5	60.9: 39.1	60.7: 39.3	59.5: 40.5
New HIV infections (Children, <15 years)[39]	Global	N (thousands)	150	330	360	390	420	420	410	340	180	180
		Share wrt global child (<15 year) population	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
		Share wrt global CLHIV population	46.88	36.67	36.00	32.50	28.00	23.33	21.58	16.19	9.47	10.00
		Share wrt global new infections	7.89	9.71	10.59	12.19	14.48	16.15	15.77	14.17	9.47	10.00
	India	N (thousands)	2.5	19.0	23.0	24.0	23.0	18.0	16.0	9.9	4.4	3.7
		Share wrt India child (<15 year) population	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
		Share wrt India CLHIV population	73.53	54.29	50.00	42.11	30.26	18.95	16.16	9.90	6.77	6.07
		Share wrt India new infections	1.92	3.45	4.51	6.00	9.20	12.00	12.31	9.00	4.94	4.40
		Share wrt global new child infections	1.67	5.76	6.39	6.15	5.48	4.29	3.90	2.91	2.44	2.06
	Karnataka	N[!]								1693	272	
		Share wrt Karnataka child (<15 years) population								0.01	0.00	
		Share wrt Karnataka CLHIV population								12.13	2.35	
		Share wrt Karnataka new infections								22.55	12.03	

Criteria	Region	Description	1990	1995	1996	1997	1999	2002	2003	2007	2016	2017
		Share wrt India new child infections								17.10	6.18	

[!]Calculated value based on source 42. Note: 1. Values mentioned as less than 0.1 and 1000 in the database were given the dummy values of 0.05 and 500 (respectively) in the tables and figures. 2. All the shares are mentioned in percentage (%). Sources: 20 (only for Karnataka 2007-2015 data), 39, 42 (only for Karnataka 2007 and 2016 data), 43.

Fig. 7. New HIV infections among all ages by geographical region, 1990-2017.

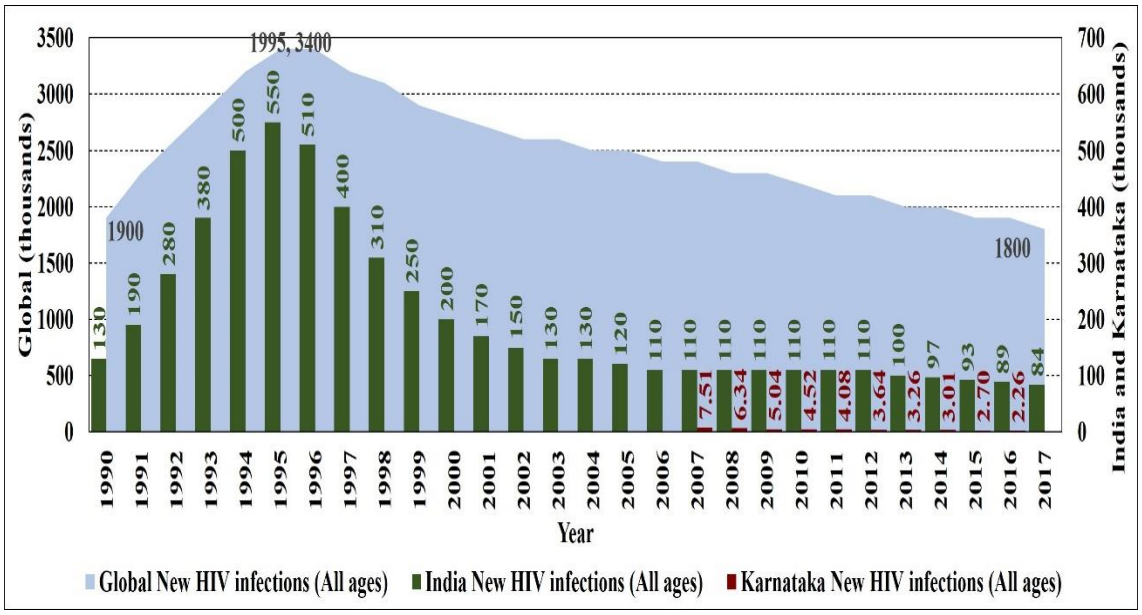
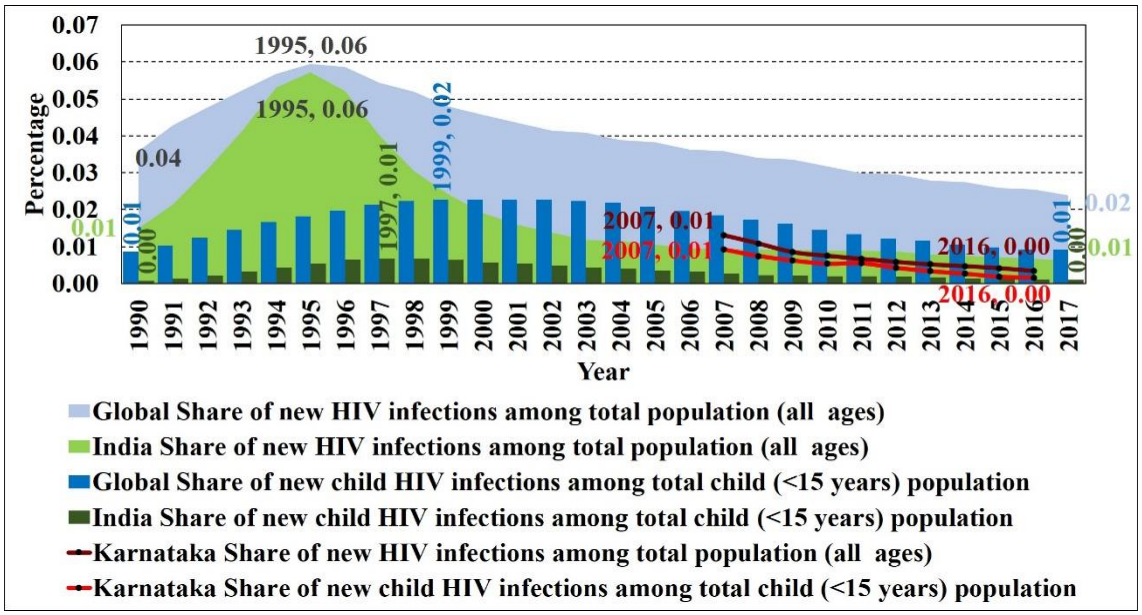


Fig. 8. Share of the new HIV infections among the population, by age and geographical region, 1990-2017.



steadily from 46.88% in 1990 to 4.00% in 2017 (Fig. 9). Across this trend, India had harbored 6.84%, 16.18%, and 4.67% of the world's new infections in 1990, 1995, and 2017, respectively (Fig. 10).

Fig. 9. Share of the new HIV infections with respect to the HIV-infected population, by age and geographical region, 1990-2017.

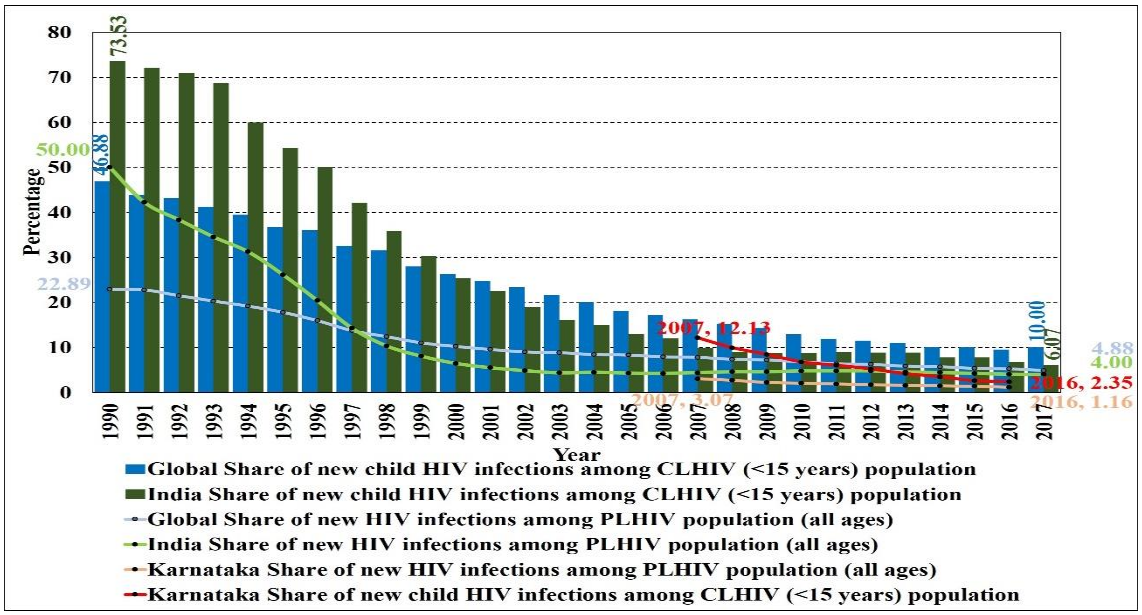
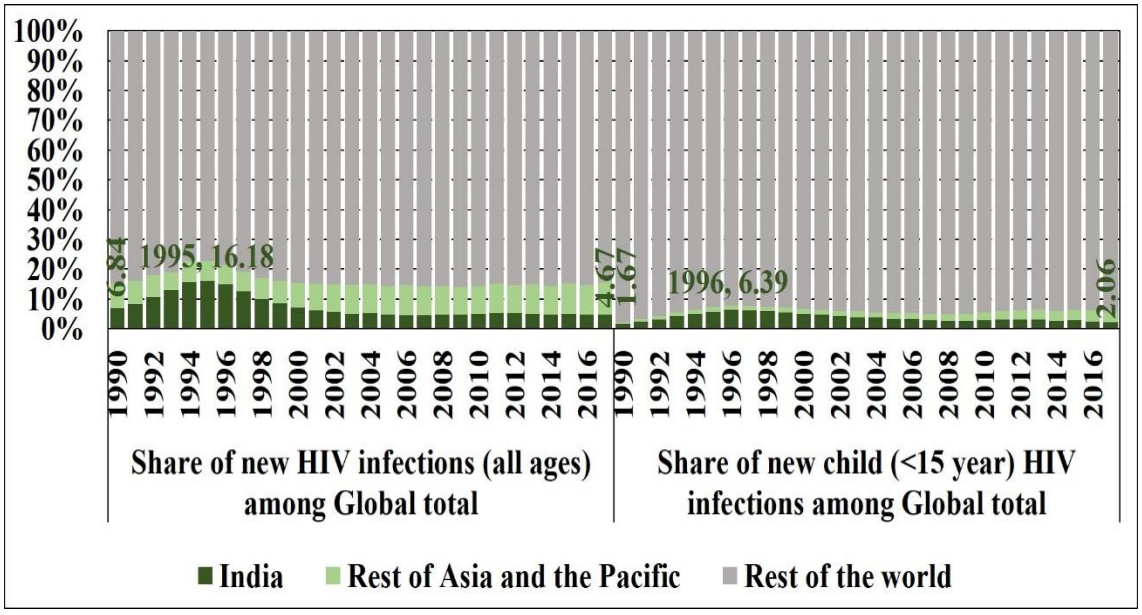


Fig. 10. Geographical share of the new HIV infections among the global total, by age, 1990-2017.



The data available was limited for the Karnataka state from 2007 to 2016, which coincided with the declining trends in the global and India new HIV infections. It showed that the number of new HIV infections decreased from 7508 to 2261 (Fig. 7)[20,42]. The share of the

Karnataka's new HIV infection with respect to the total Karnataka state population, and total PLHIV population in the state, also decreased from 0.01% to near-zero and from 3.07% to 1.16% respectively, during this period (Fig. 8 and 9). The state of Karnataka had diminishingly harbored 6.83% of India's new HIV infection in 2007 to 2.54% of them in 2016. The data showed that the number of new infections and its share in the total population had declined from 1995 in India and the world, and the share of the new infections with respect to the PLHIV numbers declined from 1990. In the Karnataka state, the new infections and its share with respect to the total and PLHIV populations showed a decline, ever since the data was available (2007).

The new HIV infections among the adults (15+ year) formed 92.11% of all the world's new HIV infections in 1990, and the share reduced to 83.85% (2002) and again increased to 90.0% in 2017[39]. In India, the share of the adult new HIV infections was more than that of the world; but, the trend was similar. It reduced from 98.08% in 1990 to 97.69% in 2003 and then increased to 95.60% in 2017[41]. A similar trend could be inferred in the Karnataka state also, with the limited data available[42,43]. It ranged between 77.45% in 2007 to 87.97% in 2016, with some fluctuations in between. Thus, a lesser number of children were getting newly infected with HIV across all the regions post-2002-2003.

Between 1990 and 2017, there was no much difference by gender in case of the global adult (15+ year) new HIV infections; but the share of the males was consistently higher in India across the years, and was of the range 60-70%[39].

The new child HIV infections among children implied those among the children <15 years of age unless otherwise specified. The number of new child HIV infections in the world and India followed a parabolic pattern. In the whole world, it increased from 0.15 million in 1990 to 0.42 million in 1999-2002 and then declined to 0.18 million in 2017 (Fig. 11)[39]. Their share within the total child (<15 years) population also increased from 0.01% (1990) to 0.02% in 1999, remained so till 2009, and then decreased to 0.01% in 2017 (Fig. 7). Between 1990 and 2017, the share of the new child HIV infections among the global CLHIV population decreased consistently from 46.88% to 10.00% in 2017 (Fig. 8). Also,

Fig. 11. New child (<15 years) HIV infections by geographical region, 1990-2017.

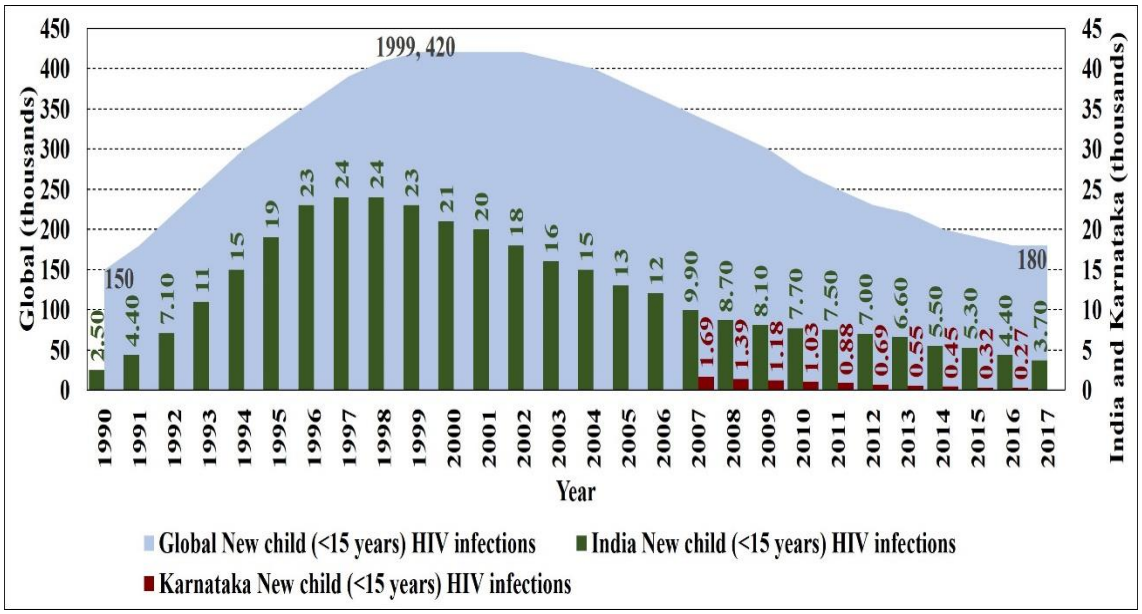
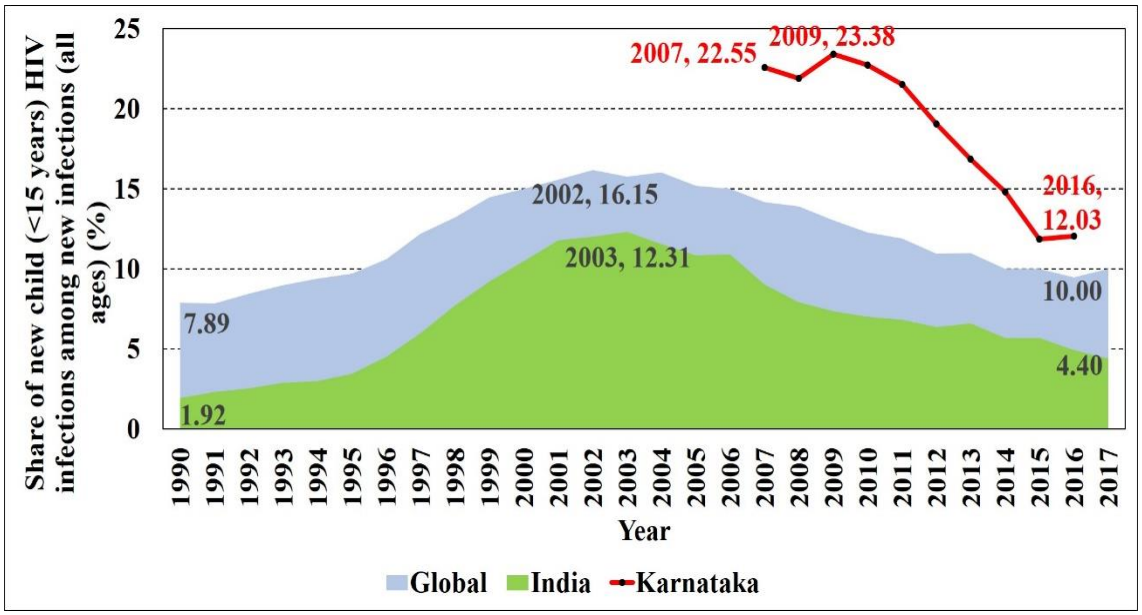


Fig. 12. Share of the new child (<15 years) HIV infections among the new HIV infections (all ages), by geographical region, 1990-2017.



the world's new child HIV infections formed 7.89% of all the new infections in the world in 1990, a peak share in 16.15% in 2002, and 10.00% in 2017 (Fig. 12).

In the same period, the number of the new child HIV infections in India also increased from 2500 in 1990 to 24000 in 1997 and 1998, and then declined to 3700 in 2017 (Fig. 11)[39]. The share of India's new child infections among the total child (<15 years) population was lesser than that of the world in the corresponding years. This, in a similar fashion, increased from near-zero in 1990 to 0.01% in 1995, and remained so till 2001, and declined back to near-zero subsequently (Fig. 8). The share of the new child infections to the India CLHIV population also declined consistently from 73.53% (1990) to 6.07% (2017) (Fig. 9). The higher HIV detection among children could have pushed up this share initially, which eventually got saturated and settled down the figures to less than the global average. India's new child infections formed 1.92% of all the new HIV infections in India in 1990, a peak share in 12.31% in 2003, and 4.40% in 2017 (Fig. 12), much lower than the global figures. Across this trend, India had harbored the least (1.67%) and the maximum (6.39%) share of the world's new child infections in 1990 and 1996 respectively, to revert to 2.06% in 2017 (Fig. 10).

Only limited data available was on new child infections for the Karnataka state (from 2007 to 2016), and this coincided with the declining trends in India and the world[42,43]. This had put the number of the new child HIV infections decreasing from 1690 in 2007 to 270 in 2017 (Fig. 11). The share of the Karnataka's new child infections within the total Karnataka child (<15 years) population remained at 0.01% in 2007-2011 and then reverted to near-zero subsequently, in line with India's, but lower than global shares (Fig. 8). The share of the Karnataka's new child infections with respect to the total CLHIV population in the state decreased from 12.13% in 2007 to 2.35% in 2016, in line with India and global trends (Fig. 9). However, the share of new child HIV infections among all the new infections within the Karnataka state was higher than the global and India figures throughout the years for which the data was available. The new infections among children constituted 22-23% of all the new infections in 2007-2009 in the Karnataka state, and this had dropped to 12.03% in 2016. The Karnataka state had retained 17.1% of the new HIV infections of the country in 2007, which reduced to 6.18% in 2017, both much higher than the India average. In short, it could be inferred that the number of the new child HIV infections and its share in the total population were decreasing in all the regions; India started experiencing the

decline before the world did, chronologically. Moreover, the state of Karnataka had a higher proportion of the new child HIV infections among all the new infections, and a higher concentration of the new child infections within its territory, compared to the global and India figures even in 2016.

1.5.3. HIV/AIDS-related deaths.

The trends in the HIV/AIDS-related deaths among various age groups between 1990 and 2017 are shown in table 6 and figures 13-18[39,42,43].

AIDS deaths included those among the people of all ages unless otherwise specified. Between 1990 and 2003, the number of the AIDS deaths in the world increased from 0.29 to 1.9 million, remained so till 2006, and then decreased to 0.94 million in 2017 (Fig. 13)[39]. The share of the AIDS deaths within the total global population increased from 0.01% in 1990, peaked at 0.03% through 2001-2008, and declined to 0.01% in 2017 (Fig. 14). Moreover, this share among the global PLHIV population increased from 3.49% (1990) to 6.46% (2003) but declined subsequently to 2.55% in 2017 (Fig. 15).

In the same period, similarly, the number of the AIDS deaths in India also increased from 3500 (1990) to 240000 (2005) and then reduced to 69000 (2017) (Fig. 13)[39]. The share of the AIDS deaths in the total Indian population increased from near-zero (1990) to 0.02% (2000), remained unchanged till 2008 and then decreased to 0.01% in 2017 (Fig. 14). Also, the share of the AIDS deaths among the India PLHIV population increased from 1.35% (1990) to 8.85% (2006) and then dropped to 3.29% (2017) (Fig. 15). Across this trend, India had harbored 1.21%, 12.63% and 7.34% of the world's AIDS deaths in 1990, 2005, and 2017, respectively (Fig. 16).

The data available for the Karnataka state (2007-2016), coincided with the declining trends in the global and India new HIV infections. It showed that the number of AIDS deaths in the state reduced from 18370 in 2007 to 3236 in 2016 (Fig. 13)[42,43]. The share of the AIDS deaths in the total population, and among the total PLHIV population in the Karnataka state

Table 6. Number and share of the HIV/AIDS-related deaths, World, India, and Karnataka, 1990-2017[39,42,43].

Criteria	Region	Description	1990	1991	1992	1997	1998	2002	2003	2005	2006	2007	2016	2017
AIDS-related deaths (All ages)[39,42,43]	Global	N (thousands)	290	360	460	1100	1200	1800	1900	1900	1900	1800	990	940
		Share wrt global total population	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.01	0.01
		Share wrt global PLHIV population	3.49	3.56	3.80	4.72	4.80	6.23	6.46	6.31	6.25	5.84	2.73	2.55
	India	N (thousands)	3.50	6.30	11.0	88.0	110	210	220	240	230	220	80	69
		Share wrt India total population	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01
		Share wrt India PLHIV population	1.35	1.40	1.51	3.14	3.67	6.77	7.33	8.57	8.85	8.80	3.64	3.29
		Share wrt global AIDS-deaths	1.21	1.75	2.39	8.00	9.17	11.67	11.58	12.63	12.11	12.22	8.08	7.34
	Karnataka	N (thousands)										18.37	3.236	
		Share wrt Karnataka total population										0.03	0.00	
		Share wrt Karnataka PLHIV population										7.51	1.66	
		Share wrt India AIDS-deaths										8.35	4.05	
AIDS-related deaths (Adults, 15+ years)[39]	Global	Share wrt global AIDS- deaths	75.52	75.56	76.09	80.00	80.00	84.44	85.26	85.26	85.79	86.11	88.89	88.30
	India	Share wrt India AIDS- deaths	85.71	76.19	76.36	86.36	88.18	93.81	94.55	95.42	95.65	95.68	96.13	96.23
AIDS-related deaths	Global	Ratio	61.9: 38.1	60.7: 39.3	60.0: 40.0	53.5: 46.5	52.5: 47.5	50.7: 49.3	50.6: 49.4	48.8: 51.2	50.6: 49.4	51.3: 48.7	56.8: 43.2	57.8: 42.2

Criteria	Region	Description	1990	1991	1992	1997	1998	2002	2003	2005	2006	2007	2016	2017
Male: Female (Adults, 15+ years)[39]	India	Ratio	73.1: 26.9	70.8: 29.2	70.2: 29.8	64.5: 35.5	65.0: 35.0	60.0: 40.0	61.9: 38.1	63.64: 36.3	59.1: 40.9	61.9: 38.1	67.5: 32.5	68.7: 31.3
AIDS-related deaths (Children, <15 years)[39]	Global	N (thousands)	71	88	110	220	240	280	280	280	270	250	110	110
		Share wrt global child (<15 year) population	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01
		Share wrt global CLHIV population	22.19	21.46	21.57	18.33	18.46	15.56	14.74	13.33	12.86	11.90	5.79	6.11
		Share wrt global AIDS-deaths	24.48	24.44	23.91	20.00	20.00	15.56	14.74	14.74	14.21	13.89	11.11	11.70
	India	N (thousands)	0.50	1.50	2.60	12.0	13.0	13.0	12.0	11.0	10.0	9.50	3.10	2.60
		Share wrt India child (<15 year) population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Share wrt India CLHIV population	14.71	24.59	26.00	21.05	19.40	13.68	12.12	11.00	10.00	9.50	4.77	4.26
		Share wrt India AIDS-deaths	14.29	23.81	23.64	13.64	11.82	6.19	5.45	4.58	4.35	4.32	3.88	3.77
		Share wrt global AIDS-related child deaths	0.70	1.70	2.36	5.45	5.42	4.64	4.29	3.93	3.70	3.80	2.82	2.36

Note: 1. Values mentioned as less than 0.1 and 1000 in the database were given the dummy values of 0.05 and 500 (respectively) in the tables and figures. 2. All the share are mentioned in percentage (%). Sources: 39, 42 (only for Karnataka 2007 and 2016 data), 43.

Fig. 13. AIDS-related deaths (all ages) by geographical region, 1990-2017.

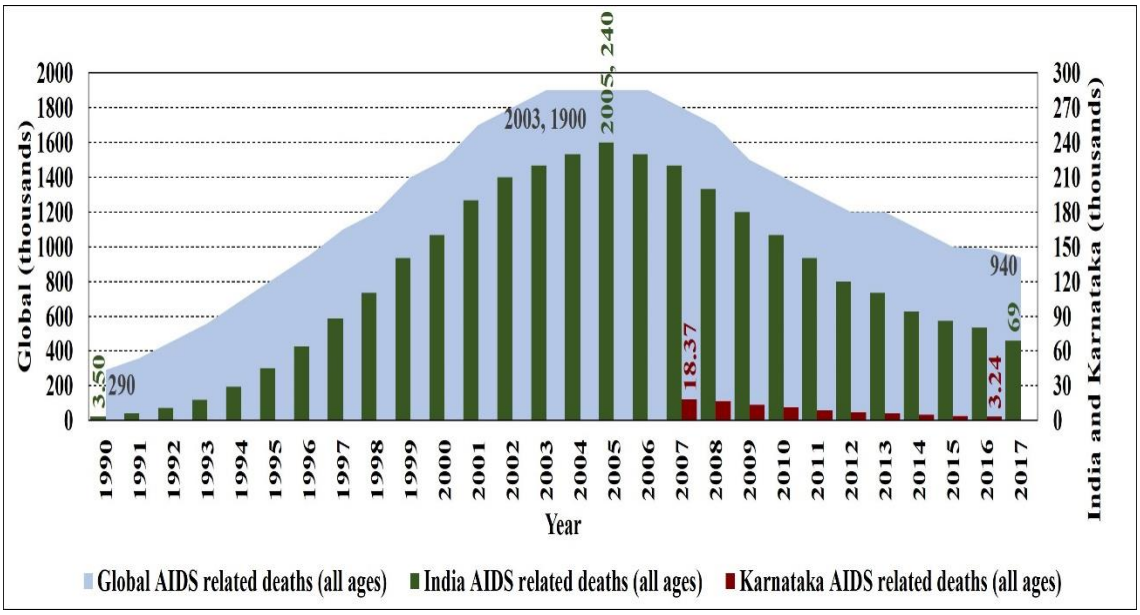
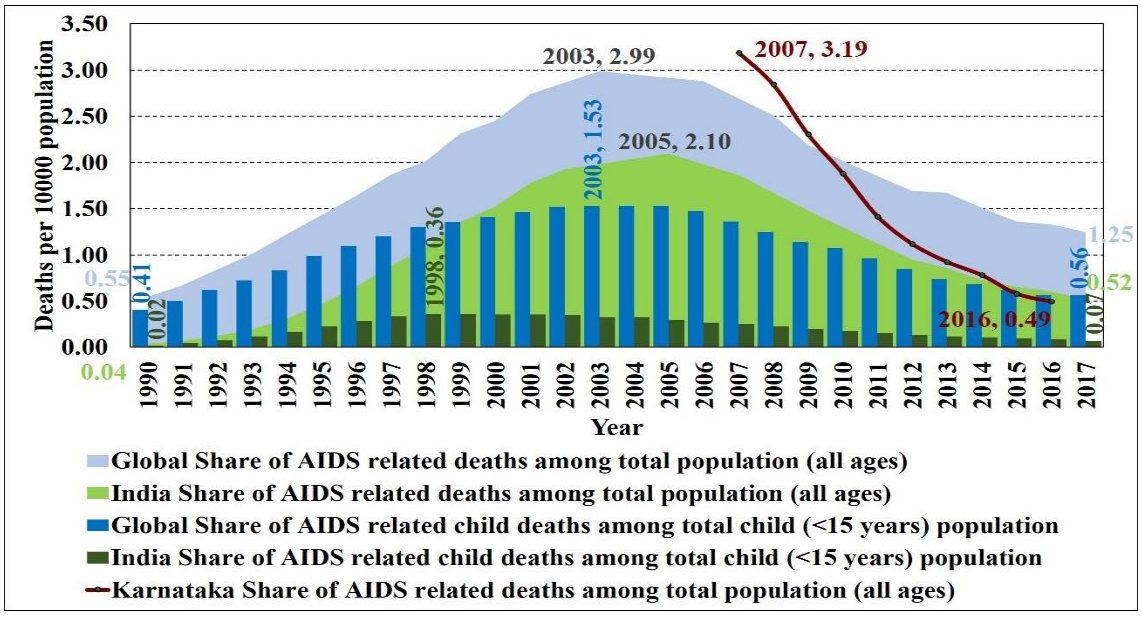


Fig. 14. Share of the AIDS-related deaths among the population, by age and geographical region, 1990-2017.



had decreased from 0.03% to near-zero and from 7.51% to 1.66% respectively, during this period (Fig. 14 and 15). The share of the India AIDS deaths harbored by the Karnataka state reduced by more than 50% (from 8.35% to 4.05%) in 2007-2016. The data showed that the number of AIDS deaths in the world and India decreased post-2005 and its share

Fig. 15. Share of the AIDS-related deaths among the HIV-infected people, by age and geographical region, 1990-2017.

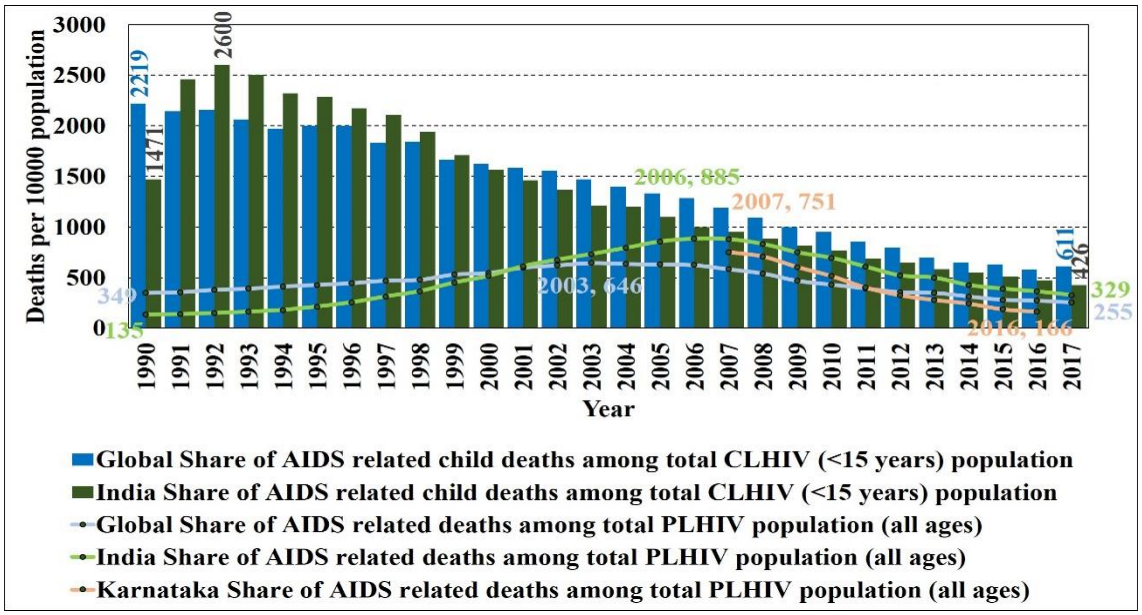
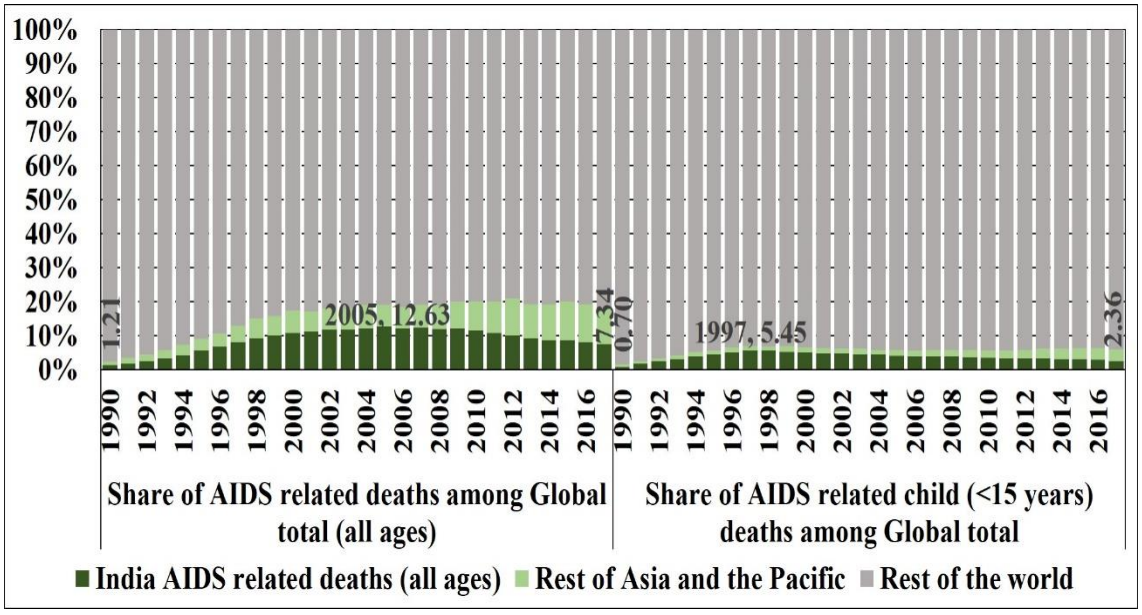


Fig. 16. Geographic share of the AIDS-related deaths among the global total, by age, 1990-2017.



in the total and the PLHIV population started diminishing post-2007. In the Karnataka state, the AIDS deaths and its share with respect to the total and the PLHIV population declined ever since the data was available (2007).

The AIDS deaths among the adults (15+ year) formed 80-90% of all the AIDS deaths globally and 86-96% in India post-1997. Both in India and the world, the deaths among HIV-infected adult men were higher than women's; and, there was an increasing trend of the deaths among the women till 2005-2006, which was reversed later[39].

AIDS-related child deaths implied those among the children <15 years of age unless otherwise specified. The number of AIDS-related child deaths in the world and India followed a parabolic pattern. In the whole world, it increased from 71 to 280 thousand (1990-2002), remained unchanged till 2005 and then declined to 110 thousand (2017) (Fig. 17)[39]. The share of the AIDS deaths within the total child (<15 years) population also increased from 0.41% (1990) to 1.53% (2003) and then decreased to 0.56% in 2017 (Fig. 14). Between 1990 and 2017, the share of the AIDS-related child deaths among the global CLHIV population decreased consistently from 22.19% to 6.11% (Fig. 15). Also, the share of the child deaths among the global AIDS deaths decreased from 24.48% (1990) to 11.70% (2017) (Fig. 18).

In the same period, the number of AIDS-related child deaths in India also increased from 500 in 1990 to 13000 in 1999-2002, and then declined to 2600 in 2017 (Fig. 17)[39]. The decline of child deaths started 2-4 years before the total AIDS deaths. The share of India's AIDS-related child deaths among the total child (<15 years) population was much lesser than that of the world's, in the corresponding years. This, in a similar parabolic fashion, increased from 0.02 deaths in 1990 to 0.36 deaths in 1998-1999, and declined to 0.07 deaths in 2017, per 10000 children (Fig. 14). The share of the AIDS-related child deaths among the India CLHIV population decreased from 14.71% (1990) to 4.26% (2017) through an interim peak at 26.00% (1992) (Fig. 15). India's AIDS-related child deaths among all the AIDS deaths decreased consistently from 23.81% (1991) to 3.77% (2017) (Fig. 18), much lower than the global figures. Across this trend, in 1990, 0.70% of the world's AIDS-related child deaths happened in India; this rose to 5.45% (1997), and then reduced to 2.36% (2017) (Fig. 16).

Fig. 17. AIDS-related child (<15 years) deaths by geographical region, 1990-2017.

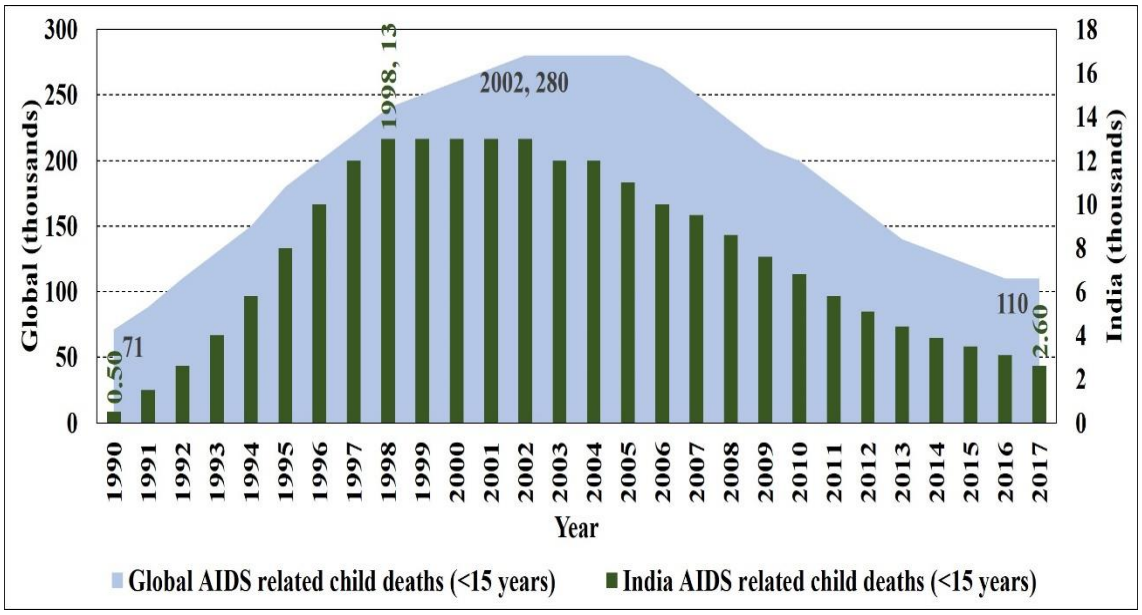
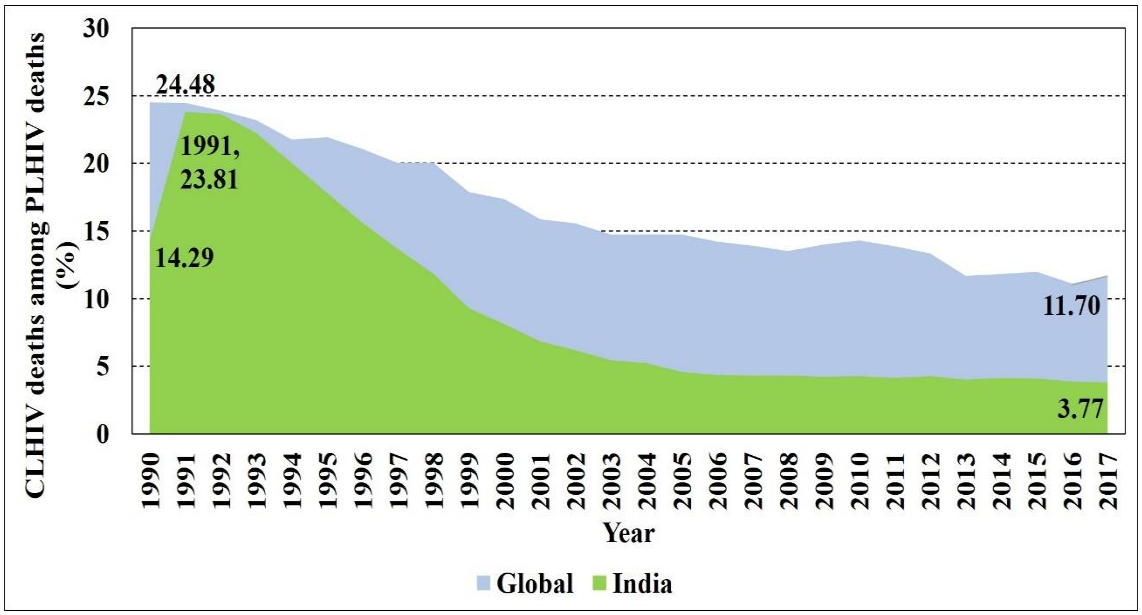
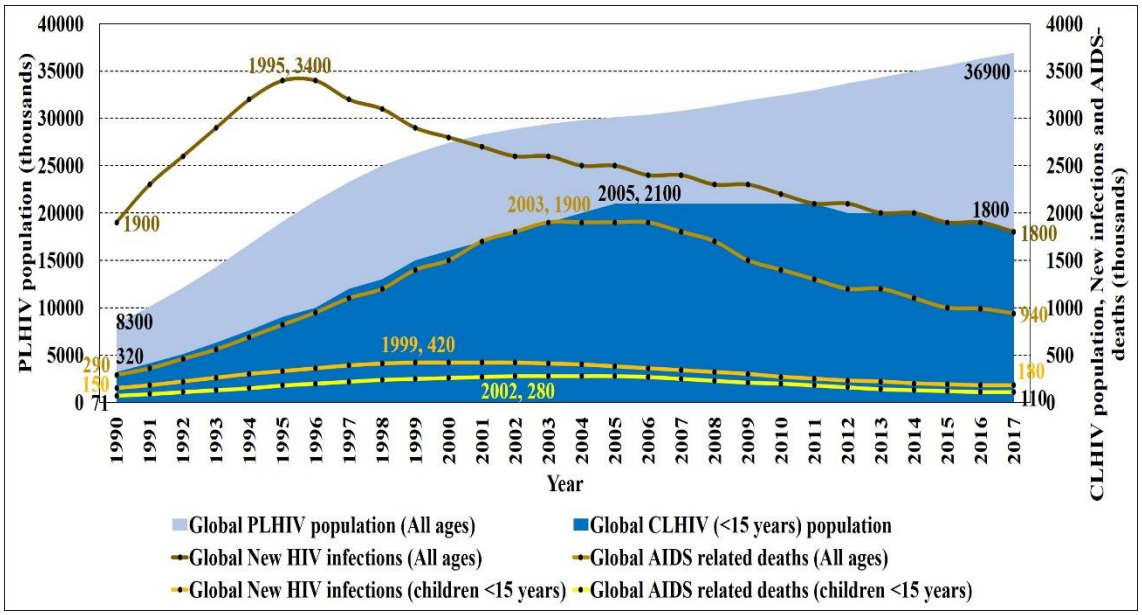


Fig. 18. Share of the AIDS-related child (<15 years) deaths among the deaths (all ages) among the HIV-infected population, by geographical region, 1990-2017.



No information on the AIDS-related child deaths in the Karnataka state was available to infer a pattern. In short, it could be inferred that the number of AIDS-related child deaths declined even before the total AIDS deaths did; and the decline of the actual numbers and the share was steep. However, initially (till 2007) the case fatality rate among the children

Fig. 19. The global population of PLHIV and CLHIV, and the new HIV infections and the AIDS-related deaths among the whole and child (<15 years) population, 1990-2017.



were much higher than that for all ages; but from 2008, this wide gap has diminished. Reciprocally, it could mean that HIV-infected children lived longer. The scenario was more-or-less similar in all the regions.

The global, India and Karnataka numbers of PLHIV, CLHIV were plotted against the new HIV infections and the AIDS deaths in the figures 19-21 (based on the tables 4-6 and the related sources). From these graphs, it could be inferred that:

- Among all the ages, the global PLHIV population kept increasing till 2017, but at a slower pace since 2000. However, the PLHIV population declined in India since 2002. Globally and in India, the new HIV infections declined from 1995, and the AIDS deaths from 2005-2006. The Karnataka state also showed the decreasing numbers of the PLHIV, new infections, and AIDS deaths, in line with the India trend. As such, the HIV/AIDS epidemic had been declining in all the regions.
- Among the children, the global and India CLHIV population decreased since 2011 and 2007 respectively. The new child infections in the world and India declined from 2002 and 1998 respectively, while the AIDS-related child deaths reversed after a delay of 3-4 years in both regions. The Karnataka trend was in line with the

Fig. 20. The population of PLHIV and CLHIV, and the new HIV infections and the AIDS-related deaths among the whole and child (<15 years) population, India, 1990-2017.

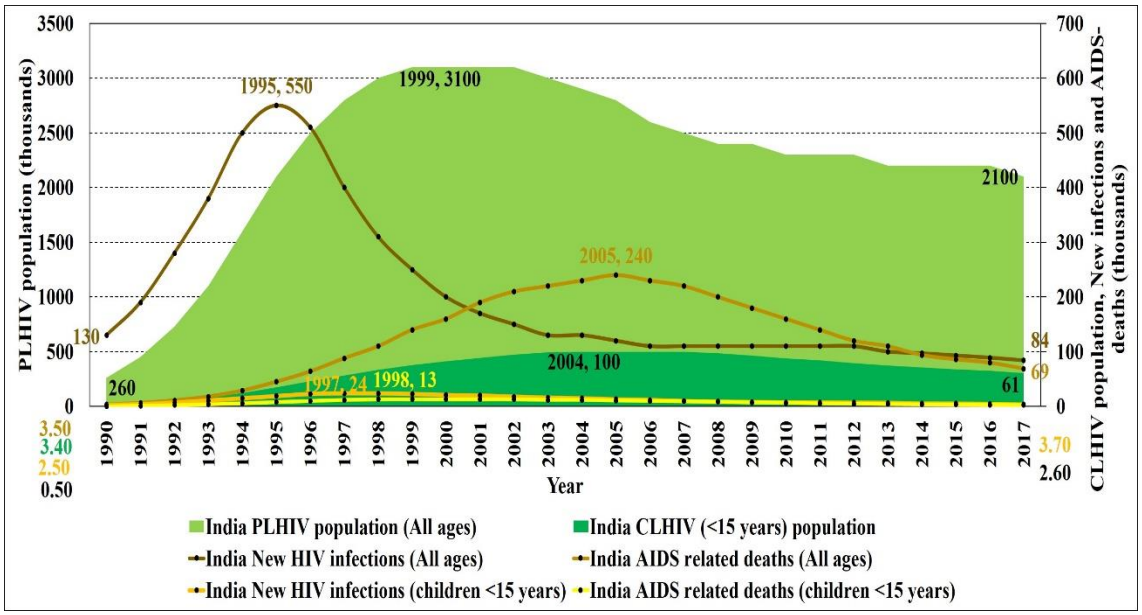
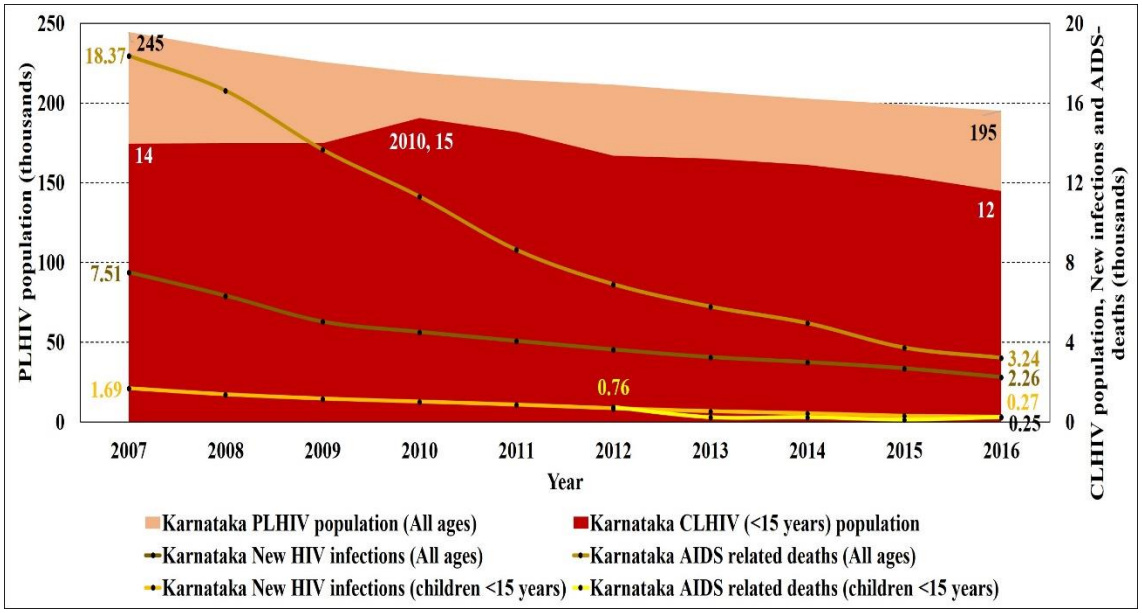


Fig. 21. The population of PLHIV and CLHIV, and the new HIV infections and the AIDS-related deaths among the whole and child (<15 years) population, Karnataka, 2007-2016.



declining India trend of CLHIV. As such, the decline of the HIV epidemic started among the children earlier in India than in the world.

- By 2017, the global new infections were higher than the AIDS deaths; hence, the PLHIV population remained increasing. However, in India and the Karnataka state, the new infections and the deaths in all ages and among the children had been converging, so that it is reaching towards a replacement level. At the same time, from the figures 8, 9, 14 and 15, it could be seen that the rates of the new infections and the AIDS deaths among the population, the rate of the new infections (inflating the existing pool of HIV infection), and the rate of the AIDS deaths (deflating the existing pool of HIV infection), were decreasing and converging, both among all ages and the children, in all the regions. As such, there could remain a near-constant pool of the HIV infection in both the groups (all ages and children), unless the new infections drastically come down or the deaths surpass the new infections, in the years ahead.

1.5.4. HIV-infected people on treatment.

The trends in the number of PLHIV and CLHIV on treatment (ART) between 2000 and 2017 are shown in table 7 and figures 22-27[31-34,37,39,41,42,47-59].

Between 2000 and 2017, the number of PLHIV (all ages) on treatment increased steadily from 0.55 to 21.69 million (Fig. 22)[39], and their share among the total PLHIV increased from 2.00% to 58.78% (2000-2017) (Fig. 23).

However, the ART provision was started in India only in 2004. The number of the PLHIV (all ages) on ART in India also increased from 0.03 million to 1.20 million (2005-2017)[39]; as such, their share among all the India PLHIV population increased from 1.00% to 57.19% (Fig. 22 and 23). As such, in 2017, the share of the PLHIV on treatment in India was slightly lesser than the global average. On average, the India PLHIV on treatment formed 5.5-6% of the global PLHIV on ART (Fig. 24).

The data available for the Karnataka state from 2007 to 2016, coincided with the increasing global and India trends in the initiation of PLHIV on ART. It showed that the numbers

Table 7. Number and share of the HIV-infected people on ART, World, India, and Karnataka, 2000-2017[31-34,37,39,41,42,47-59].

Criteria	Region	Description	2000	2005	2007	2008	2009	2010	2013	2015	2016	2017
PLHIV receiving ART (All ages)[31-34,37,39,47-59]	Global	N^	548000	2107000	3696000	5008000	6380000	8020848	13236969	17215858	19396217	21691374
		Share wrt global PLHIV population	2.00	7.00	12.00	16.00	20.00	24.76	38.59	48.36	53.43	58.78
	India	N^		28000	125000	216000	312000	412125	775466	940187	1050326	1200965
		Share wrt India PLHIV population		1.00	5.00	9.00	13.00	17.92	35.25	42.74	47.74	57.19
		Share wrt global PLHIV on ART		1.33	3.38	4.31	4.89	5.14	5.86	5.46	5.42	5.54
	Karnataka	N			7094	13599	16285	14100		127156	139671	155376
		Share wrt Karnataka PLHIV population			2.90	5.81	7.22	6.44		63.88	71.63	
		Share wrt India PLHIV on			5.68	6.30	5.22	3.42		13.52	13.30	12.94

Criteria	Region	Description	2000	2005	2007	2008	2009	2010	2013	2015	2016	2017
		ART										
	Belgaum	N			675	1207	1778	2347				17303
	Belgaum	Share wrt Karnataka PLHIV on ART			9.52	8.88	10.92	16.65				11.14
PLHIV receiving ART (Adults, 15+ year-s)[39,41]	Global	Share wrt global PLHIV on ART					95.38	94.32	94.57	95.01	95.24	95.66
PLHIV receiving ART (Adults, 15+ year-s)[39,41]	India	Share wrt India PLHIV on ART			92.51	83.13	87.91	93.86	94.23	94.31	94.33	96.11
PLHIV receiving ART Male:	Global	Ratio					50.0: 50.0	48.6: 51:4	44.2: 55.8	42.9: 57.1	42.6: 57.4	42.7: 57.3

Criteria	Region	Description	2000	2005	2007	2008	2009	2010	2013	2015	2016	2017
Female (Adults, 15+ years)[37,39]	India	Ratio					56.4: 43.6	57.0: 43.0	53.7: 46.3	51.8: 48.2	51.1: 48.9	51.8: 48.2
CLHIV receiving ART (<15 years)[31-34,39,41,42,48-59]	Global	N					295000	455910	718127	859528	922794	941433
		Share wrt global CLHIV population					14.05	21.71	35.91	45.24	48.57	52.30
		Share wrt global PLHIV on ART					4.62	5.68	5.43	4.99	4.76	4.34
	India	N			9358	13079	18618	25315	44740	53522	59577	46767
		Share wrt India CLHIV population			9.36	13.48	20.02	28.77	59.65	78.71	91.66	76.67
		Share wrt India PLHIV on ART			7.49	6.06	5.97	6.14	5.77	5.69	5.67	3.89

Criteria	Region	Description	2000	2005	2007	2008	2009	2010	2013	2015	2016	2017
		Share wrt global CLHIV on ART					6.31	5.55	6.23	6.23	6.46	4.97
	Karnataka	N[!]			1198	1928	3003	3640		8117	8899	10170
		Share wrt Karnataka CLHIV population			8.59	13.79	21.49	23.89		65.75	76.83	
		Share wrt Karnataka PLHIV on ART			16.89	14.18	18.44	25.82		6.38	6.37	6.55
		Share wrt India CLHIV on ART			12.80	14.74	16.13	14.38		15.17	14.94	21.75
	Belgaum	N			101	223						1411
		Share wrt Karnataka			14.96	18.48						8.15

Criteria	Region	Description	2000	2005	2007	2008	2009	2010	2013	2015	2016	2017
		CLHIV on ART										
Deaths averted by ART (All ages)[39]	Global	N	51959	201803	452850	609375	700109	840000	1100000	1200000	1200000	1200000
		Share wrt global PLHIV population	0.19	0.67	1.47	1.95	2.19	2.59	3.21	3.37	3.31	3.25
		Share wrt global PLHIV on ART	9.48	9.58	12.25	12.17	10.97	10.47	8.31	6.97	6.19	5.53
	India	N		2540	17839	33194	46558	60000	78000	83000	81000	83000
		Share wrt India CLHIV population		0.09	0.71	1.38	1.94	2.61	3.55	3.77	3.68	3.95
		Share wrt India CLHIV on ART		9.07	14.27	15.37	14.92	14.56	10.06	8.83	7.71	6.91
		Share wrt global deaths averted		1.26	3.94	5.45	6.65	7.14	7.09	6.92	6.75	6.92

^Calculated data for the period 2000-2009 from source 37. [!]Calculated value based on source 42. Note: 1. Values mentioned as less than 0.1 and 1000 in the database were given the dummy values of 0.05 and 500 (respectively) in the tables and figures. 2. All the share are mentioned in percentage (%). Sources: 31-34 (for Karnataka 2012-2016 data), 37, 39, 41 (for Karnataka 2010-2011 data on CLHIV and PLHIV numbers; Karnataka 2007-2011 data on PPTCT; India 2007-2009 data on PLHIV-ART), 42 (for Karnataka 2007, 2016 data), 47-59.

Fig. 22. PLHIV (all ages) on treatment, by geographical region, 2000-2017[5].

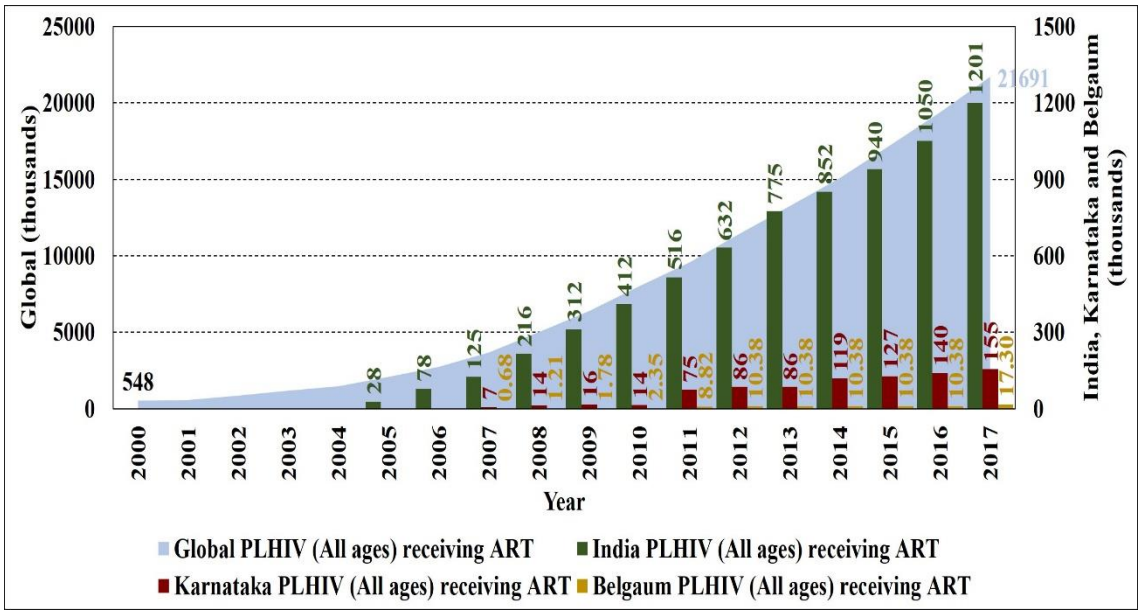
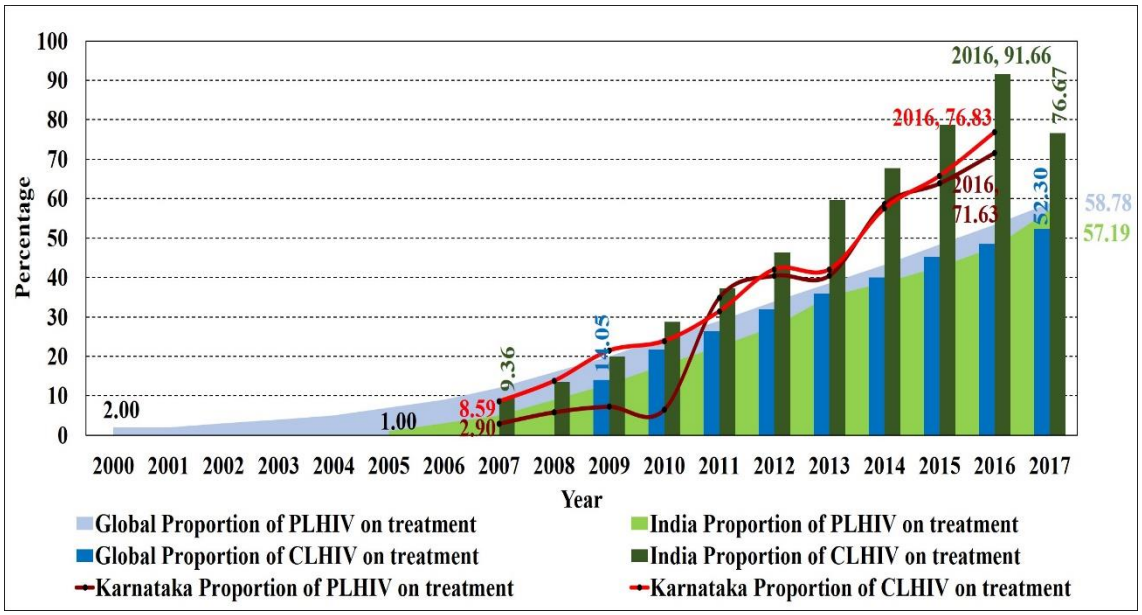
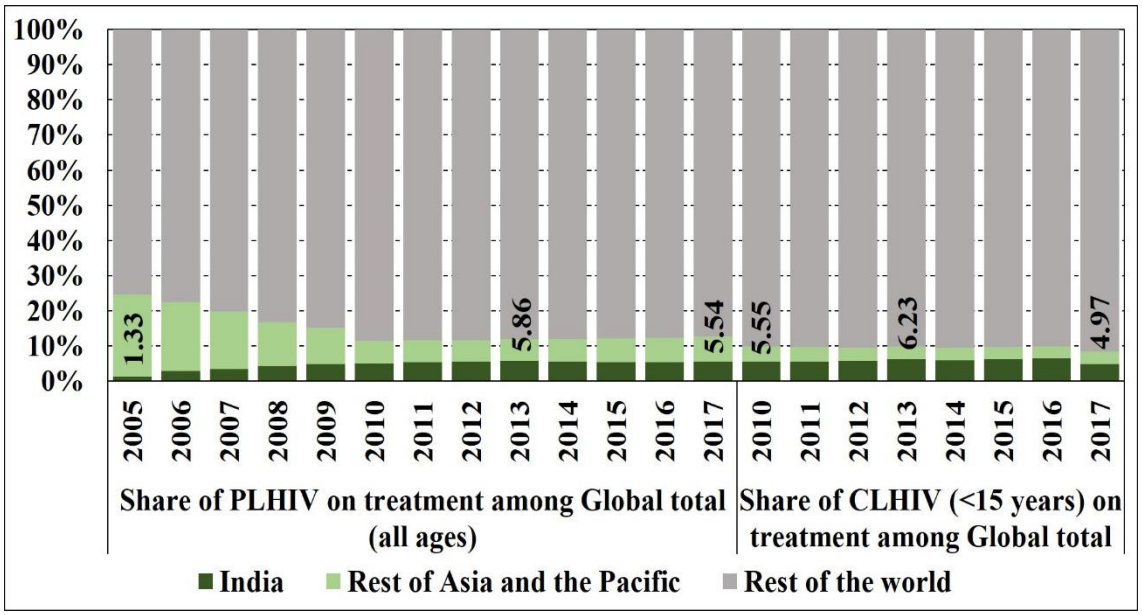


Fig. 23. Share of the HIV-infected people on treatment, by age and geographical region, 2000-2017[5].



[5] Missing values were substituted by data available from a previous year, as the data is cumulative, to show the trend.

Fig. 24. Geographic share of the HIV-infected people on treatment among the global total, by age, 2005-2017.



increased from 7 to 155 thousand (Fig. 22)[31-34,47-59]. The share of PLHIV on ART increased from 2.9% in 2007 to 71.63% in 2016 (Fig. 23). As such, the Karnataka state fared better than India and global figures in the initiation of ART for the PLHIV.

The Belgaum district had also reported an increase in the number of the PLHIV on ART from 675 (2007) to 17303 (2017) (Fig. 22)[31-34,47-59]. It thus harbored around 11% of the Karnataka PLHIV on treatment in its territory. On the whole, the data showed that the number and the share of the PLHIV (all ages) initiated on treatment increased in all regions since its introduction. However, the coverage and the inclusion in treatment differed between the regions.

The share of the adults (15+ year) among the PLHIV (all ages) on ART formed 94-96%, both in the world and India[39]. However, since 2010, there was a slightly increasing share of the adults among those on treatment, possibly because there were lesser children testing HIV positive to be put on treatment. Considering the whole world, more adult women were on ART compared to the adult men, while in India, it was vice versa[39]. Again, since 2010, there was a slightly increasing share of women among those on treatment, possibly because

more women were infected and subsequently initiated on treatment or because the men moved out of the treatment (due to early death, etc.).

The number of the CLHIV on ART increased globally (295 to 941 thousand, 2009-2017), and in India (9.36 to 46.77 thousand, 2007-2017), Karnataka (1198 to 10170, 2007-2017) and Belgaum (101 to 1411, 2007-2017)[31-34,39,41,42,47-59]. As such, the share of the CLHIV on treatment also increased over the years (Fig. 25). In 2017, slightly more than a half (52.3%) of the CLHIV were on ART globally, while India and the Karnataka state fared better by initiating ART to more than three-fourths (76-77%) of the CLHIV (Fig. 23). As in the case of PLHIV of all ages, the India CLHIV on treatment formed around 5-6% of the global CLHIV on ART (Fig. 24). In India, Karnataka state and Belgaum district, the share of the CLHIV among the PLHIV (all ages) put on ART was initially high, to settle down to around 50% of the initial share after around 10 years of ART programming (2007-2017): 7.49% reduced to 3.89% in India; 16.89% to 6.55% in Karnataka; and, 14.96% to 8.15% in Belgaum. Thus, end 2017, the Belgaum district held a higher share of the CLHIV among the PLHIV on treatment among all the regions. However, the global share of the CLHIV among the PLHIV on treatment remained around 4-5% across these years (Fig. 26).

The deaths estimated to be averted due to ART ranged from 0.2 to 1.2 million globally, while it has been increasingly saving up to 83000 PLHIV lives in India (Fig. 27)[39]. As such, the share of the estimated lives saved increased with respect to the total PLHIV population; but the share among the PLHIV population on ART decreased due to the increasing number of the PLHIV initiated on ART. In short, about 52% of the global CLHIV and 76% of the India CLHIV were initiated on ART, cumulatively till 2017. ART had been saving 3-4% of lives of all the PLHIV and 5-7% of lives of the PLHIV on ART in 2017, indicating that there could be an advantage of life-years if the PLHIV were initiated on ART.

If the figures of the share of the PLHIV and the CLHIV on treatment was plotted against the AIDS deaths, we could obtain a graph as in figure 28 (based on the tables 6 and 7 and the related sources). When the proportion of the PLHIV on treatment increased from 2.00%

Fig. 25. CLHIV (<15 years) on treatment by geographical region, 2007-2017[6].

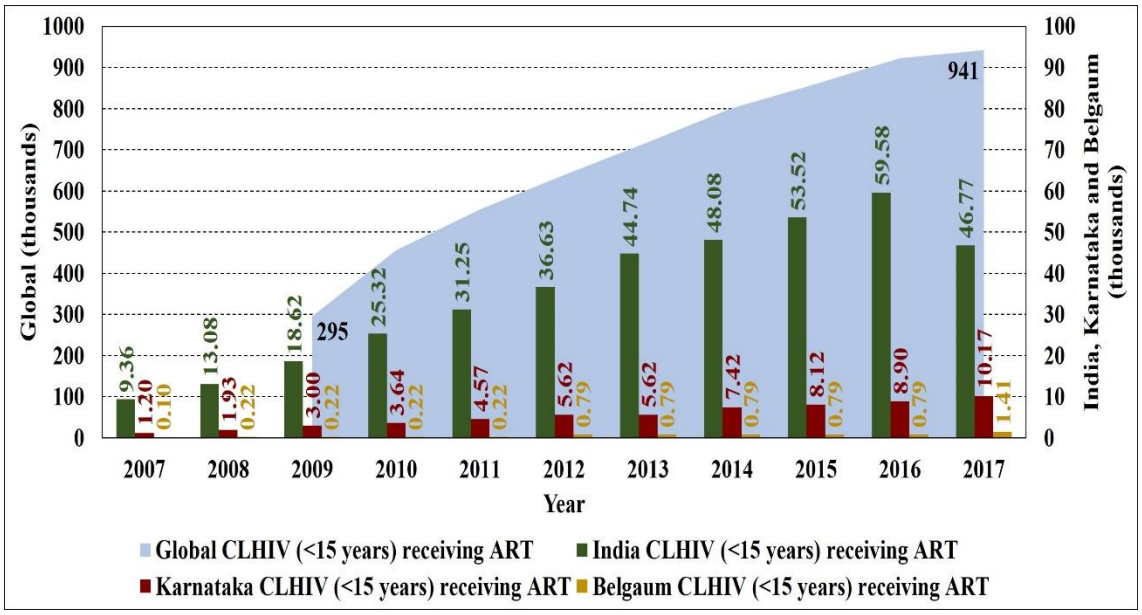
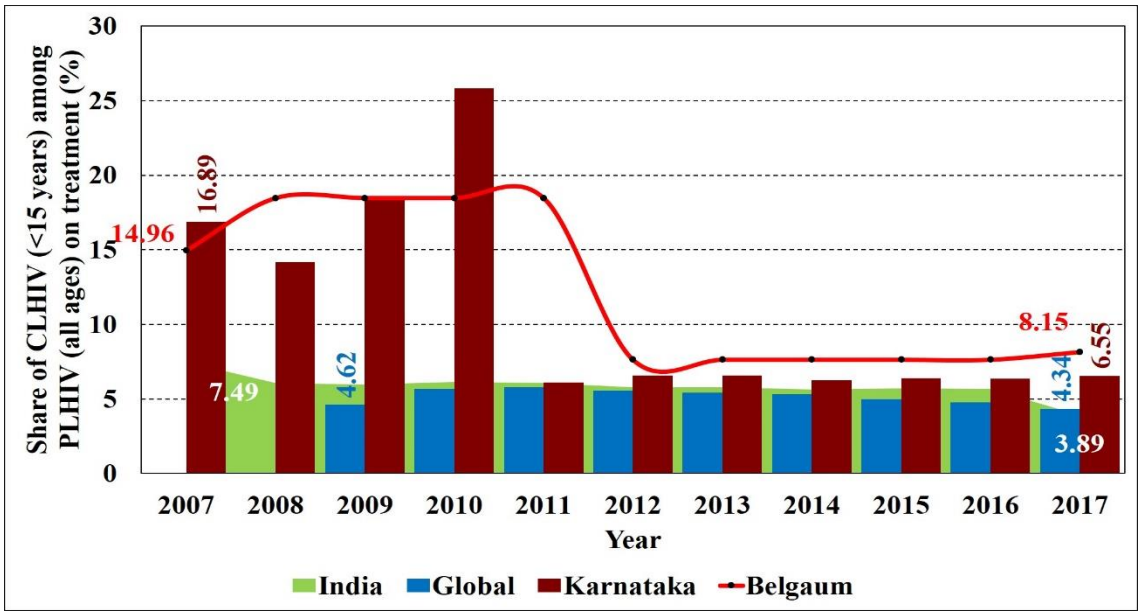


Fig. 26. Share of the CLHIV (<15 years) on treatment among the PLHIV (all ages) on treatment, by geographical region, 2007-2017[6].



[6] Missing values were substituted by data available from a previous year, as the data is cumulative, to show the trend.

Fig. 27. Deaths averted by ART (all ages), and the share of these averted deaths among all the PLHIV and those on treatment, by geographical region, 2005-2017.

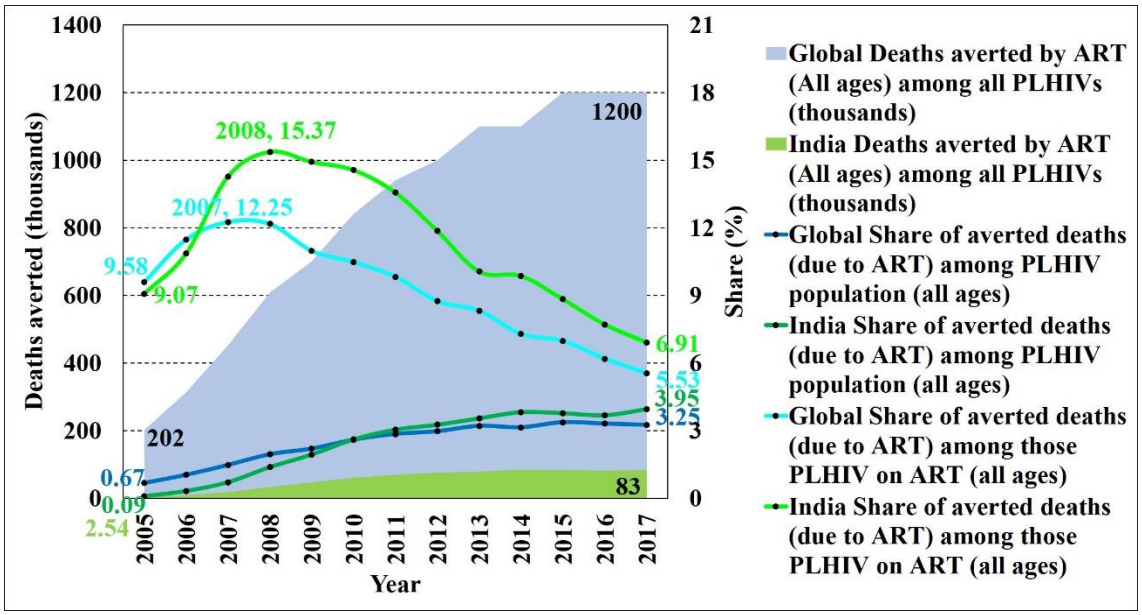
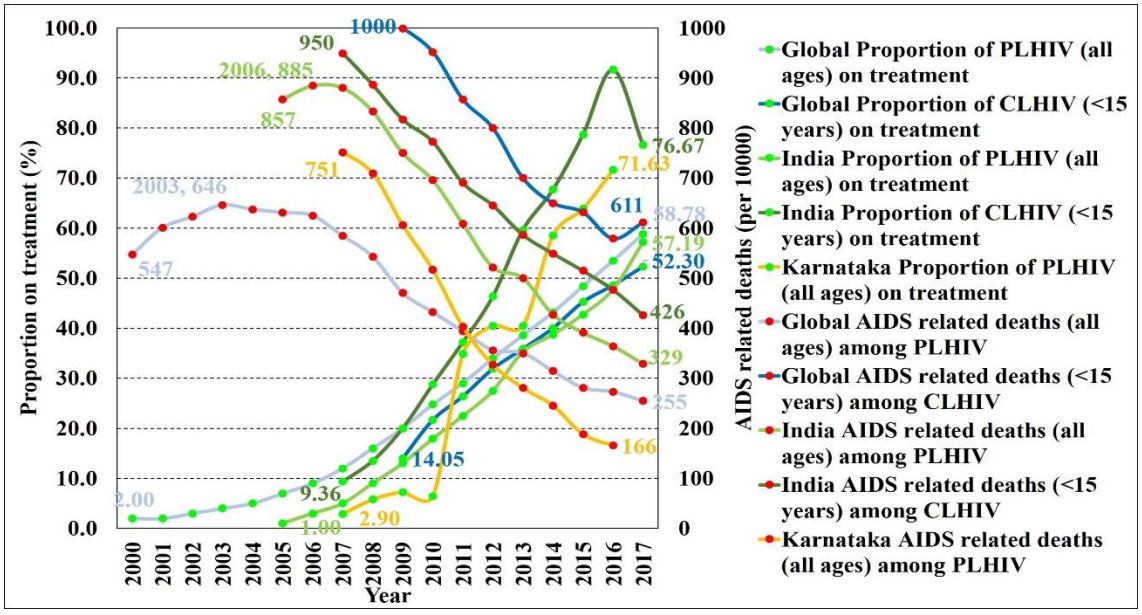


Fig. 28. Proportions of the HIV-infected people on treatment, and the deaths among them, by age and geographical region, 2000-2017.



to 8.78% globally, and from 1.00% to 57.19% in India, the deaths reduced from 646 to 255 and 885 to 329 respectively, per 1000 PLHIV. Similarly, when the proportion of the CLHIV on treatment increased from 14.05% to 52.30% globally, and from 9.36% to

76.67% in India, the deaths reduced from 1000 to 611 and 950 to 426 respectively, per 1000 CLHIV. In the Karnataka state, when the share on treatment increased from 2.90% to 71.63% among PLHIV, the deaths decreased 751 to 166 per 1000 PLHIV. It showed that, in all regions, when the proportion on treatment increased, the case fatality rate (deaths) decreased, both among both the PLHIV and the CLHIV.

It had been reported that around three-fourths of the HIV-infected people in India and Karnataka were initiated on ART (Table 7, Fig. 23 and 28)[31-34,39,41,42,47-59]. However, the HIV program and surveillance reports were too complex to infer[Z]. Table 8 and figures 29-33[31-34,47-59] show this HIV related information from the Karnataka state and the Belgaum district.

At the beginning of 2007, there were around 32 thousand PLHIV in the Karnataka state, which increased to 3.70 lakh by 2017 (Fig. 29)[31-34,47-59]. The registration of the PLHIV for treatment was around 78% in 2007, but it did not progress with increasing detection of the PLHIV till 2010 when the registration was 25%. However, subsequently enhanced

[Z] The HIV program data in India started with 'the number of people tested' from ICTC and 'the number of people ever registered' for care at ART centre, as the denominators. This was because, the facilities for the HIV testing and treatment were independent vertical strategies of HIV program in India, often located in two separate rooms in a health care facility, at least till 2016. In 2015, a software PLHIV-ART Linkage System (PALS) was initiated by the NACO, to decrease this 'linkage loss' of the HIV-infected people between the testing and treatment facilities, initially for HIV-infected pregnant women and later scaled up for the general PLHIV[21]. As such, using the HIV program data from India for making an inference need to be done carefully. That is, the larger denominator of 'the people ever tested HIV positive' available at the ICTC might not be the best, but only a better available denominator for denoting the 'people eligible for ART treatment', rather than the smaller denominator of 'the people ever registered' at ART centre, disregarding the issues of multiple testing and other flaws in it. Rather, the denominator for 'the people ever registered' was 'the people ever tested HIV positive'.

Table 8. PLHIV and CLHIV on various levels of the treatment cascade, Karnataka and Belgaum, 2007-2017[31-34,47-59].

Criteria	Region	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PLHIV identified	Karnataka	PLHIV identified in the year, N	32213	48166	52021	37411	41810	36504	30906	27804	23028	20855	19753
		PLHIV cumulative, N	32213	80379	132400	169811	211621	248125	279031	306835	329863	350718	370471
	Belgaum	PLHIV identified in the year, N	2660	5602	6067	4397	4718	2236	3432	3061	2521	2262	2130
		PLHIV cumulative, N	2660	8262	14329	18726	23444	25680	29112	32173	34694	36956	39086
PLHIV (All ages) on ART (cumulative)	Karnataka	PLHIV ever registered for care, N	25180	39548	41386	43628	209508	232761		268057	283670	303058	320492
		Share among cumulative PLHIV identified	*78.17*	*49.20*	*31.26*	*25.69*	*99.00*	*93.81*		*87.36*	*86.00*	*86.41*	*86.51*
		PLHIV ever initiated on ART, N	10547	19325	24475	29275	121156	140520		176959	193197	216778	242935
		Share wrt Karnataka PLHIV ever registered	*41.89*	*48.86*	*59.14*	*67.10*	*57.83*	*60.37*		*66.02*	*68.11*	*71.53*	*75.80*
		PLHIV alive and on ART during the year, N	7094	13599	16285	14100	74821	85605		118607	127156	139671	155376
		Share wrt Karnataka PLHIV ever registered	*28.17*	*34.39*	*39.35*	*32.32*	*35.71*	*36.78*		*44.25*	*44.83*	*46.09*	*48.48*
		PLHIV dead after ART start, N	1938	3141	4419	4916	20813	24727		41329	47091	55405	63530
		Share wrt Karnataka PLHIV ever registered	*7.70*	*7.94*	*10.68*	*11.27*	*9.93*	*10.62*		*15.42*	*16.60*	*18.28*	*19.82*

Criteria	Region	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		PLHIV LFU after ART start, N	1515	2585	3771	10259	25522	30188		17023	18950	21702	24029
		Share wrt Karnataka PLHIV ever registered	*6.02*	*6.54*	*9.11*	*23.51*	*12.18*	*12.97*		*6.35*	*6.68*	*7.16*	*7.50*
		PLHIV never initiated on ART, N	14633	20223	16911	14353	88352	92241		91098	90473	86280	77557
		Share wrt Karnataka PLHIV ever registered	*58.11*	*51.14*	*40.86*	*32.90*	*42.17*	*39.63*		*33.98*	*31.89*	*28.47*	*24.20*
	Belgaum	PLHIV ever registered for care, N	2679	3093	4471	6764	24214	27751					35709
		Share among cumulative Belgaum PLHIV identified	*100.7*	*37.44*	*31.20*	*36.12*	*103.28*	*108.06*					*91.36*
		Share wrt Karnataka PLHIV ever registered	*10.64*	*7.82*	*10.80*	*15.50*	*11.56*	*11.92*					*11.14*
		PLHIV ever initiated on ART, N	925	1575	2466	4613	14140	17100					26521
		Share wrt Belgaum PLHIV ever registered	*34.53*	*50.92*	*55.16*	*68.20*	*58.40*	*61.62*					*74.27*
		PLHIV alive and on ART during the year, N	675	1207	1778	2347	8819	10383					17303
		Share wrt Belgaum PLHIV ever registered	*25.20*	*39.02*	*39.77*	*34.70*	*36.42*	*37.41*					*48.46*

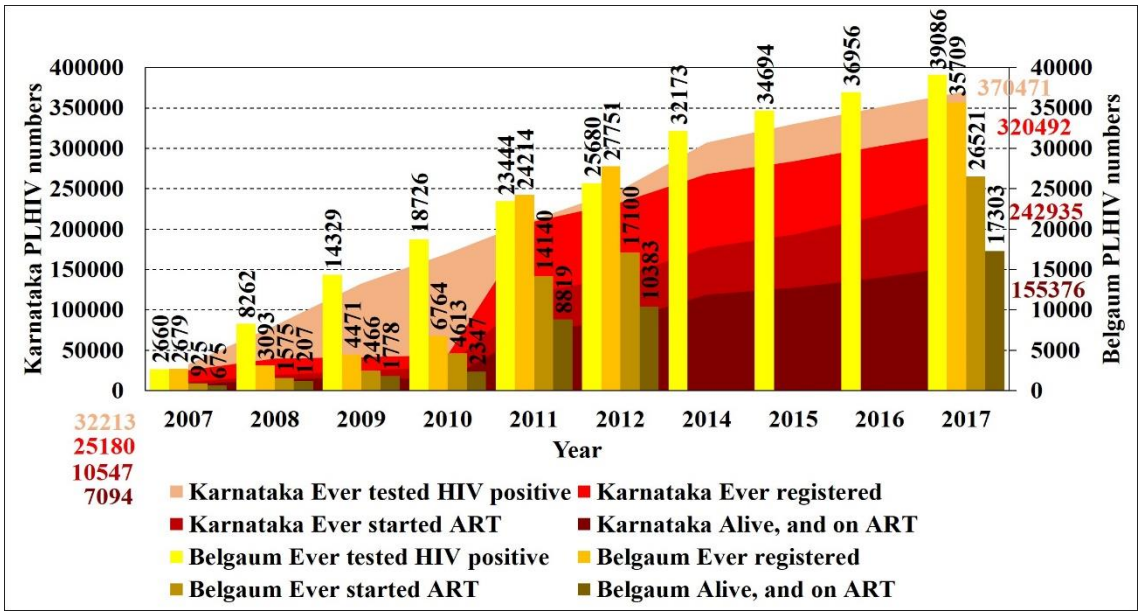
Criteria	Region	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		PLHIV dead after ART start, N	160	331	401	484	2014	2487					7103
		Share wrt Belgaum PLHIV ever registered	*5.97*	*10.70*	*8.97*	*7.16*	*8.32*	*8.96*					*19.89*
		PLHIV LFU after ART start, N	90	37	287	1782	3307	4230					2115
		Share wrt Belgaum PLHIV ever registered	*3.36*	*1.20*	*6.42*	*26.35*	*13.66*	*15.24*					*5.92*
		PLHIV never initiated on ART, N	1754	1518	2005	2151	10074	10651					9188
		Share wrt Belgaum PLHIV ever registered	*65.47*	*49.08*	*44.84*	*31.80*	*41.60*	*38.38*					*25.73*
CLHIV (< 15 years) registered at ARTC (cumulative)	Karnataka	CLHIV ever registered for care, N						16778		17161	17814	18337	18799
		Share wrt Karnataka PLHIV ever registered						*7.21*		*6.40*	*6.28*	*6.05*	*5.87*
		CLHIV ever initiated on ART, N						8318		9312	10206	11367	13051
		Share wrt Karnataka CLHIV ever registered						*49.58*		*54.26*	*57.29*	*61.99*	*69.42*
		CLHIV alive and on ART during the year, N	1198	1928	3003	3640	4569	5618		7415	8117	8899	10170

Criteria	Region	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		Share wrt Karnataka CLHIV ever registered						*33.48*		*43.21*	*45.57*	*48.53*	*54.10*
		CLHIV dead after ART start, N						763		1261	1389	1642	1922
		Share wrt Karnataka CLHIV ever registered						*4.55*		*7.35*	*7.80*	*8.95*	*10.22*
		CLHIV LFU after ART start, N						1937		636	700	826	959
		Share wrt Karnataka CLHIV ever registered						*11.54*		*3.71*	*3.93*	*4.50*	*5.10*
		CLHIV never initiated on ART, N						8460		7849	7608	6970	5748
		Share wrt Karnataka CLHIV ever registered						*50.42*		*45.74*	*42.71*	*38.01*	*30.58*
	Belgaum	CLHIV ever registered for care, N						2427					2832
		Share wrt Belgaum PLHIV ever registered						*8.75*					*7.93*
		Share wrt Karnataka CLHIV ever registered						*14.47*					*15.06*
		CLHIV ever initiated on ART, N						1104					1786

Criteria	Region	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		Share wrt Belgaum CLHIV ever registered						*45.49*					*63.06*
		CLHIV alive and on ART during the year, N	101	223				793					1411
		Share wrt Belgaum CLHIV ever registered						*32.67*					*49.82*
		CLHIV dead after ART start, N						78					266
		Share wrt Belgaum CLHIV ever registered						*3.21*					*9.39*
		CLHIV LFU after ART start, N						233					109
		Share wrt Belgaum CLHIV ever registered						*9.60*					*3.85*
		CLHIV Never started ART, N						1323					1046
		Share wrt Belgaum CLHIV ever registered						*54.51*					*36.94*

LFU: Lost to Follow-up or missed. Note: All the share are mentioned in percentage (%). Values more than 100% possible due to 'in-migration' or 'transfer-in' cases for treatment.

Fig. 29. PLHIV in the various levels of treatment cascade, Karnataka and Belgaum, 2007-2017.



enrolment helped to include 86% (3.2 lakh) of the PLHIV into the CST program in 2017. The scenario was also similar in the Belgaum district. The enrolment of the PLHIV into treatment was near-100% in 2007, which decreased to 36% in 2010, and later picked up to 91% in 2017. The people missing between the identification and the enrolment (14% in the Karnataka state, and 9% in the Belgaum district) could be due to the 'linkage loss', multiple testing, fear, stigma, issues of confidentiality, people taking treatment from the private sector or other systems of medicine, etc.

The enrolment at ART centres did not mean the start of ART for the PLHIV till 2017. The start of the ART was based on the category of patient, CD4 count, presence of opportunistic infections, etc. before 2017[21]. In 2017, the NACO had adopted the 'test and treat' strategy for all who tested positive for HIV. As such, those registered at the ART centres during this study period belonged to four categories, namely, 'ART not initiated', 'alive and on ART', 'dead after start of ART' and 'lost to follow-up (LFU) or missing' (the last three categories together formed the 'ART initiated' category). Assuming that those registered at the ART centre was 100% of PLHIV (disregarding the 'linkage loss'), figure 30 shows the relative size of the PLHIV in these categories. In both the Karnataka state and the

Belgaum district, a quarter or more of the registered PLHIV were not initiated on ART at any point of time between 2007 and 2017. However, this category was diminishing, and more PLHIV were initiated on ART. Among those PLHIV initiated on ART, the deaths increased from 6-7% to around 20% in both the Karnataka state and the Belgaum district, between 2007 and 2017. Another 6-7% were LFU after the initiation of ART in 2017. As such, <50% of the PLHIV registered for care at the ART centres were alive and on ART at any point of time in the period 2007-2017.

On the other hand, only limited data were available on the CLHIV on treatment. No valid figures to suggest the denominator of 'child ever tested positive' were available for both the Karnataka state and the Belgaum district. As such, reliance on the exclusive ART centre data was inevitable, and this started with 'CLHIV ever registered'. In 2012, there were around 16778 CLHIV in the Karnataka state registered for care at the ART centres, and less than half of them were ever initiated on ART. The total number of ever registered CLHIV and the proportion of them ever initiated on ART increased to 18799 and 69.4% in 2017 (Fig. 31)[31-34,47-59]. The scenario was also similar in the Belgaum district. Less than 50% of the enrolled 2427 CLHIV were ever initiated on treatment in 2012. The number of CLHIV registered increased to 2832, and proportion of them on treatment increased to 63% in 2017 (Fig. 31).

Assuming that those registered at the ART centre was 100% of PLHIV, figure 32 shows the relative size of the CLHIV categories at the ART centres in the Karnataka state and the Belgaum district. In both these regions, around one-third or more of the registered CLHIV were not initiated on the ART at any point of time between 2012 and 2017. However, this category was diminishing, and more CLHIV were initiated on the ART. Among those CLHIV initiated on ART, the cumulative deaths increased from 3-4% to around 10% in both the Karnataka state and the Belgaum district, between 2012 and 2017. Another 4-5% of the CLHIV on ART were LFU in 2017. As such, around 54% of the CLHIV registered at the ART centres in the Karnataka state, and 50% of them in the Belgaum district were alive and on ART at any point of time in the period 2012-2017.

Fig. 30. Share of the PLHIV ever registered for care, in the various levels of treatment cascade, Karnataka and Belgaum, 2007-2017.

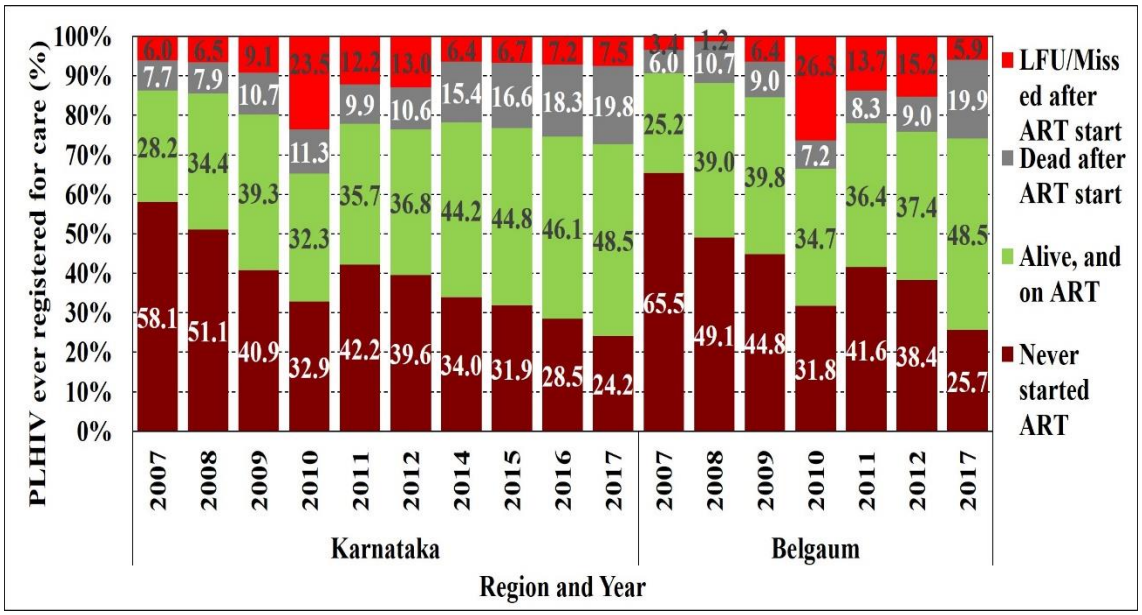
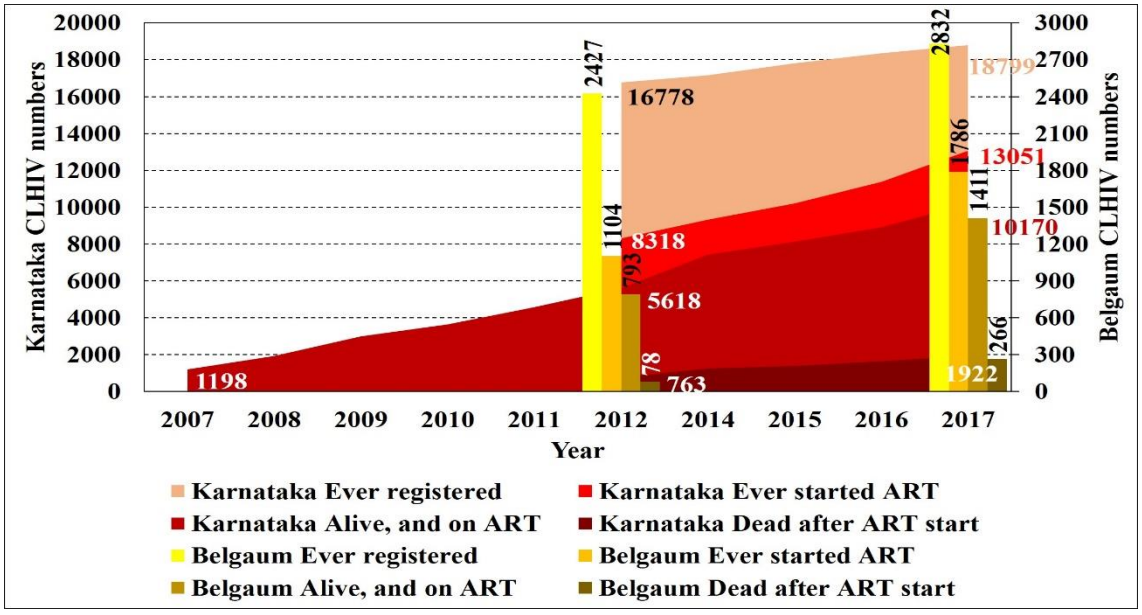


Fig. 31. Ever registered CLHIV in the various levels of treatment cascade, Karnataka and Belgaum, 2007-2017.



The share of the CLHIV among all the PLHIV in the various levels of treatment cascade is shown in figure 33. A decreasing trend in the CLHIV share among ever registered PLHIV was observed in both the Karnataka state and the Belgaum district over the period

Fig. 32. Share of the ever registered CLHIV in the various levels of treatment, Karnataka and Belgaum, 2012-2017.

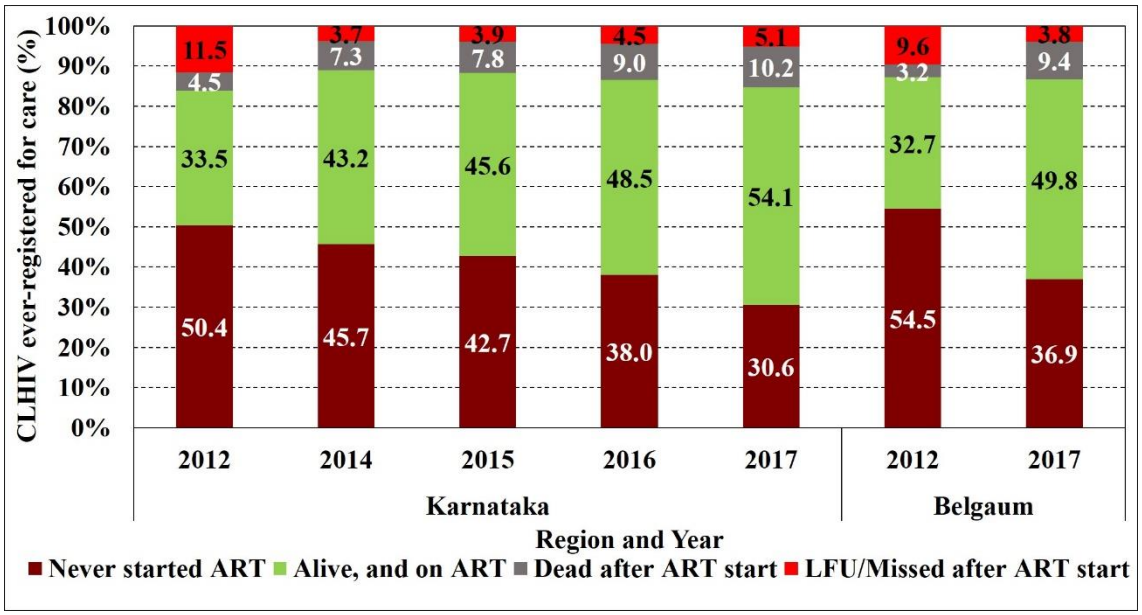
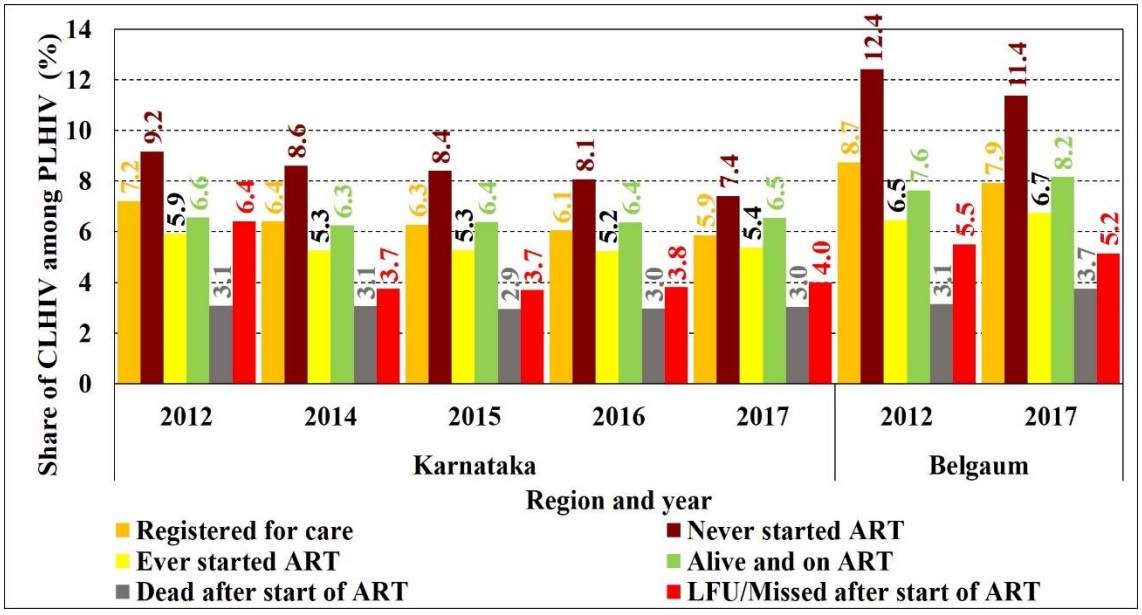


Fig. 33. Share of the CLHIV among all the HIV-infected in the various levels of treatment, Karnataka and Belgaum, 2012-2017.



2012-2017, which could be due to the decreasing number of the new HIV infections among children in that region. Similarly, in the same time period, in both the regions, against the background of decreasing proportion of 'never started ART among ever registered PLHIV'

(as discussed in Fig. 30), a further decrease in the share of the CLHIV in this group meant that, more number and share of the children identified as HIV positive were initiated on ART. As such, these two trends together depicted a decreasing HIV epidemic among children with a residual community pool of the CLHIV and increased inclusion of CLHIV in treatment processes, over the years. Within each region, the share of the CLHIV remained nearly unchanged for other categories like 'ever started ART', 'death', 'LFU/Missed after ART start' and 'alive and on ART'. This meant that the child patterns followed the larger patterns of change in each of these categories, as seen in Fig. 30. However, it was important to note that the share of CLHIV among all the PLHIV in all these six categories ('registered for care', 'never initiated on ART', 'ever started ART', 'alive and on ART', 'death after ART' and 'LFU after ART') in the Belgaum district were higher, compared to the Karnataka state's. This could be due to the presence of a larger (compared to Karnataka state's) existing pool of the CLHIV from the past years, which got identified and enrolled for the care and treatment in more recent years; a part of this bulk of the CLHIV remained on care with or without ART (as prescribed by the eligibility criteria on those days) while the other part exited (LFU and deaths) the systems of care within a short period of time (creating a high turn-over rate).

On the whole, the ART coverage had been scaled up among the PLHIV and the CLHIV post-2000 in all the regions of the world. The Karnataka state fared better than India and the global figures in the initiation of ART for the PLHIV. Since 2010, there is a decreasing share of the children and an increasing share of the adults (especially women) among those on treatment. In all the regions, when the proportion on treatment had increased, the case fatality rate (deaths) decreased, fetching the advantage of life-years, both among all the ages and the children. The HIV program data from the Karnataka state and the Belgaum district were also in line with the global trends. Belgaum district data showed a higher number of the CLHIV (among all the PLHIV) getting into the systems of care, thereby increasing their share among all the PLHIV through each level of the care and treatment processes, including death and LFU, compared to the Karnataka averages.

1.5.5. The Prevention of Mother-To-Child Transmission and Early Infant Diagnosis.

The Prevention of Mother-To-Child Transmission (PMTCT) is synonymous with Prevention of Parent-To-Child Transmission (PPTCT), except that latter was conceptualized and used more in the Indian scenario. As discussed earlier, the main strategy of the PMTCT program was the provision of ARV to the HIV-infected pregnant mothers and the children born to them. As such, the number of pregnant mothers needing and receiving ARV could be the indicators. Of these, the former (pregnant mothers needing ARV) could also be a proxy indicator for the HIV positive pregnancies; and sans the issues of pregnancy wastage, pregnancy-related mother deaths, and multiple pregnancies, this also provided the number of the exposed children born in the region. The PMTCT program was followed by the Early Infant Diagnosis (EID) program, for the early identification of the HIV infection to commence the treatment for the HIV-exposed infants. Table 9 and figures 34-39 show the status of the trends in the PMTCT in different geographical regions[39,41,42].

Globally, the 0.44 million pregnant mothers who required the ARV (which could also be a proxy for the estimated HIV positive pregnancies or the HIV-exposed children) for PMTCT in 1990 increased to 1.4 million in 2010 (Fig. 34)[39]. However, there was no much variation in the numbers between 2010 and 2017. The share of the pregnant mothers needing ARV in the total population (which also indicated the HIV positive pregnancy rate or the HIV-exposed childbirth rate in a population) also increased from 83 per million population in 1990 to 229 in 2000 but decreased later to 186 per million population in 2017. The global share of the pregnant mothers needing ARV with respect to the PLHIV population (which also indicated the pregnancy rates among the HIV-infected) decreased from 5.3% to 3.79% (Fig. 35).

In India, the number of the HIV positive pregnancies (needing ARV) decreased from 51 to 23 thousand between 2007 and 2017, to decrease its share in the total population from 44 (approximately 20% of the global) to 17 (<10% of the global) per million, and among the PLHIV from 2.06% (approximately 45% of the global) to 1.10% (approximately 30% of

Table 9. Number and share of the pregnant mothers needing and receiving ARV for PMTCT, World, India and Karnataka, 2000-2017[39,41,42].

Criteria	Region	Description	1990	1991	2000	2007	2010	2012	2013	2016	2017
Pregnant women needing ARV for PMTCT [39,41,42]	Global	N	440000	550000	1400000	1300000	1400000	1400000	1400000	1400000	1400000
		Share wrt global total population (per million)	83	102	229	195	202	197	195	188	186
		Share wrt global PLHIV population	5.30	5.45	5.11	4.22	4.32	4.15	4.08	3.86	3.79
	India	N				51375	27000	25000	25000	23000	23000
		Share wrt India total population (per million)				43.55	21.93	19.79	19.55	17.37	17.17
		Share wrt India PLHIV population				2.06	1.17	1.09	1.14	1.05	1.10
		Share wrt global pregnant women needing ARV for PMTCT				3.95	1.93	1.79	1.79	1.64	1.64
	Karnataka	N				4604	3189	2632	2407	1852	1951
		Share wrt Karnataka total population (per million)				79.86	52.96	42.46	38.27	28.19	29.27
		Share wrt Karnataka PLHIV population				1.88	1.46	1.24	1.16	0.95	
		Share wrt India pregnant women needing ARV for PMTCT				8.96	11.81	10.53	9.63	8.05	8.48

Criteria	Region	Description	1990	1991	2000	2007	2010	2012	2013	2016	2017
Pregnant women who received ARV for PMTCT [39,41,42]	Global	N					686136	918645	978751	1101680	1117840
		Share wrt global pregnant women needing ARV for PMTCT					49.01	65.62	69.91	78.69	79.85
	India	N				9300	12651	1568	5239	13951	13716
		Share wrt India pregnant women needing ARV for PMTCT				18.10	46.86	6.27	20.96	60.66	59.63
		Share wrt global pregnant women receiving ARV for PMTCT					1.84	0.17	0.54	1.27	1.23
	Karnataka	N				957	2187			1517	
		Share wrt Karnataka pregnant women needing ARV for PMTCT				20.79	68.58			81.90	
		Share wrt India pregnant women receiving ARV for PMTCT				10.29	17.29			10.87	
New HIV infections averted by	Global	N		68	2684	67215	130000	160000	170000	200000	210000
		Share wrt global pregnant women needing ARV for PMTCT		0.01	0.19	5.17	9.29	11.43	12.14	14.29	15.00
		Share wrt global pregnant women receiving ARV for PMTCT					18.95	17.42	17.37	18.15	18.79
	India	N						1300	1300	2900	3500

Criteria	Region	Description	1990	1991	2000	2007	2010	2012	2013	2016	2017
PMTCT [39]		Share wrt India pregnant women needing ARV for PMTCT						5.20	5.20	12.61	15.22
		Share wrt India pregnant women receiving ARV for PMTCT							24.81	20.79	25.52
		Share wrt global new HIV infections averted by PMTCT						0.81	0.76	1.45	1.67

Note: All the share are mentioned in percentage (%)unless otherwise mentioned. Values more than 100% possible due to 'in-migration' or 'transfer-in' cases for treatment. Sources: 39, 41 (for Karnataka 2010-2011 data on CLHIV and PLHIV numbers; Karnataka 2007-2011 data on PPTCT; India PLHIV-ART 2007-2009 data), 42 (for Karnataka 2007, 2016 data only).

Fig. 34. Pregnant women needing and receiving the ARV for PMTCT by geographical region, 2007-2017.

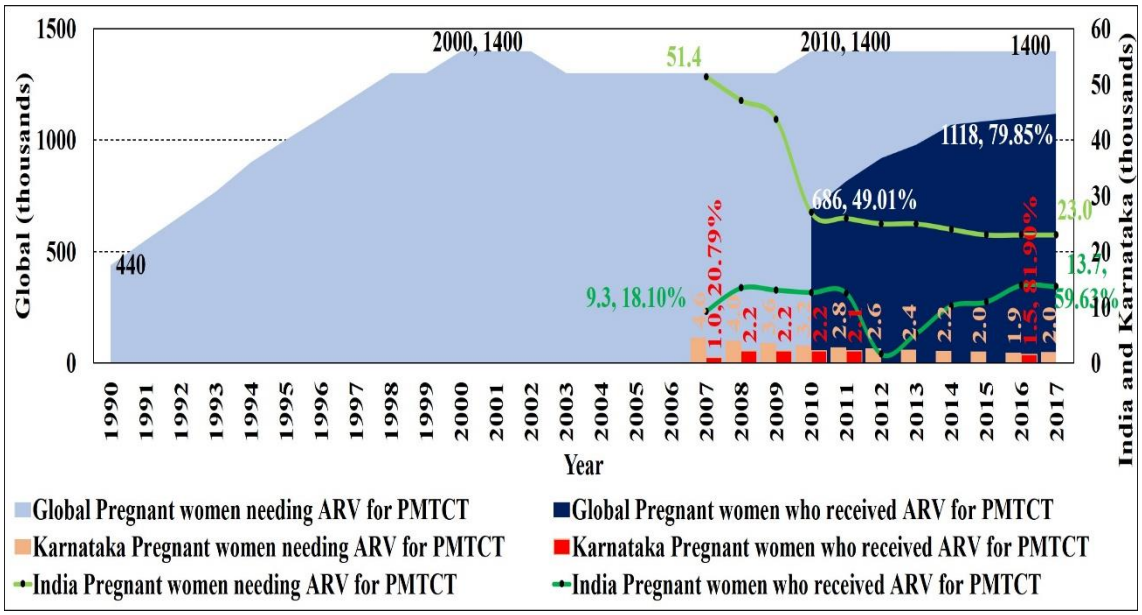
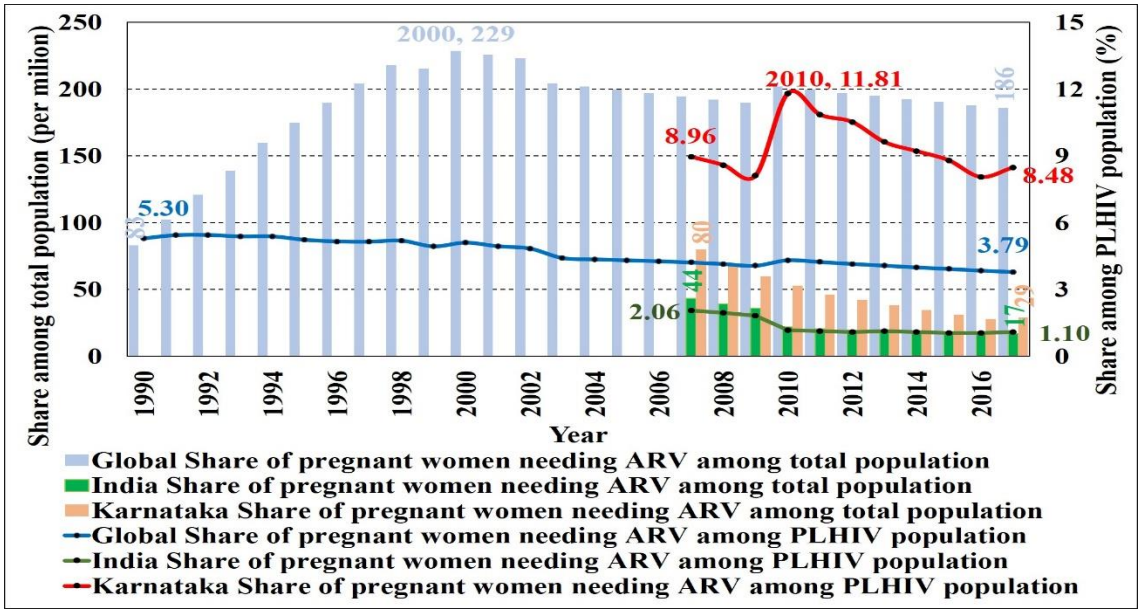


Fig. 35. Share of the pregnant women needing the ARV for PMTCT among the PLHIV and the total population, by geographical region, 1990-2017.



the global) (Fig. 34 and 35)[39]. As such, the India HIV positive pregnancy rate in the total population and among the PLHIV population was much lower than the global.

Geographically, the share of the India HIV positive pregnancies dropped from 3.95% of the global to 1.64% between 2007 and 2017 (Fig. 36).

In the Karnataka state, the number of HIV positive pregnancies needing the ARV decreased from 4604 to 1951 (2007-2017) (Fig. 34)[41,42]. In the state, this retained the rate of the HIV positive pregnancies in the total population as higher than India's, but lower than the global, at any point of time, even if it had decreased from 80 to 29 per million population (2007-2017). The pregnancy rate among the PLHIV in the Karnataka state was much higher than India (more than four times) and the global (more than double) figures; this was of the range 8.5-9% in the state in 2007-2017 (Fig. 35).

As described earlier, the guidelines for the PMTCT-ARV prophylaxis changed from sdNVP to long-term NVP to long-term triple-drug regimen to lifelong triple-drug regimen at various points of time. The global data were available only for that based on the latest strategy and hence used for the review here. In 2010, globally 49% (0.65 million) of the needy pregnant women received the ARV, while it increased to 80% (1.18 million) in 2017. In the same period, the coverage of the ARV increased from 18% (9300) to 60% (13716)[39] in India, and from 20% (957) to 82% (1517) in the Karnataka state (Fig. 34)[41,42]. Geographically, the share of the India ARV-covered HIV positive pregnancies among the global remained less than 2% (Fig. 36.)

The estimated new HIV infections averted due to the PMTCT had increased from 0.13 to 0.21 million globally, and from 1300 to 3500 in India, in 2010-2017[39]. Figure 37 shows that this trend was in line with the increasing trends in the number of pregnant women needing ARV and ARV coverage. This had increased the averted HIV infections from a rate of 0.01% to 15.00% (1990-2017) globally, and from 5.20% to 15.22% (2012-2017) in India, among all the pregnant women needing ARV (Fig. 38). However, the rate of averted new HIV infections among those pregnant women who received the ARV was higher than that among all the HIV positive pregnancies. This stayed around 19% and 25% globally and in India in 2017 (Fig. 38), which meant that the subsequent HIV infections among the HIV-exposed children decreased by this factor.

Fig. 36. Geographic share of the pregnant women needing and receiving ARV/ART among the global total, 2007-2017.

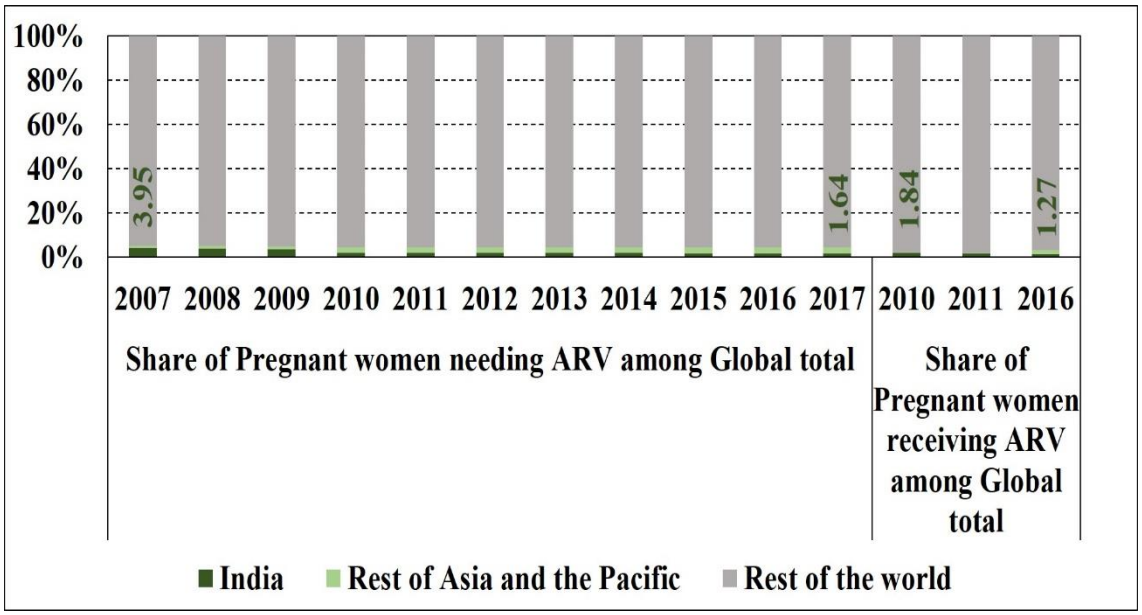
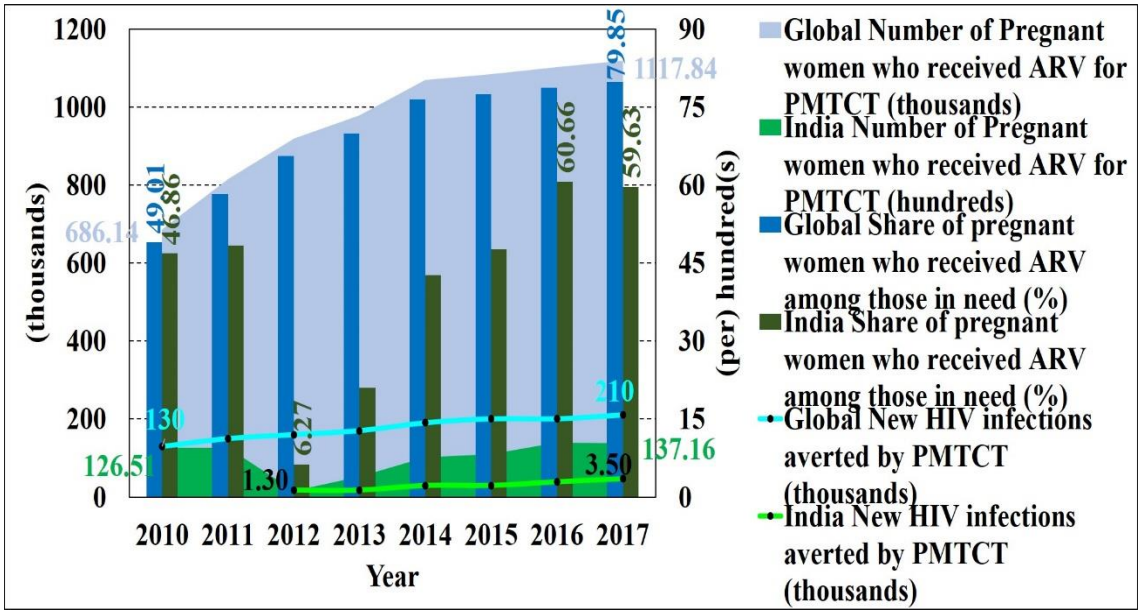


Fig. 37. Number and share of the pregnant women who received the ARV among those in need for PMTCT, and the estimated new HIV infections averted by the PMTCT, by geographical region, 2010-2017.



An inverse-but-non-linear relationship was observed when the proportion of the pregnant women in need receiving the ARV and the new HIV infections among the children <15

Fig. 38. Share of the new infections averted by PMTCT among the pregnant women needing and receiving the ARV, by geographical region, 1991-2017.

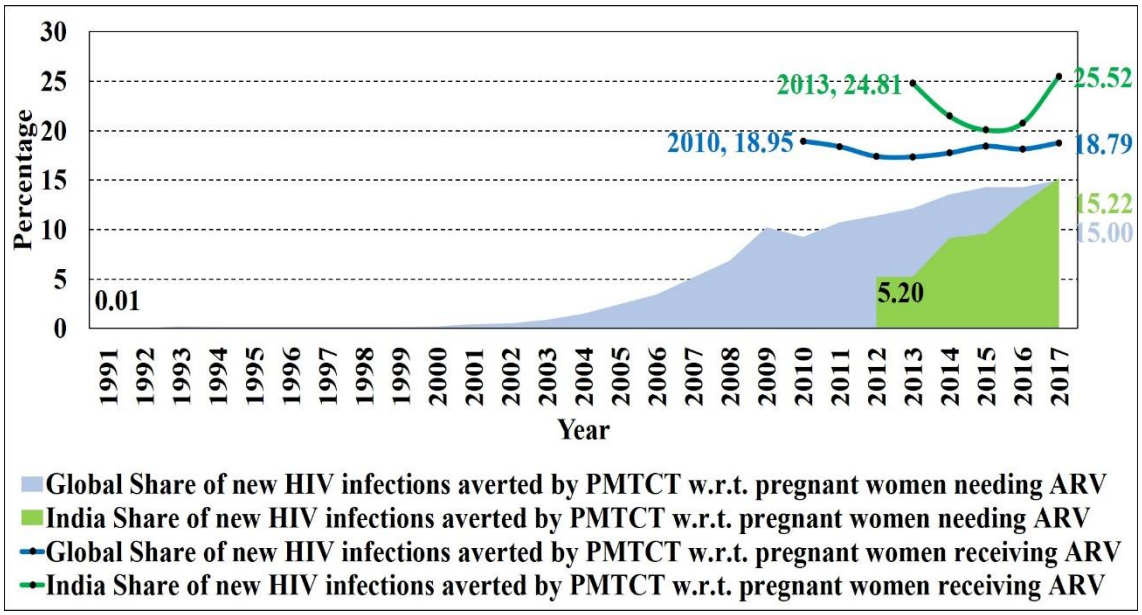
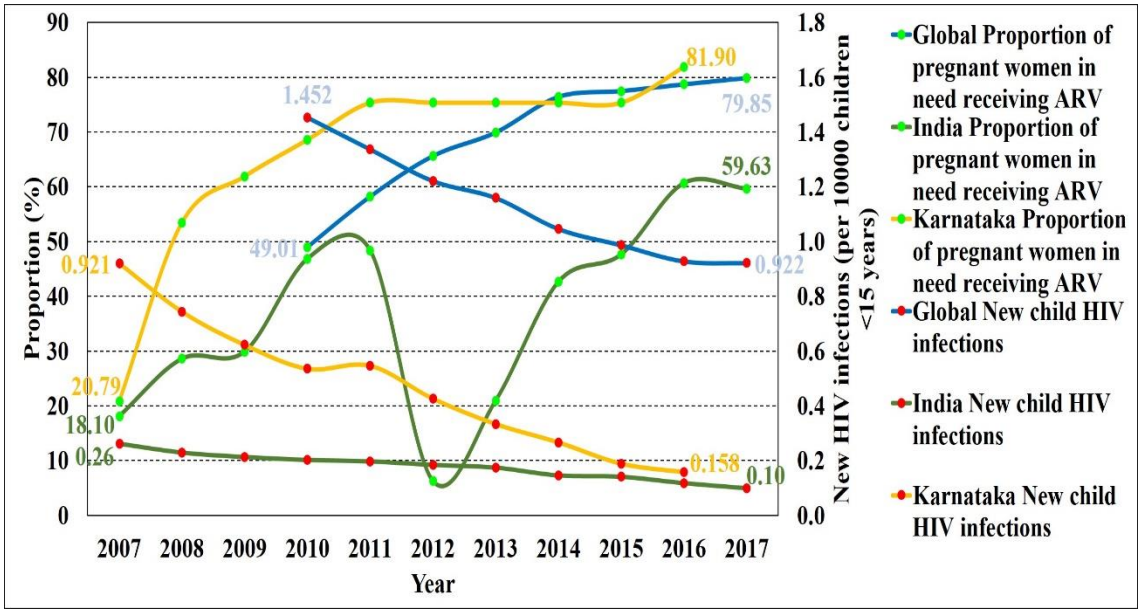


Fig. 39. The proportion of the pregnant women in need receiving the ARV, and the new HIV infections among the children <15 years, by geographical region, 2007-2017.



years were plotted against each other (based on tables 5 and 9) (Fig. 39). When the ARV coverage among the HIV positive pregnancies increased from 49.01% to 79.85% (2010-2017) globally, the number of new HIV infections dropped from 1.45 to 0.92 per thousand

Table 10. The proportion of the HIV-exposed children undergoing an early HIV test during infancy, World and India, 2010-2017.

Criteria	Region	2010	2011	2012	2013	2014	2015	2016	2017
Exposed children having a viro-logical HIV test for EID within two months of age (%)	Global	33	36	41	40	48	49	44	51
	India	6	7	8	9	10	25	27	23

under-15 children. Similarly, when the ARV coverage increased from 18.10% to 59.63% in India, and from 20.79% to 81.90% in the Karnataka state (2007-2017), the number of the new HIV infections among the children (<15 years) dropped from 0.26 to 0.10 and 0.92 to 0.16 per thousand children, respectively.

In short, there was a slowing down of increase in the HIV positive pregnancies from 2000 in the whole world, while India had decreasing numbers. The coverage of the ARV increased, which simultaneously had resulted in decreased new HIV infections among the children. However, the rate of advantage (new infections averted by PMTCT) was different in different parts of the world, while there was a clear-cut advantage among those pregnant women receiving ARV.

If the risk of MTCT in India was 5%[41], it could be expected that there would be 1150 infants (out of the 23000 HIV positive pregnancies) in India, and 98 (out of the 1951 HIV positive pregnancies) in the Karnataka state, in 2017, turning HIV positive (HIV-exposed-and-infected or HIV-EI children), sans the events of pregnancy wastage, pregnancy-related mortality (of pregnant mother or infant) and multiple pregnancies. However, more numbers could be expected, as the MTCT rate of 5% was reported for the ARV-covered pregnancies (which is not a reality in India), and because the transmission rate was higher in some other studies[25]. The rest would be HIV-exposed and uninfected (HIV-EU) children. As the efficiency of the ARV to prevent MTCT was not 100%, and as the coverage of ARV was not 100%, the PMTCT strategy had to be supplemented with a strategy for early diagnosis of HIV infection among the infants for initiating early treatment. Table 10 shows the share of HIV-exposed children undergoing a virological (DBS-DNA PCR) HIV test as a part of

the EID program. The share of the HIV-tested HIV-exposed children increased from 33 to 51% across the globe, while the magnitude and the share were lesser in India (despite an increase from 6% to 23%), between 2010 and 2017. Hence the chance of detecting an HIV infection due to MTCT in the early life of infants was also lesser in India.

1.5.6. The HIV incidence, prevalence, and related ratios.

The trends in the HIV incidence, prevalence, and incidence-prevalence ratio between 1990 and 2017 are shown in table 11 and figures 40-46[20,31-34,39,42,47-60].

The prevalence of HIV infection denoted the pool of the existing HIV infection at any point in time. The global prevalence of HIV infection has increased from 0.30% to 0.80% (1990-2008) and remained more or less constant until 2017 (Fig. 40). On the other hand, the prevalence of the HIV infection in India was lesser than the global; it increased between 1990 (0.05%) and 1997 (0.50%), and remained so till 2002, and declined further till 2017 (0.20%)[39]. The available data for the Karnataka state coincided with the declining phase of the HIV prevalence in India; it decreased from 0.68% to 0.43% in (2007-2016)[20,42] and was higher than India's, but lower than the global.

In India, the HIV Sentinel Surveillance (HSS) survey also predicted the prevalence among various groups like the antenatal mothers and HRGs[60]. Among the antenatal mothers, the prevalence of the HIV infection decreased from 0.95% to 0.28% in India, and from 1.52% to 0.38% in the Karnataka state, between 2004 and 2017. Between 2003 and 2017, the Belgaum district also witnessed a steep drop of HIV prevalence among pregnant women from 4.50% to 0.63%. As such, the state of Karnataka had a higher HIV prevalence among the pregnant women than the Indian average; while the Belgaum district had it higher than that of the Karnataka state (Fig. 41).

A crude form of HIV prevalence is the HIV positivity, the proportion of HIV-infected among the tested, which could be obtained from the HIV program and surveillance data

Table 11. HIV prevalence, positivity, incidence, incidence-prevalence ratio and incidence-mortality ratio, by geographical region, 1990-2017[20,31-34,39,42,47-60].

Criteria	Region	Description	1990	1994	1995	1997	2000	2003	2004	2005	2006	2007	2009	2011	2012	2013	2015	2016	2017
HIV prevalence (Adults, 15-49 years)[20,39,42]	Global	%	0.30	0.50	0.60	0.70	0.80	0.80	0.80	0.80	0.80	0.70	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	India	%	0.05	0.30	0.40	0.50	0.50	0.40	0.40	0.40	0.40	0.30	0.30	0.30	0.30	0.20	0.20	0.20	0.20
	KA	%										0.68	0.59	0.53	0.51	0.49	0.45	0.43	
HIV prevalence, Male: Female (15-49 years)[39]	Global	R	0.30: 0.30	0.50: 0.50	0.60: 0.60	0.70: 0.70	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80	0.70: 0.80
	India	R	0.05: 0.05	0.40: 0.20	0.50: 0.30	0.60: 0.40	0.60: 0.40	0.50: 0.40	0.50: 0.30	0.40: 0.30	0.40: 0.30	0.40: 0.30	0.30: 0.20	0.30: 0.20	0.30: 0.20	0.30: 0.20	0.30: 0.20	0.30: 0.20	0.20: 0.20
HIV prevalence, ANC[6]	India	%						0.80	0.95	0.90	0.60	0.49	0.49	0.40		0.35	0.29		0.28
	KA	%						1.43	1.52	1.49	1.12	0.86	0.89	0.69		0.53	0.36		0.38
	BGM	%						4.50	4.25	3.63	3.13	2.00	1.50	0.90		0.75	0.63		0.63
HIV positivity, General population[31-34,47-59]	KA	HT										199	746	1180	1262	1660	1948	1941	2220
		PD										28912	48472	39477	34673	29461	21994	20004	18862
		HP										14.51	6.50	3.35	2.75	1.77	1.13	1.03	0.85
	BGM	HT										14.6	61.1	101.4	566.5	118.8	143.2	141.7	153.9
		PD										2413	5552	4461	2135	3286	2402	2164	2035

Criteria	Region	Description	1990	1994	1995	1997	2000	2003	2004	2005	2006	2007	2009	2011	2012	2013	2015	2016	2017
		HP										16.55	9.09	4.40	3.77	2.77	1.68	1.53	1.32
HIV positivity, Pregnant women[31-34,47-59]	KA	HT										393	795	1011	962.0	1170	1286	1322	1418
		PD										3301	3549	2333	1831	1445	1034	851	891
		HP										0.84	0.45	0.23	0.19	0.12	0.08	0.06	0.06
	BGM	HT										17.6	75.3	104.2	49.4	100.5	112.6	111.8	111.8
		PD										247	515	257	101	146	119	98	95
		HP										1.40	0.68	0.25	0.20	0.15	0.11	0.09	0.08
HIV positivity, Total population[47-59]	KA	HT										591.8	1541	2191	2224	2830	3234	3262	3638
		PD										32213	52021	41810	36504	30906	23028	20855	19753
		HP										5.44	3.38	1.91	1.64	1.09	0.71	0.64	0.54
	BGM	HT										32.2	136.3	205.5	106.0	219.3	255.8	253.6	265.7
		PD										2660	6067	4718	2236	3432	2521	2262	2130
		HP										8.26	4.45	2.30	2.11	1.57	0.99	0.89	0.80
HIV incidence (All ages)[39]	Global	/1000	0.49	0.61	0.63	0.59	0.49	0.43	0.41	0.40	0.38	0.37	0.35	0.32	0.31	0.30	0.27	0.26	0.25
	India	/1000	0.24	0.64	0.58	0.35	0.19	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09	0.08	0.07	0.07	0.10
	Global	/1000	0.85	1.01	1.03	0.94	0.75	0.64	0.62	0.60	0.58	0.57	0.54	0.50	0.48	0.47	0.44	0.42	0.40

Criteria	Region	Description	1990	1994	1995	1997	2000	2003	2004	2005	2006	2007	2009	2011	2012	2013	2015	2016	2017
HIV incidence (Adults, 15-49 yrs)[39]	India	/1000	0.40	1.03	0.93	0.54	0.29	0.19	0.18	0.17	0.16	0.15	0.15	0.14	0.13	0.12	0.11	0.10	0.15
Incidence-Prevalence ratio[39]	Global	R	0.23	0.19	0.18	0.14	0.10	0.09	0.08	0.08	0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.05	0.05
	India	R	0.52	0.33	0.27	0.15	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
Incidence-Mortality ratio[39]	Global	R	5.61	3.95	3.48	2.60	1.64	1.23	1.17	1.15	1.15	1.19	1.32	1.40	1.44	1.48	1.52	1.53	1.53
	India	R	24.25	12.52	9.42	3.91	1.19	0.62	0.55	0.52	0.51	0.51	0.62	0.76	0.80	0.85	0.96	0.98	1.02

ANC=Antenatal care. %: Percentage. R: Ratio. HT: HIV tested (thousands). PD: PLHIV detected, N. HP: HIV positivity, %. /1000: per 1000 population. KA: Karnataka. BGM: Belgaum. Sources: 20 (for Karnataka 2007-2015 data only), 31-34 (for Karnataka 2012-2016 data), 39, 42 (for Karnataka 2007, 2016 data only), 47-60.

Fig. 40. HIV prevalence, incidence, and incidence-prevalence ratio, by geographical region, 1990-2017.

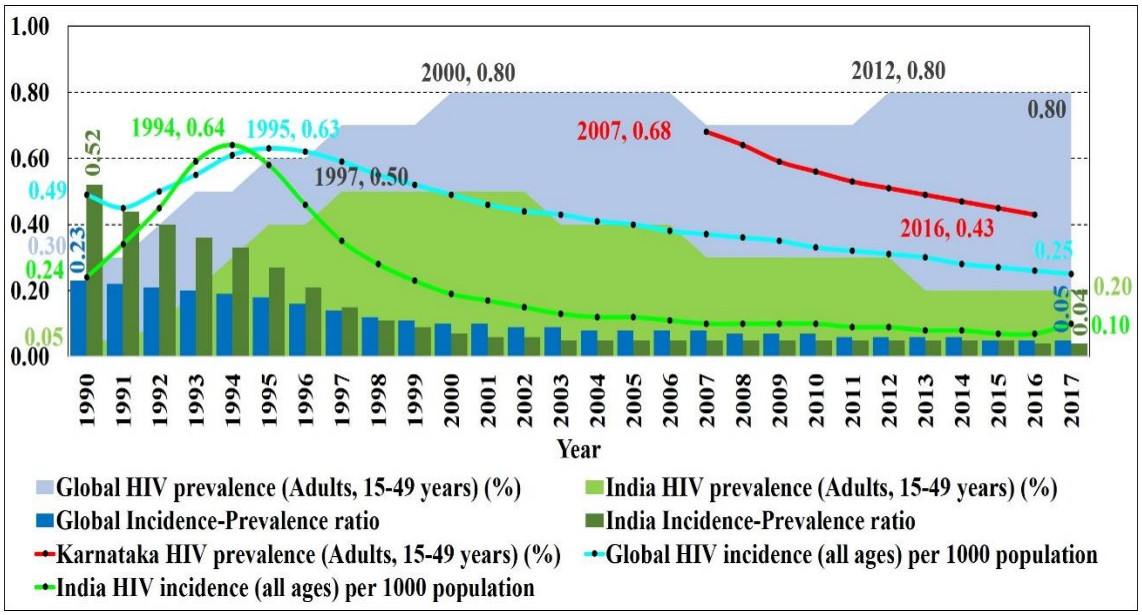
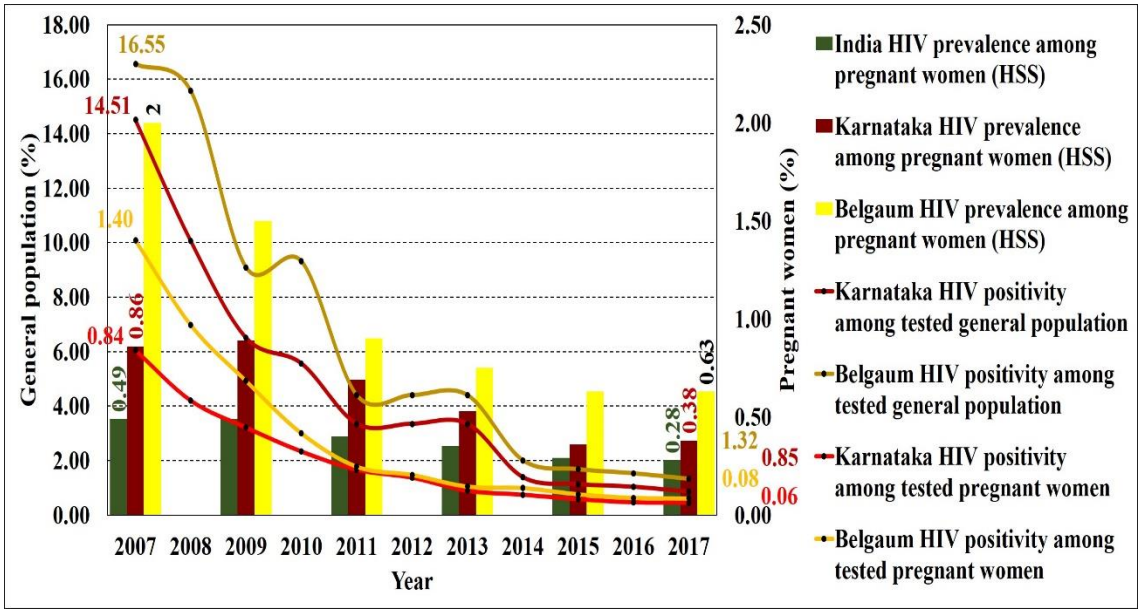


Fig. 41. HIV positivity among the tested general population and pregnant women, and prevalence among the pregnant women, India, Karnataka and Belgaum, 2007-2017.



(Fig. 41)[31-34,47-59]. The HIV positivity among the tested decreased between 2007 and 2017: from 14.51% to 0.85% and from 0.84% to 0.06% among the general population and the pregnant women of the Karnataka state; and, from 16.55% to 1.32% and from 1.40% to

0.08% among the general population and the pregnant women of the Belgaum district (respectively). However, the positivity among the general population was higher than that among the pregnant women; and the positivity in the Belgaum district was higher than that of their counterparts in the Karnataka state. There is no report for HIV positivity among children <15 years of age available for the review, except for a year (2012). However, among the biological children of PLHIV in the Belgaum district, the HIV positivity under-5 and under-15 children were 18.6% and 10.6% respectively[61].

The incidence of the HIV infection indicated the rate of the new infections in a region and is expressed annually. Incidence of a particular year added to the prevalence of the subsequent year(s), sans the death of the HIV-infected person. Both the global (0.63 per 1000 population) and India (0.64 per 1000 population) HIV incidence peaked almost in the same period (1994-1995) and then decreased. The rate of the rise and the fall of the incidence in India was higher than that of the world. The HIV incidence in the world and India in 2017 were 0.25 and 0.10 per 1000 population, respectively (Fig. 40)[39].

The ratio between the incidence and the prevalence denoted the number of new infections per existing PLHIV in that community in a year. A value less than 0.03 for this ratio meant that the prevention and control program was better enough to keep the 'spread' of infection to less than one person from each existing infected person in the latter's 'infectious life span' assumed as 33 years[62]. As such, this ratio referred to the 'status of infectiousness' or proliferation of the HIV infection against the background of control strategies undertaken, and hence could instead help to know whether the programs employed to contain the infection was moving in the right direction, and by what magnitude. If the value was retained less than 0.03 for a longer time, then the infection could eventually be eliminated. The incidence-prevalence ratio had declined steadily for both the whole world and India, from 0.23 and 0.52 in 1990 to 0.05 and 0.04 in 2017, respectively (Fig. 40)[39]. The rate of fall of the incidence-prevalence ratio was higher for India, and near the threshold value of 0.03 in 2017, and hence it could be inferred that the prevention and control measures fetched better benefits than the global average. The decline in the incidence-prevalence ratio was associated with a decline in the new infections and the AIDS deaths, both among

Fig. 42. New HIV infections and AIDS deaths (all ages), and Incidence-Prevalence ratio, by geographic region, 1990-2017.

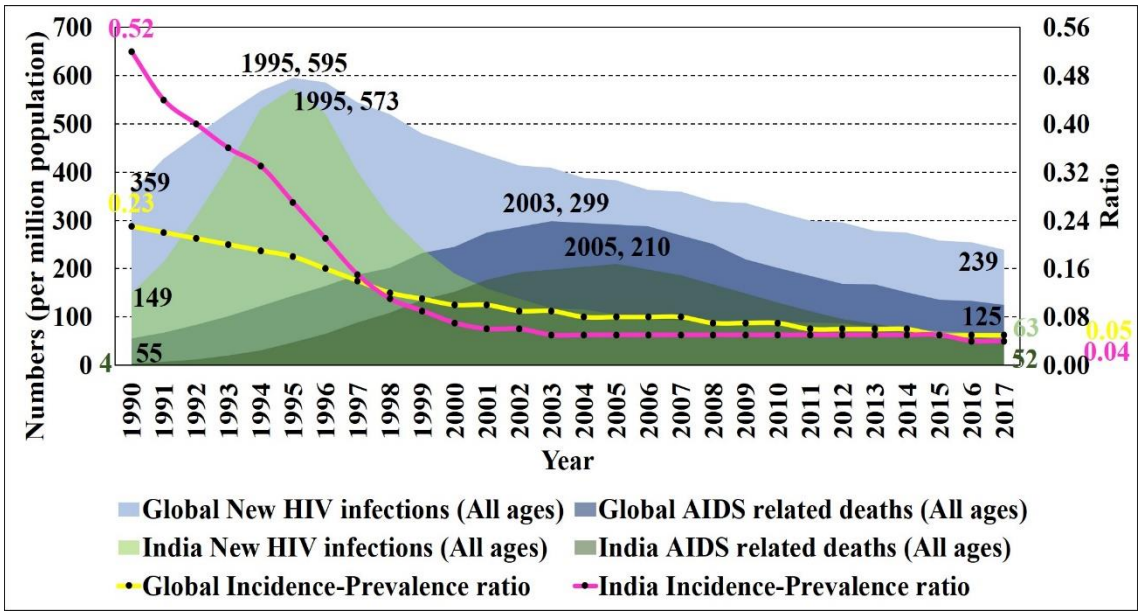
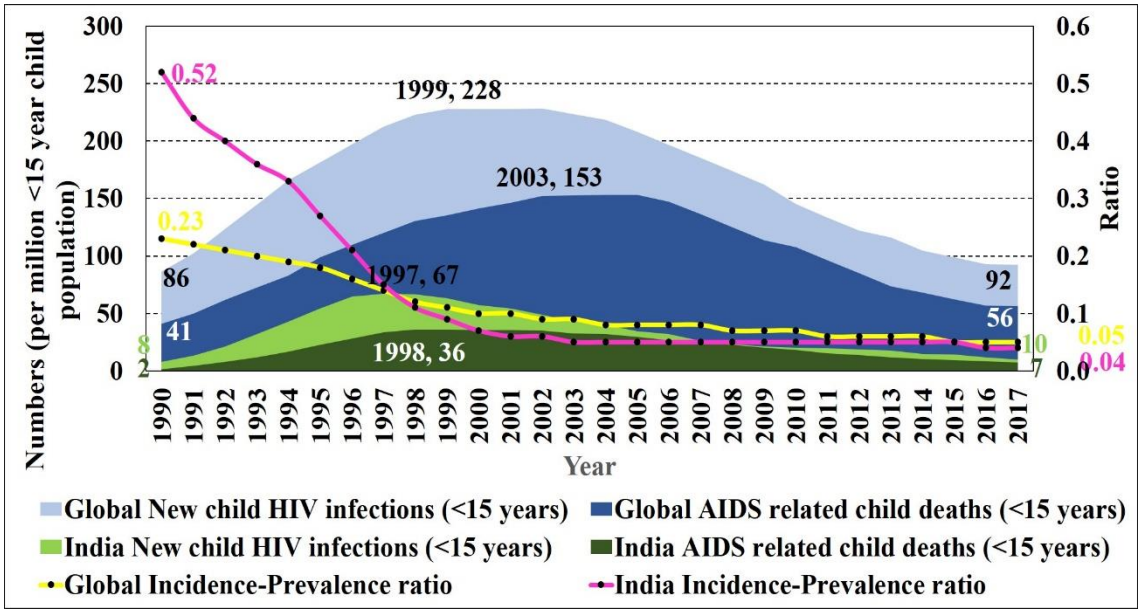
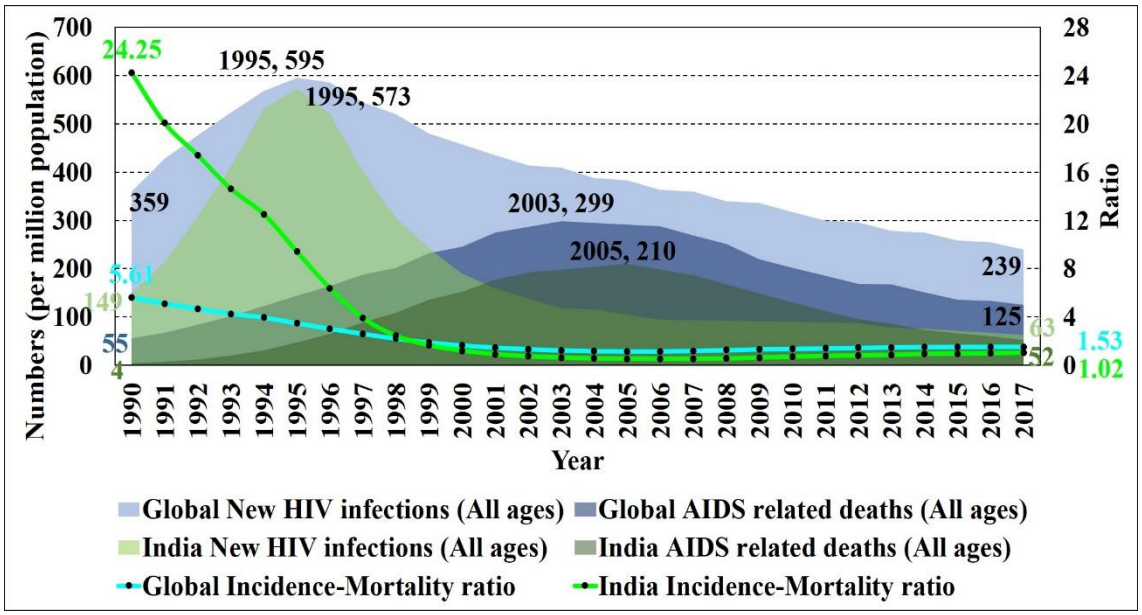


Fig. 43. New HIV infections and AIDS-related deaths among the children <15 years, and Incidence-Prevalence ratio, by geographic region, 1990-2017.



the PLHIV and the CLHIV (Fig. 42, 43; based on tables 5, 6, 11). Hence it could be inferred that the prevention control measures had resulted in reducing the new HIV infections and the AIDS deaths (or inversely, prolonging life).

Fig. 44. New HIV infections and AIDS-related deaths (all ages), and Incidence-Mortality ratio, by geographic region, 1990-2017.



The ratio between the incidence and the mortality denoted the ratio of the number of new infections to the number of deaths in a year[62]. This meant how much larger/smaller the new infections were, compared to the deaths. If the incidence-mortality ratio were more than 1, the size of the PLHIV population would be growing; if less than 1, it would be shrinking. However, incidence mortality ratio could be lower than 1, in case of both the low incidence and/or the high mortality among PLHIV community. At a mortality rate equal to that of prevalence, both the incidence-mortality and the incidence-prevalence ratios would be equivalent. The incidence-mortality ratio of the world decreased from 5.61 in 1990 to 1.15 in 2004-2005, and then marginally increased to 1.53 in 2017. Similarly, it decreased from 24.25 in 1990 to 0.51 in 2006-2007 in India and then increased to 1.02 in 2017[39]. The initial decline was due to the decline in the new infections, and the post-2005 increase could be due to the splay in the decline of mortality rate compared to the incident infections. The relation of the incidence-mortality ratio to new infections and deaths, both among the PLLHIV and the CLHIV, are shown in Fig. 44 and 45 (based on tables 5, 6, 11). Figure 46 (based on table 11) shows that the incidence of HIV infection, mortality among the PLHIV and spread of HIV was decreasing, and thereby, the whole HIV epidemic was declining,

Fig. 45. New HIV infections and AIDS-related deaths among the children <15 years, and Incidence-Mortality ratio, by geographic region, 1990-2017.

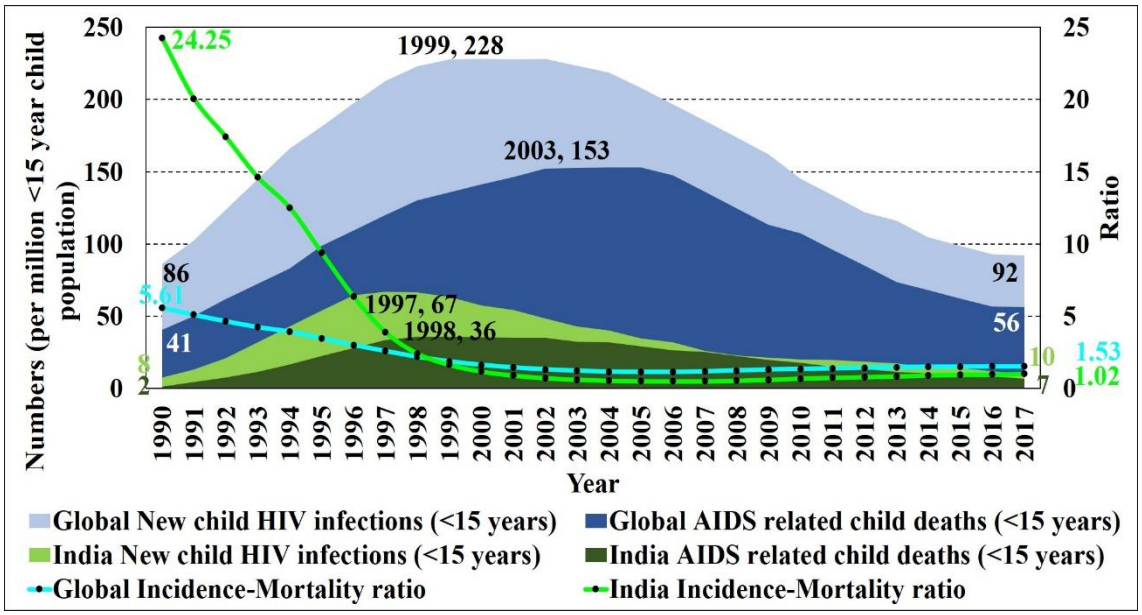
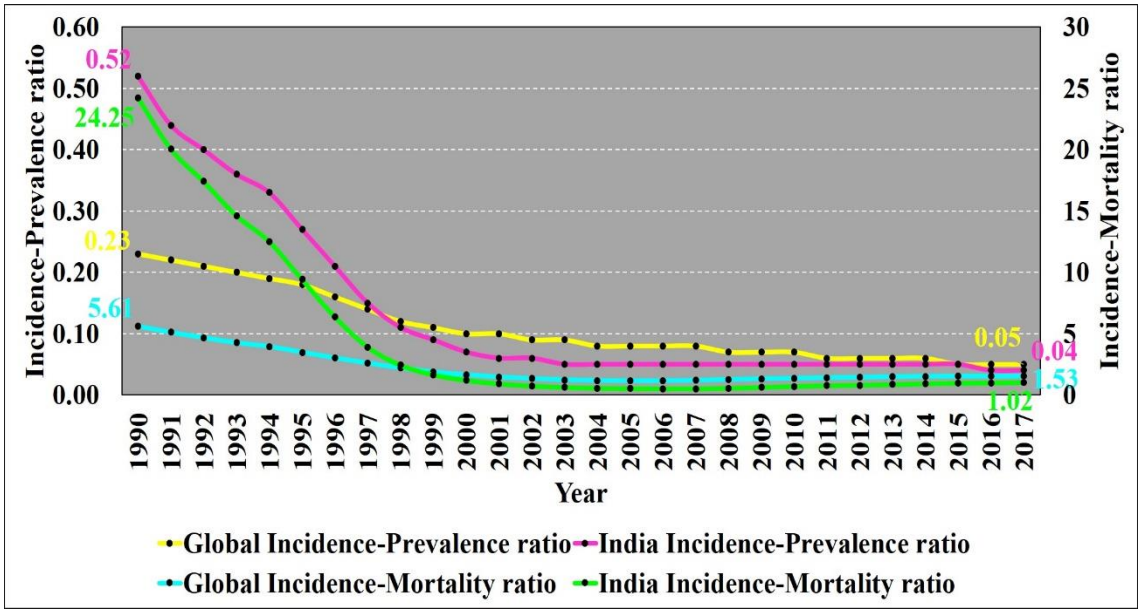


Fig. 46. Incidence-Prevalence and Incidence-Mortality ratios, by geographic region, 1990-2017.



as both the incidence-prevalence and incidence-mortality ratios were near-converging in both India and the world.

1.6. HIV-exposed children and their profile.

As described earlier, HIV-exposed children born to an HIV-infected mother could be either HIV-infected (HIV-EI) or HIV-uninfected (HIV-EU), if they were ever HIV tested. Some HIV untested children would have an unknown HIV status (HIV-E?). The exposure to maternal HIV infection, own HIV infection, and environmental factors could influence the nutritional, morbidity, and mortality status of the HIV-exposed children.

1.6.1. HIV/AIDS, nutrition and growth and development.

The nutritional and health aspects of HIV-infected children had been studied in various parts of the world. Most of the studies had confirmed that HIV-infected children had significantly poorer nutritional outcomes compared to HIV-uninfected children. The prevalence of less-than-recommended height for age ('stunting') among the HIV-infected children were found to be high in a community-based cross-sectional study in the rural South Africa[63], and a cross-sectional study conducted in the health centers of Zimbabwe[64]. Also, the ages of child, mother, and head of the household, and the birth weight of the child were identified as significant factors that determine the nutritional status of the child, in these studies. The mean weight for age (WFA) and length-for-age (or height for age, HFA) among the HIV-infected children were also reported to be lower than the HIV-uninfected children[65]. In contrast, the under-nutrition reported was less among the HIV-infected children on Highly Active Anti-Retroviral Therapy (HAART) from an out-patient clinic of Brazil[66], which could probably be due to the nutritional priming that was ensured before the HAART.

In a prospective study on the nutritional aspects of the HIV-infected children on rehabilitation care in Hyderabad, it was identified that 59.7% of them were stunted, 46.8% were underweight, and 19.5% had low Body Mass Index (BMI)-for-age[67]. This study had also reported the presence of micro-nutrient (Vitamin A, D, Iron, and Folic Acid) deficiencies among the HIV-infected children, as their dietary intake of the total energy and micronutrients were less compared to the recommended dietary allowance (RDA).

Stunting (76%), underweight (71%) and wasting (38%) were reported among the HIV-infected children 0-5 year of age, while low height (60%), weight (35%) and BMI (20%) for age were reported among 6-18 year children, from an ART centre in Gwalior, India[68]. In addition to the HIV infection, the LBW, orphan status, younger age and illiteracy of the mother, lower socio-economic status and recurrent infections were identified as the key factors influencing the nutritional status of the HIV-infected children. Another three cross-sectional studies conducted in India had established similar under-nutrition rates among the CLHIV, around 60-63%[69,70,71].

The World Health Organization (WHO) had recommended 10% increased energy consumption for the HIV-infected-but-asymptomatic adults and children, compared to the energy intake of a healthy person to maintain growth and health; and, 20-30% more energy intake was recommended for the HIV-infected symptomatic people[72]. Enhanced nutrition was proved to be helpful to better the nutritional status of HIV-infected children during morbidity[73]. A step ahead, it was also demonstrated that good nutrition alone, despite their ART status, could help to improve the growth and development in the HIV-infected children in India[74]. On the other hand, it was also reported that the macronutrient supplementation did not help to improve the nutritional status of HIV-infected adults in Chennai[75]. However, it was widely accepted that a better nutritional status was the key to the success of ART for prolonging the life of HIV-infected individuals. However, the correction of the nutritional status was difficult as the infection progressed[76].

A study had reported that, among the children infected with HIV in utero, the birth weight was lesser by 0.28 kg, and the length was lesser by 1.64 cm, compared to the HIV negative children[77]. The lower birth weight had also been described among the HIV-exposed newborns when compared with the HIV unexposed[78,79]. The maternal triple-drug therapy (using Zidovudine, Lamivudine, and Nelfinavir) was shown to have no impact on the anthropometric outcomes of children, in a prospective study of the mother-child pairs in Brazil[80,81]. From an Indian study, it was noted in the post-neonatal life that, even though the HFA had improved and the stunting had decreased among the CLHIV treated with ART for three years, the indicators like the BMI for age and wasting (low weight for height)

were inconsistent with the duration of the ART; as such, the ART was only partially effective in countering the malnutrition and growth failure. The initial clinical stages of the HIV infection, the younger age of the children and the lower initial readings of the indicators (HFA and BMI for age) were found to influence the retrieving of the respective anthropometric measurements with ART[82]. However, this retrospective study has included the children attending a clinical facility for three years, and have excluded the dead, lost-to-follow-up, and treatment-failure children.

The issues related to breastfeeding, alternative feeding, weaning, LBW, retarded growth, malnutrition, growth retardation, less immunity, and poor response to ART were found mutually interlinked in the CLHIV[65,77,83-85]. However, all these studies were from the African background, where these inter-relationships could be much stronger, as all these happened under the wider umbrella of poverty, less development, and food insecurity. The situations elsewhere could be different.

Very few studies have compared the growth and development among the HIV-EI and the HIV-EU groups of children. In an African background (the DRC), the HIV-EI children, in comparison with the HIV-EU children and the HIV unexposed and uninfected children, had lesser HFA, WFA, and weight-for-length in 0-24 months of age; but, the HIV-EU children who had these lower than that of the HIV unexposed and uninfected children at birth, caught up with that of the latter within 3 months of age[78]. On the other hand, in a European background, all the HIV-exposed children (the HIV-EI and the HIV-EU children) had similar height and weight at birth; however, they diverged in their growth, growth pattern and growth velocity in the subsequent years of life: the HIV-infected children grew more slowly than their HIV-uninfected counterparts, and the gap between the two groups widened with age[81]. A situation akin to that of the European situation was also observed among the children born to black women in South Africa, where the HIV-EI and the HIV-EU children were similar at birth, but diverged in their growth later in life[86]. It was found that the HIV-EI children experienced significantly greater growth retardation within the first three months of life compared the HIV-EU children[87], and the HIV-EI children on an average weighed 400g lesser at one year of age[79]. In a Tanzanian study, the

HIV-exposed children had significantly less growth faltering with higher maternal schooling and CD4 count, while the infant's HIV infection was linked only to the inadequate HFA and weight for length[88]. However, the nutritional recovery and growth after the treatment for malnutrition among the HIV-EI and the HIV-EU children were similar, so that early recognition and management of malnutrition could be of advantage, for the HIV-exposed children[85]. All these results were, again, from the African background, and there was limited information on the nutrition and growth patterns in the Indian background.

As early as 1985, it had been documented that HIV-infected children had neurological problems[89]. Impaired growth, and cognitive and motor developments were reported as a morbidity and mortality risk factor among the HIV-infected children[89,90,91]. Communication and behavioural (like psychosomatic, learning, hyperactivity, conduct, and anxiety) problems were also reported among the HIV-infected children[92,93,94]. The HIV-infected children having opportunistic infections had more neurological abnormalities and lesser head circumference, compared to those not having it and the HIV-uninfected children[95]. Neither the in utero exposure to maternal HIV infection nor the maternal triple-drug ARV/ART (both antenatal and post-natal) influenced the neurodevelopmental aspects of the HIV-exposed children, compared to the HIV unexposed children[96,97]. However, a combination ART improved the neurocognitive signs among the HIV-EI children, and the viral load and the CD4 count marginally predicted the future changes in those signs[98]. In contrast, no much improvements in the neuro-developmental functions following HAART had also been reported in a different setting[99].

In short, HIV-infected children tend to be malnourished; and the undernourishment manifested in different forms in their life. It had been reported to have resulted in LBW, lower weight and height gain, nutrient deficiency signs and symptoms, and neurodevelopmental deficits. The age of the child, mother, and head of the household, birth weight, orphan status, maternal schooling, maternal CD4 counts, socio-economic status, recurrent infections, breastfeeding, alternative feeding, and weaning were identified as key factors influencing the nutritional status of the HIV-exposed child. Good nutrition

was identified as a pre-requisite for the better outcomes of ART. The differentials among the HIV-infected and uninfected children were mainly informed from the African sub-continent, and indicated higher malnutrition among HIV-infected than uninfected; however, the rate of recovery to any nutrition intervention was similar in both the categories. Maternal ARV or ART had no significant influence on the growth and development of the HIV-exposed child, but own ART had some signs of benefits, but not in all the settings. The nutritional status of the children in terms of simultaneously-undernourished mother-child pair had not been considered for studies till time.

1.6.2. HIV/AIDS and morbidity.

The HIV reduces the immunity, and hence, is well known for its co-morbidities, both in the infected children and adults. However, the type of infections varied between the countries. Recurrent sinusitis/ upper respiratory tract infection, chronic diarrhea, tuberculosis, chronic dermatological conditions, and oral candidiasis were reported from among the HIV-infected children 8-19 years of age from Zimbabwe HIV-treatment clinic[100]. In a retrospective cohort study conducted in a hospital of Brazil, among the HIV-infected children 0-18 years of age, the most common comorbidities were anaemia (67.2%), pneumonia/ septicemia/ acute bacterial meningitis (64.2%), acute otitis media/ recurrent sinusitis (55.4%), recurrent severe bacterial infections (47.4%) and dermatitis (43.1%); while the most common clinical signs were hepatomegaly (81.62%), splenomegaly (63.8%), lymphadenopathy (68.4%) and persistent fever (32.8%)[101]. In a clinic-based prospective study from Africa, compared to the HIV-EU children, the HIV-EI children had recurrent fever, chronic diarrhea, vomiting, ear infections, skin conditions, oral thrush, and cough; and the signs of otitis media, dermatitis, oral candidiasis, active chest problems, lymphadenopathy, and developmental delay were frequently present; but, the frequencies of symptoms and diseases among the HIV-EU children and the HIV unexposed and uninfected children were similar[102]. However, another study from Jamaica had reported that the incidence of the infectious diseases (like upper respiratory tract infection, otitis media, and acute gastroenteritis), and allied hospitalization, were higher in the (mostly breastfed) HIV-EU infants than for the HIV unexposed[103]. Anaemia, and

respiratory (pneumonia, upper respiratory tract infections, pulmonary TB) and dermatological (scabies, dermatitis, herpes simplex, herpes zoster, molluscum contagiosum, mumps) co-morbidities were reported higher in the HIV-infected children 1.5 to 15 years of age in Hyderabad, India, and was found to be associated with undernourishment, higher viral load and non-ART status[67]. Acute respiratory infections and acute watery diarrhea were reported higher among the HIV-infected children 0-18 years of age attending an ART center in Gwalior, India[68].

The presentation of morbidity also varied by the ART status of HIV-infected children. In a Cote d'Ivoire hospital (retrospective) study, it was reported that digestive and dermatological problems, tuberculosis, severe acute malnutrition, anaemia and pneumonia, and frequency of hospitalization, were higher commonly present among the children on ART[104]. Similarly, bronchitis, diarrhea and the diseases of ear, nose, and throat had figured as most common morbidities among children 18 months to 18 years of age who underwent HAART; however, the incidence of diseases was higher among the untreated symptomatic children and similar among the asymptomatic and the children on HAART[105].

Worldwide, the PLHIV had 20-37 times higher chance to have the TB infection than an HIV-uninfected person[106]. The situation was not much different in India[107]. However, epidemiological information on the HIV-TB co-infection among the children is lacking; it ranged 5.8% in the Dominican Republic to 56% in Zambia; a study reported the co-infection prevalence as 16% in Mumbai India[108]. Also, chronic cough more than one-month duration, abnormal lung functions, chronic skin diseases, pubertal delay, and hearing impairment were noticed as the chronic HIV co-morbidities among the HIV-infected children 6-15 years of age in primary health care centers of Zimbabwe[64].

To summarize, the HIV infection in the children was characterized mostly by acute morbidities, especially those related to the respiratory tract, gastrointestinal tract, and skin, which in turn resulted in higher hospitalization. However, the presenting infections varied in different geographic settings. No epidemiological information was available for the HIV-TB co-infection among the children in India, despite a few clinic-based studies. The

non-communicable diseases like anaemia, pubertal delay, and hearing impairment were also reported among children. There were conflicting reports on the acute morbidity burden among HIV-EU and HIV unexposed children. The morbidities had not been explored in terms of co-morbid mother-child pair, or among the HIV-exposed children as a whole group, hitherto.

1.6.3. HIV/AIDS and mortality.

Mortality in HIV-infected individuals was usually due to co-morbidities. In Africa, 50% of the HIV-EI children died within the first two years of the life[65,109]. Also, the HIV-EU children had two-times increased risk of death within the first two years of life, as compared to children born to HIV-uninfected mothers[110]. Perinatally acquired HIV infection also predisposed the growth failure, the severity of which had led to mortality[65]. In a clinic-based prospective study from Africa, it was observed that by the 2 years of age, 35% of the HIV-infected children died, and by 3 years of age, 89% died. Among the HIV-infected children, the shortest median survival time was <10 months (after the occurrence of first AIDS-related morbidity conditions, like splenomegaly, oral thrush, and developmental delay), and the longest was more than 20 months (after the first occurrence of conditions, such as fever, cough, diarrhea, and lymphadenopathy). The proportion of children surviving 12 months after a first morbidity episode was lower among the HIV-infected children (39-68%), compared to the HIV-uninfected children (81-96%). As such, these clinical conditions could serve as predictors of mortality among the HIV-infected children[102].

Mortality could also depend upon the ART status of the HIV-infected child. Mortality was higher among the children infected-but-not-on-ART[104]. A multi-site retrospective cohort study (2004-2009) among children <12 years of age in sub-Saharan Africa revealed that 78% of the deaths occurred within the first year of ART, mounting the overall mortality rate to 2.25 deaths per 100 person-years; as such, increased mortality was found associated with the younger age and advanced disease[111]. In the Asia-Pacific region, mortality accrued to 6.6% among the children on combination ART (crude mortality of 1.9 per 100 child

years); the low CD4 count, initiation of ART on low WFA children, and the advanced clinical stage of the disease predicted the risk to death[112]. HAART had significantly brought down the mortality in the HIV-infected children (from 7.2 to 0.8 per person-years), by reducing the deaths due to Mycobacterium avium and Cryptosporidium infections between 1996 and 2000; as such, the deaths reported later were due to 'End-stage-AIDS', some non-AIDS-defining-infections (like sepsis) and multi-organ failure[113]. An ART program data from Thailand found that the mortality incidence among the children <18 years of age was 99 per 1000 person-years of follow-up within 6 months of the initiation of ART, and 6 per 1000 person-years after 6 months. Age >13 years, HIV-RNA >400 copies/millilitre, BMI z-scores <-2 standard deviation (SD), and haemoglobin (Hb) values <8 g/dl were found to be associated with the HIV-related mortality among children[114]. TB was identified as the main reason for mortality among the PLHIV and CLHIV[105,106]. However, all these studies were from the non-Indian background.

In a nutshell, the mortality was higher among the HIV-infected and the HIV-exposed than the HIV unexposed children. The rate, reason, and predictors of mortality differed from region to region. Younger age, anaemia, acute morbidities, ART initiation among the underweight children, non-ART status, low CD4, and high viral counts predicted imminent mortality. Opportunistic infections killing the CLHIV had reduced since the introduction of HAART, but TB emerged as the main reason for mortality. There is a dearth of mortality information among the CLHIV from the Indian background.

Box 2. Summary of review of the literature.

Since the index case of HIV infection was reported, the infections spread into the community predominantly through the sexual mode of transmission to adults and mother-to-child transmission to children. The strategies of PPTCT, EID, and CST, were intended to ensure infection-free children and to prolong the life of PLHIV and CLHIV.

Globally, even though the HIV epidemic was not homogeneously spread across the regions, the HIV epidemic scenario in the world, India, and Karnataka were similar; the

difference was in the magnitude of the epidemic. While India had a low-grade epidemic in the world, the Karnataka state had a graver epidemic in the country, and the Belgaum district experienced an aggravated form of epidemic in the Karnataka state, during 1990-2017. However, in 2017, the burden and trends of the HIV infection showed the signs of control of the epidemic, irrespective of regional and intra-country variations. There was a stagnation/decline in the number of PLHIV/CLHIV, new infection, and AIDS-related deaths; the incidence, prevalence, and mortality had come down. Evidence showed that theAIDS-related mortality reduced with a higher proportion of PLHIV/CLHIV on ART, and the new HIV infections among children reduced with a higher proportion of HIV-infected pregnant mothers receiving ARV/ART. The scenario as in 2017 is explained in Box 1, Introduction.

Grossly, the HIV-exposed and HIV-infected children were decreasing in numbers over the past years. However, as the ARV/ART had reduced the MTCT, there was a growing ratio of the HIV-EU children against the HIV-EI children. The ART had added to the life years of infected mothers and children; however, the quality of life years added was not adequately explored. Internationally, the morbidity and mortality among the HIV-infected children were reported as higher than the HIV non-infected and HIV unexposed, against the all-embracing backdrop of undernourishment. Thus, the under-nourishment, inadequate growth and development for age, morbidity, and mortality remained entangled among the HIV-exposed children. The issues of breastfeeding, alternative feeding, weaning, LBW, poor growth, malnutrition, growth retardation, less immunity, morbidity, and poor response to ART were interlinked to the larger malnutrition-morbidity-mortality cycle. The share and category of malnutrition, the type and frequencies of morbidity, the rate and reasons for mortality, and the factors influencing undernourishment, morbidity, and mortality among the HIV-exposed children could depend on the larger environmental and socio-economic conditions of the country. On the whole, this could portray a vicious cycle of ‘malnutrition-growth and development abnormalities-morbidity-malnutrition’, influenced by the environmental, socio-economic, and breastfeeding factors, resulting in mortality, against each country’s scenario.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND METHODOLOGY

This chapter includes:

CHAPTER 2
CONCEPTUAL FRAMEWORK AND METHODOLOGY

2.1. The research problem.

From the literature, the identified trends of HIV infection in India, the Karnataka state and the Belgaum district were the decline of the HIV positivity and the number of HIV-infected among the total population, pregnant women and children, the increasing coverage of PPTCT program and decreasing MTCT, and the increasing number and coverage of PLHIV and CLHIV on ART; all these tend to dictate a waning epidemic of HIV infection, and increasing life duration of HIV-infected people. The reducing MTCT had resulted in a comparatively larger cohort of the HIV-EU children in the households of the HIV-infected mothers, despite that both the HIV-EI and the HIV-EU children would have been exposed to the maternal HIV infection, subsequent ill-health and the ARV/ART drugs (in utero or during breastfeeding). It was evident that the HIV infection, nutritional status, morbidity, and mortality were interlinked, among the adults and the children. As such, the demands other than the ART could be more on the CST program to ensure the quality of life of the HIV-exposed children, in the future. Moreover, then, a generalized CST program might not suffice; the health care system would be expected to meet more customized and individualized needs to of these children. Thus, on the whole, it may require a shift from 'predominantly-quantity-or-coverage-based' health care to 'predominantly-quality-based' health care, especially for the children. However, there were many lacunae in our knowledge in an Indian background, as to how to proceed for this change. So as a first step, it was imperative to identify these knowledge gaps and try to find an answer for the same.

2.1.1. The gaps in the present knowledge domain.

The following restraints and limitations in the available information had been identified from the review of the literature.

- The majority of the research studies were done on, and informed about, the HIV-infected people (adults and children). Only a very few studies with very less number

of the study population had explored isolated (or at the maximum two interlinked) criteria to profile the morbidity, mortality, nutritional, immunological and socio-economic aspects of the HIV-exposed children; and almost all these were small clinical studies from Africa. Hence, there was a deficiency of:

  - community-based studies which could have been more inclusive of the HIV-exposed children (as they include HIV-EU children of the HIV-infected mothers); and,
  - studies from India to look into the health-ill-health patterns, and the associated factors, among the HIV-exposed children.

- Not all the HIV-infected children were HIV-exposed, and not all the HIV-uninfected children were HIV unexposed. Thus there could be four categories of children: the HIV-EU, HIV-EI, HIV unexposed-but-infected (through other modes of transmission) and HIV unexposed-and-uninfected. As such, the HIV-infected and HIV-uninfected categories of children were not homogenous. Even the same HIV-infected mother could have all these categories of children in her family. For example, there could be (an) already-born HIV unexposed-and-uninfected elder child(ren) when the mother was diagnosed to be HIV-infected in a subsequent pregnancy (this categorized the child as 'HIV affected', as described in chapter 1, section 5.1.); or, her child(ren) could be HIV unexposed-but-infected due to other possible modes of transmission; or, from the pregnancy when she was diagnosed as HIV-infected, she could have HIV-exposed child(ren), either infected or uninfected. As such, irrespective of the HIV status of the children or their exposure to maternal HIV infection, being in the same family could expose these children to similar parental care, food cooked in the family, germs from close contacts, quality and quantity of water and air, cultural and social practices, socio-economic status, familial health-seeking behaviour etc. which could influence their nutrition, morbidity, and mortality. Also, the HIV-exposed children would have the factor of 'exposure to the maternal HIV infection, ill-health, and interventions', while in utero or on breast milk. However:

- most of the published studies included and described the HIV-infected children, in relation to the HIV-uninfected children, but disregarded whether those children were exposed to the maternal HIV infection;
- very few studies had differentiated the HIV unexposed-and-uninfected from the HIV-EU children in their results; and,
- the differential patterns, magnitude and associated factors of nutrition, morbidity, and mortality between the HIV-EI and HIV-EU children were less studied.

- The existing best source of information from the government NACP-PPTCT program data[21,31-34,47-59] did not include the information from/of:
  - the private sector;
  - HIV-infected pregnant mothers who were:
    - missed for registration within the government system (as explained in 'linkage loss' in chapter 1, section 5.4); or,
    - having implicating issues like migration (for work, health care, or otherwise), HIV-untested and/or home deliveries[8], early miscarriages in the antenatal period before seeking antenatal care, difficult geographical terrains, etc.; and,
  - the children who:
    - acquired the HIV infection beyond the 18-month test[9];
    - were HIV-EU[10]; and,

[8] This was important, as 11% of the pregnant mothers did not receive any antenatal care, 6% had deliveries at home, 34.3% did not have an HIV test during ANC or delivery, and 35.3% received antenatal care only from private sector HCFs in the Karnataka state[115].

[9] The PPTCT program mandated a final antibody-based HIV test for the HIV-exposed children at the age of 18 months, to conclusively confirm/exclude HIV infection. In real-life situations, there could be children breastfed beyond 18 months of age, and thus sero-converting (from testing HIV negative to HIV positive) after the age of 18 months.

[10] The PPTCT does not maintain the health related data of the HIV-EU children.

        - were unofficially excluded from the registers for socio-economic, confidentiality, and stigma-related reasons (e.g., the children of HIV-infected politicians, police officers, etc.).
- The monthly (cross-sectional) reports of the PPTCT program were generated at district and state levels. Hence the outcomes of the existing PPTCT program:
    - were not analyzed longitudinally, by tracking the life, health and HIV-related events of the mother-child pairs over time to identify the patterns and associated factors; and,
    - described only the "how much" of HIV infection among the HIV-exposed children by 18 months of age, but not the "why" (the determinants, predictors, or associated factors).
- The information available on the CLHIV was very limited, partly because the reports of children were not generated separately[31-34,47-59]:
    - for example, till 2017 (adoption of 'test and treat' policy by NACO, as described in chapter 1, section 5.4.), even if a child was initiated on ART, the reason for the same was not known; it could be due to low immunity or morbidity of the child (which influences the health-seeking behaviour), or due to mother or family-related reasons, or due to real-time inclusion further to changes in the ART policies; and,
    - the socio-economic, nutritional, immunological, morbidity, and mortality profile of the identified CLHIV not reaching an ART centre was unknown.
- There were hidden cases of the HIV-infected children to the tune of 47 per million children (0-14 years of age) in the community[61], and their likely-HIV-exposed siblings, who could be missing from the records of both the private and public sector HCFs.

2.1.2. The need and relevance of this research study.

The four southern states of India, viz. (undivided) Andhra Pradesh, Karnataka, Maharashtra, and Tamil Nadu had been harboring more than 50% of the India HIV infections[20,21]. There were increasing numbers and share of the HIV-EU children and the

AIDS orphans in India[39], of whom we do not have much information. Also, we do not have much epidemiological information on HIV exposure among the children, other than the HIV infection.

The risk factors, trends and patterns of the HIV infection among the children, and the care and support systems for HIV-infected children in India as a whole, Karnataka state, and Belgaum district were almost similar. In these settings, over the past few years, there was a decreasing trend in the reported number of HIV-infected children, and an increasing trend in the number and duration of life of the children on ART. Expanded coverage of the PPTCT services was reported to have resulted in reducing the MTCT, thereby resulting in a comparatively higher number of HIV-EU children.

The existing care and support services for the HIV-exposed children were predominantly offered by the government HCFs and included free prophylaxis/treatment, counseling (for mothers), and some social entitlements. However, the services were mostly for the HIV-infected children, and limited information was maintained only for those CLHIV who reached the HCFs. On the other hand, the system neither kept a track nor maintained a record of the health status of the HIV-EU children. Thus, the differentials of the life and health outcomes between the HIV-EI and HIV-EU groups of children were not known. Also, with the lesser incidence of HIV infection among the children and the increasing initiation of the CLHIV on ART, the health care system tend to be further skewed to meet the (drug) demand for the same; and the demand for services to ensure the quality of life of the larger HIV-EU community tend to be unmet. Hence, in the coming days, it would be important to plan and put an organized effort to ensure care and support services to the larger HIV-EU children's community and look beyond the provision of ART to the HIV-EI children. This would warrant a shift in the focus of CST services from a "quantity-or-coverage perspective" to a "quality perspective", to prolong the life of the HIV-exposed children, in addition to increasing the scope of both the target population and the services.

Conceptually, it was deemed important to mainstream and incorporate the concept of the 'exposure to maternal HIV' as this could help to:

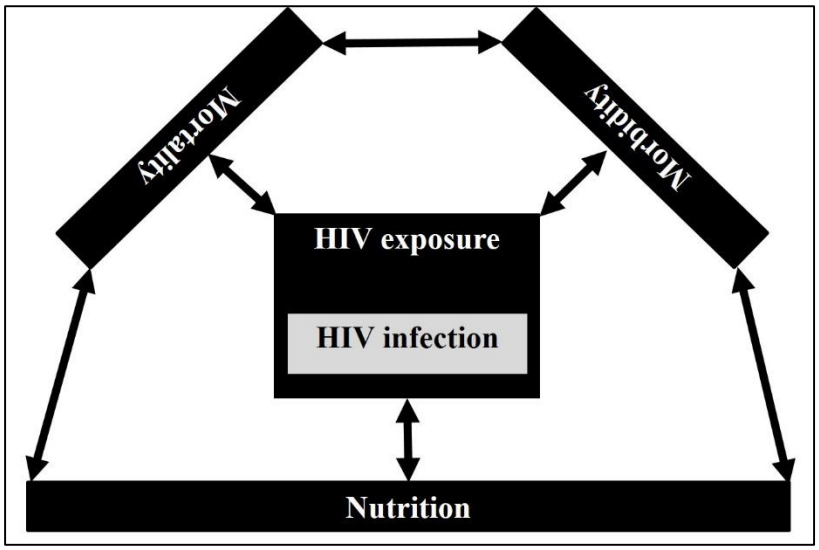
- link all the children to the HIV-infected mother in the family, irrespective of the HIV status, so that they could be considered as a mother-child pair, both during research studies and while determining package and mode of delivery of the welfare programs in the future; and,
- throw light on the magnitude of HIV exposure as the reason for the HIV infections among children, and thereby differentiate the MTCT from other modes of transmission among the children in the community.

Also, against the background of decreasing HIV epidemic, it was important:

- to know about the "why" (the associated factors), in addition to the "how" (the patterns) of the real-time course of HIV infection, nutrition, morbidity and mortality among HIV-exposed children;
- to identify nutritional, morbidity and mortality differentials of patterns, and associated factors, among the HIV-EI and HIV-EU children, if any;
- to identify the hitherto-unregistered children at the CST services;
- to be informed about the nutritional, morbidity and mortality events happening among the HIV-exposed children, to enable informed decision-making (e.g., the choice of drugs, indicators for health intervention, etc.) of HIV programs in India and the countries witnessing similar HIV epidemic in the world; and,
- to fill up the gaps in the knowledge domain of HIV, to 'complete the picture before the sunset'.

The facility-based studies missed the unlinked children, and that risked a less-clear picture of health outcomes and its determinants. On the other hand, the community-based studies on the nutritional, morbidity, and mortality aspects of the HIV-infected or exposed children were not reported from India. As such, there was a dearth of this information on the HIV-exposed children in India. Most of the available information regarding these aspects came from the African sub-continent, which may not be the case with India, due to the differences in cultural, social, and economic aspects. Hence this prospective community-based cohort study of the children (<5 years) exposed to the maternal HIV infection was proposed. It was important to consider the factors of HIV exposure, mother, pregnancy

Fig. 47. Conceptual diagram of the research study.



and child aspects, and the child's nutrition, morbidity, and mortality aspects in a single research framework, while studying the HIV-exposed children, as given in figure 47. This research study was expected to bring a new unique body of knowledge on the HIV-exposed children in Indian background, bridge the existing gaps, and was expected to have future program implications.

2.2. The reasons for the selection of Belgaum district for the research study.

By having functional health care systems, and as the district HIV scenario was in line with the state and national trends, many research projects had been conducted in the HIV related fields in the Belgaum district. One such study was to estimate the burden of pediatric HIV infections, using a multi-pronged strategy, undertaken by Indian Council of Medical Research (ICMR) taskforce, in collaboration with NACO, Karnataka State AIDS Prevention Society (KSAPS), St. John's Research Institute (SJRI) Bangalore, Karnataka Health Promotion Trust (KHPT) Bangalore, and DAPCU Belgaum, with approval from Institutional Ethics Committee of SJRI, Bangalore. It was conducted in two phases: the first phase (2011-2014) was an effort to estimate the burden of pediatric HIV infections, (a conceptual framework of this phase is given in Annexure 3), and the second phase (2014-2017) was a cohort study of the children identified (including the recruitment missed) in

phase 1 and the HIV-exposed children born subsequently till 2017. The researcher himself was involved in the ICMR study, and hence had a chance to get first-hand information on, and interaction with, the participants, people (various stakeholders), and processes (systems of both research and health/HIV care in the district). Hence, with the approval of ICMR, by keeping the ICMR study as a parent study, it was proposed to take up the Ph.D. research study in the Belgaum district of the Karnataka state, from Jawaharlal Nehru University (JNU), New Delhi. However, a separate approval from the Institutional Ethics Review Board of JNU was obtained for this Ph.D. research study. Accordingly, the study participants of the Ph.D. research study, the HIV-exposed children <5 years of age, were aggregated from among the group of children included in the parent study, to explore the health and life outcomes among them, in terms of the patterns, magnitude and associated factors of nutrition, morbidity, and mortality, grossly, and differentially between the HIV-infected and uninfected.

In short, this Ph.D. research study was proposed to piggy-back on the simultaneous ICMR (Phase 2) study. The main advantages of building up the research study on this background were that:

- the investigator was familiar with the ICMR study and its processes, and the Belgaum district, and its stakeholders, health care systems and participants; and,
- the sample frame in the ICMR study was more inclusive and representative of Belgaum health care and HIV scenario, as it included the study subjects:
    - from all the government, non-government and private HCFs having an HIV testing facility in the district;
    - of age >18 months, unlike the PPTCT program data; and,
    - including the orphaned children and the HIV-exposed children born in the district, from 2011-2017.

However, this also ran a concurrent risk: the children of the parents who did not consent for the parent ICMR study were also missed as subjects in the Ph.D. research study.

2.3. Methodology.

2.3.1. The objectives of the research study.

The objectives of the study were:

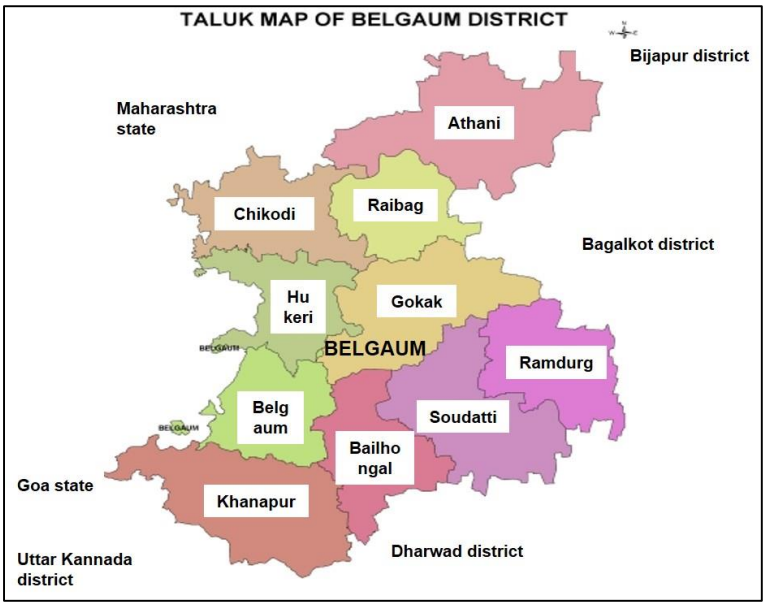
- to study and analyze the real-time course and natural history of the HIV infection among the children exposed to maternal HIV infection, 0-5 years of age, in the Belgaum district, Karnataka state; and,
- to explore and compare the patterns, and identify the associated factors, of nutrition, growth and development, morbidity and mortality among the HIV-exposed children, infected and not infected with HIV, below the age of 5 years.

2.3.2. The study setting and its HIV scenario.

The Belgaum district was chosen for the research study, and the whole district formed the geographical study setting. The Belgaum district shared boundaries with the Sangli and Kolhapur districts of the Maharashtra state on the North and North-West, the Goa state in the South-West, the Uttar Kannada district of the Karnataka state in the South, the Dharwad, Bagalkot, and Bijapur districts of the Karnataka state on the East. Administratively, the Belgaum district was divided into ten talukas (Fig. 48.).

The total population of the Belgaum district was 4779661 (7.8% of the Karnataka state's; males=50.7%, females=49.3%) in 2011. Around 75% of the Belgaum population was rural, and scattered among 1263 villages; the rest 25% was urban from among the 31 towns. The sex ratio among the total population for the Karnataka state and the Belgaum district stood at 973 females for 1000 males; however, the child sex ratio of the Belgaum district (934) was lower than the Karnataka average (948). The rural-urban differentials of the child sex ratio were similar in both the Belgaum district and the Karnataka state, while the urban Belgaum showed slightly favorable sex ratio for the female children, compared to the state figures. The literacy rate of the Belgaum district was 73.5% (males=82.2%, females=64.6%).

Fig. 48. Taluka-wise map of the Belgaum district.



The government HCFs of the Belgaum district included one medical college hospital attached to the district hospital, 9 taluka hospitals, 140 primary health care centres, and 616 sub-centres as in 2018. Also, there were 177 ICTCs and 17 ART centres for HIV prevention and CST services (Table 2)[35]. In addition, there were 782 private HCFs mapped in the district in 2015, of which 3 HCFs offered tertiary level care (all at the district headquarters), 142 (district headquarters=64, other talukas/towns=78) offered secondary level care, and 637 (district headquarters=117, other talukas/towns/villages= 520) offered primary level care[61]. 149 government and 136 private HCFs had a facility for HIV testing. However, there were no private HCFs exclusively for HIV care.

As described in chapter 1, the Belgaum district had:

- HIV prevalence of 0.63% among the antenatal pregnant women (Table 11)[60];
- HIV positivity of 1.32% among the HIV tested general population and 0.08% among the pregnant women (Table 11)[31-34,47-59];
- a cumulative total of 39086 PLHIV till 2018, of which 35709 (91.36%) were ever registered for care at the ART centres. Of the ever registered PLHIV, 74.27% were ever initiated on ART, 48.46% were alive, and on ART in 2017, 19.89% were

cumulatively dead after the start of ART, and 5.92% were cumulatively regarded as LFU/missed after ART start; and,

- 2832 (7.93% of all PLHIV) CLHIV ever registered at ART centres till 2018, of which 63.06% were ever initiated on ART, 49.82% were alive, and on ART in 2017, 9.39% were cumulatively dead after the start of ART, and 109 (3.85%) were cumulatively regarded as LFU/missed after ART start (Table 8)[31-34,47-59].

According to the DAPCU report[35], the EID HIV testing protocols had been rolled out in the Belgaum district in March 2010. The expanded PPTCT project (long term NVP for mother from the fifth month of pregnancy and for the child till the end of breastfeeding) had replaced single dose Nevirapine (sdNVP) in the district in August 2012. Later, the triple-drug ARV was introduced irrespective of the CD4 count for the pregnant mothers in October 2014[24]. In 2016, all the pregnant HIV positive mothers and children were started on life-long ART, irrespective of the CD4 counts; and in 2017, 'test and treat' protocol was adopted for all the PLHIV in 2017. All the government welfare schemes offered by the Karnataka state (Table 3)[34] were also rolled out for the PLHIVs in the district. Thus, the HIV scenario in the district was in line with that of the Karnataka state and India.

2.3.3. The study design.

It was proposed to do a prospective cohort study for a period of 12 months, so that it could help to capture the real-time course and natural history of HIV infection, and the patterns and associated factors of nutrition, growth and development, morbidity and mortality, among the cohort of 0-5 years children exposed to maternal HIV infection. The period of data collection proposed was in 2014-2015 (12 months). However, as the start of the parent ICMR study was delayed, the field activities of the Ph.D. research study was commenced only on 01 Dec 2014. Moreover, after the start, it was decided to extend the data collection from 12 months to 36 months, for want of sufficient observations to make valid results and inference. As such, the Ph.D. research study was also undertaken for 36 months, from 01 Dec 2014 to 30 Nov 2017; the actual data collection happened in the field between 01 Jul 2015 and 30 Nov 2017 (29 months).

2.3.3.1. The inclusion criteria.

A child was defined as the child <5 years of age for the research study. The inclusion criteria for the study were:

(1) all the children in the families recruited in phase 1 (recruitment period: 2011-2013) of the parent ICMR study (that is, children of reported index HIV-infected parent and/or pregnant mothers); and,

(2) all the HIV-infected children identified through clinics in phase 1 of the parent ICMR study (that is, children detected as HIV-infected based on the sickness screening criteria from the clinics); and,

(3) all the children identified as double orphans (both father and mother dead) among the HIV-infected children reported as "index person" in the line list aggregated during phase 1 of the parent ICMR study (that is, children detected as HIV-infected, but not included in phase 1 of the parent ICMR study); and,

(4) all the same-womb siblings, if any, in the family of the children identified in (2) and (3) above; and,

(5) all the children born to the HIV-infected pregnant women identified from 01 June 2013 (after the end of recruitment in phase 1 of the parent ICMR study) to 30 November 2017 (till the end of phase 2 of the parent ICMR study); and,

(6) all the elder children of the pregnant women in the families identified in (5) above; and,

(7) all the children identified in (1)-(6) above, who/whose family were contactable, and residing in the Belgaum district (for more than 3 months in the immediate past at the time of enrolment, as reported by the participant); and,

(8) all the children identified in (1)-(6) above, whose parents were willing to consent for their children's participation in the research study.

2.3.3.2. The exclusion criteria.

The criteria on which the children were excluded from the research study were:

(1) the children $\geq$60 months of age at the time of recruitment; or,

(2) the children identified as not born HIV-exposed (mother not known as HIV-infected when pregnant with the child); or,
(3) the children identified as HIV-infected before their mothers; or,
(4) the children identified as permanently migrated or not contactable (that is, the child was not available for contact over the phone and in-person for three consecutive visits (for data collection) spaced by a minimum of 15 days); or,
(5) the children born before 01 Jan 2011; or,
(6) the children residing outside the Belgaum district; or
(7) the children of parent(s) who were not willing to consent for their child's participation in the study (either in the beginning or subsequently through the course of the study).

2.3.3.3. The frame and recruitment of the study subjects.

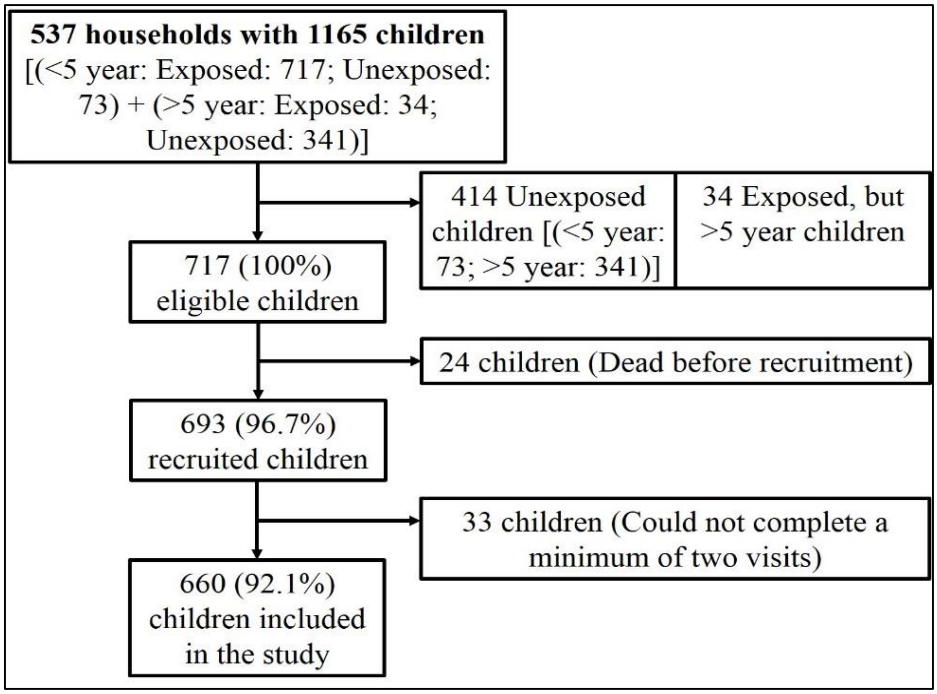
The parent ICMR study had 985 households (HHs) with 2276 (248 HIV-infected, 1771 HIV-uninfected, 257 HIV status not known) children (<15 years) in its frame. Among these HHs, 3.8% (n=87) of the children were dead, 3.1% (n=70) were permanently migrated outside the district, 4.2% (n=95) did not consent for the study, 0.1% (n=2) were excluded for other reasons, at the beginning of the study. This retained 2022 (230 HIV-infected, 1694 HIV-uninfected, 98 HIV status not known) children in the line list of the parent study[26]. The inclusion and exclusion criteria were applied on these 985 HHs with 2022 children, to obtain 653 HHs (also equivalent to families or mothers) with at least one child of age <5 years, the identify the study subjects for the research study (Table 12). This formed the frame of study households in the Ph.D. research study.

No sampling was done, and efforts were made to include all the eligible children in the HHs identified. The recruitment of the study subjects was attempted systematically, starting with the HHs (equivalent to mothers or families) and then proceeding to the children. Each family and child was given a linked unique six-digit identification number (the first two digits denoted the taluka code, next three digits denoted the family or the mother code, and the last digit was the child code).

Table 12. Recruitment of HHs and the reasons for exclusion.

Sl. No.	Level of recruitment	Sub-Sl. No.	Reason for exclusion	HHs	
				N	%
1	Line listed with a child <5 years			653	100.0
		1.a.	Mother HIV-uninfected	16	2.5
		1.b.	All children in the family delivered before the mother was detected as HIV-infected	27	4.1
2	Eligible			610	93.4
		2.a.	All children in the family dead before recruitment	24	3.7
		2.b.	Some children in the family delivered before the mother was detected as HIV-infected AND the rest of the children died before recruitment	2	0.3
3	Recruited			584	89.4
		3.a.	All children in the family had no minimum of two visits completed	47	7.2
4	Included in the database for analysis			537	82.2

Fig. 49. Recruitment of children in the cohort study and reasons for exclusion.



Of the 653 HHs line listed as having at least one child <5 years of age, 43 (6.6% of the total HHs; 16 HIV-uninfected mothers, 27 mothers detected as HIV-infected after the childbirth) HHs had no HIV-exposed children (Table 12). This retained 610 (93.4% of the total) 'eligible HHs' with at least one eligible HIV-exposed child <5 years of age in the line list. Of the 610 'eligible households', 26 (4.0% of the total and 4.3% of eligible HHs; 24 with all the HIV-exposed children dead before the start of recruitment and data collection, 2 with a combination of reasons) HHs were further excluded from the line list. This facilitated recruitment of 584 (89.4% of the total and 95.7% of 'eligible households') HHs into the cohort study. During the study, it was not possible to have a minimum number of two visits (data collection) for all the children in 47 (7.2% of the total, 7.7% of eligible, and 8.0% of recruited) HHs. This attrition was mostly among the households with HIV-exposed children born towards the end of the study period, or due to the refusal to participate after the first episode of data collection. As such, 537 (82.2% of the total, 88.0% of eligible, and 92.0% of recruited) HHs with HIV-exposed <5-year children were included in the cohort study and the database for analysis.

Among the 537 HHs with at least one eligible child, there were a total of 1165 (<5 years: HIV-exposed=717, HIV unexposed=73; >5 years: HIV-exposed=34, HIV unexposed=341) children. By applying the inclusion and exclusion criteria, 448 'ineligible children' (38.5% of the total; 73 HIV unexposed <5-year children, and 34 HIV-exposed and 341 HIV unexposed children >5 years) were excluded. Of the remaining 717 'eligible children', 24 (2.1% of the total and 3.3% of 'eligible children') was dead before recruitment and data collection and were not recruited. Hence, 693 (59.4% of the total and 96.7% of 'eligible children') children were recruited into the cohort study. However, during the study, it was not possible to have a minimum number of two visits for 33 (2.8% of the total, 4.6% of eligible, and 4.8% of recruited) recruited children. This attrition was, again, mostly among the HIV-exposed children born towards the end of the study period, or due to a refusal to participate in the study after the first episode of data collection. Thus, finally, 660 (56.7% of the total, 92.1% of eligible, 95.2% of recruited) children with HIV-exposed <5-year children were included in the cohort study, database and analysis (Fig. 49).

Table 13. Representativeness of recruited study subjects in the sample frame.

Sl. No.	Level	Sub-Sl. No.	Reason for exclusion	Children <5 years			
				N	%	%	%
1	Children < 5 years among line listed HHs			952	100.0		
		1.a.	HIV unexposed children whose mothers were HIV-uninfected	21	2.2		
		1.b.	HIV unexposed children in the families where all the children were born before the mother was detected as HIV-infected	36	3.8		
		1.c.	HIV unexposed children in the families where some children were born before the mother was detected as HIV-infected	77	8.1		
2	Eligible children otherwise			818	85.9	100.0	
Children eligible during the process of recruitment in the study				717		87.7	
		2.a.	Children in the families where all children in the family were dead before recruitment	26	2.7	3.2	
		2.b.	Children in the families where some children in the family were dead before recruitment	26	2.7	3.2	
3	Children who could be recruited otherwise			766	80.5	93.6	100.0
Children recruited in the study				693			90.5
		3.a.	Children in the families where all children had no minimum of 2 visits completed	64	6.7	7.8	8.4
		3.b.	Children in the families where some children had no minimum of 2 visits completed	42	4.4	5.1	5.5
4	Children who could be and were retained in the study			660	69.3	80.7	86.2

The representativeness of the study subjects with respect to the total children <5 years of age among the line listed 653 HHs is as per the table 13. There were a total of 952 children <5 years among the line listed HHs.

- Of these, 21 children had their mothers HIV-uninfected, and 113 were born before their mothers were detected as HIV-infected, thereby leaving 818 (85.9%) children as HIV-exposed and 'otherwise eligible'. As 717 children were found as 'eligible children' in the process of recruitment of the study, this kept the representativeness of eligibility at 87.7%.
- Further, 52 of these 818 children were dead before the recruitment/data collection, thereby reducing the number of children who could be recruited to 766 (80.5% of the total and 93.6% of the 'otherwise eligible') children. As 693 children were recruited in the process of recruitment of the study, this kept the representativeness of recruitment at 90.5%.
- During the course of the study, a minimum of two visits (data collection) could not be completed for 106 children, thereby deflating the number of children who could be and were retained in the study/database to 660 (69.3% of the total, 80.7% of 'otherwise eligible', and 86.2% of 'recruit-able') children.

2.3.3.4. Censoring.

The censoring of the child observations was done:

(1) at the end of the study; or,
(2) when the child completed 4 years and 364 days of life; or,
(3) when the parents of the child opted their child out of the study; or,
(4) when the child died; or,
(5) when the child was untraceable/migrated permanently, and not contactable (as defined in chapter 2, section 3.3.2.), whichever happened earlier.

2.3.4. The data collection.

2.3.4.1. The time of data collection.

The data collection was done in the Belgaum district from 01 July 2015 to 30 November 2017 (29 months).

2.3.4.2. The protocol and process of data collection.

The secondary information on the HIV-infected pregnant women was collected from all the 285 HCFs (149 government and 136 private; chapter 2, section 3.2.) having HIV testing facility in the Belgaum district, from 01 June 2013 till 30 November 2017. This information was appended to the line list of eligible households of phase 1 of ICMR parent study, to update the line list for the time. All these households were contacted, eligibility (as per inclusion and exclusion criteria) was verified, and the consenting eligible children were recruited.

In the cohort study, a baseline and an end line data collection was done, with the scheduled follow-up data collection in between. As such, there was a recruitment or baseline visit, interim follow-up visits, and an endpoint or end line visit. The information related to the family and the mother were captured only in the baseline and end-line data collection schedules, while the information related to the child was captured on all (baseline, follow-up and end line) data collection schedules.

All the recruited children were followed up, till the end of the study or censoring. The frequency of visits to (data collection for) the child was planned to be:

- weekly visits during the post-natal period till one month of age of the child;
- monthly visits during the rest of the first year of the child's life; and
- once in two months during the second to the fifth year after birth.

As such, the data collection was scheduled and synchronized based on the age of the child. The visits were scheduled at 8-10 days, 15-17 days, 22-24 days and 29-31 days in the first month of life; then after the completion of 2, 3, 4, …, 12 months of life; followed by the completion of 14, 16, 18, …, 58 months of life. An additional 59 month's visit was scheduled for children getting censored by age criteria. The information on the schedules of the visit is given in Annexure 4. For all schedules of the first month of life, a duration of three days was earmarked to make the visit for data collection. However, for all the other schedules (2 to 59 months), a duration of 30 days was reserved for making the visit for data

collection. However, in case the planned visit could not be successfully completed in this stipulated time, an unscheduled visit was planned and undertaken case-to-case, with a different code to identify the same.

The data collection was done during the planned dedicated field visits scheduled for the same, after the recruitment of the household and child. For ensuring rigorous data collection, a visit plan schedule was developed for each recruited child, based on the date of birth on a customized Microsoft® Excel worksheet using functions. This master micro-planner was used to generate the schedule for data collection activities for a calendar month. Data collection forms were identified with unique identification numbers generated for the research study, as described in chapter 2, section 3.3.3. Each set of forms for a mother-child pair (baseline, follow-up and end line) was obtained, segregated, cleaned and archived chronologically; and within each set, family information first, followed by mother information and child information, in order.

The primary data collected was cross-checked and evidenced with the secondary data (maintained in health care records) wherever possible, and vice versa (e.g., date of delivery, date of the test, ART details, etc.). The data collection was done at a venue convenient to the participant/respondent. Confidentiality of the information collected from the study participants was ensured as per national protocol[116] and research protocol (Annexure 5, Participant information sheet).

For anthropometry of children, the weight was determined using a digital scale accurate to 0.1 kg. The height/length, head circumference, and mid-upper arm circumference were measured to the nearest 0.1 cm using a standard measuring tape. A portable infantometer that measured the length and weight from a single platform in the same accuracy as above was used for children <1 year of age. Measuring equipment was checked for accuracy and calibrated using known weights and standard measuring tape every 3 months. The results of haemoglobin (Hb) measurement obtained for the parent ICMR study were utilized for this research study. In the parent study, Hb was analyzed in the field using Hemocue® 301.

All the children who expired at an age <5 years, on or after 01 January 2011 (start of phase 1 of the parent ICMR study period) were eligible for the verbal and social autopsy inquiry. Verbal and social autopsy forms were de-identified and read by two different persons from medical background independently to ascertain the cause of death; one person was the investigator himself, while the help was sought from a supervisor of the parent ICMR study for the second reading. In case of any discordance, it was planned to be read by a third expert for finalizing the same; however, this was not indicated in the course of study.

2.3.4.3. The tools.

A piloted and standardized pro-forma-based data collection was undertaken in the study. Separate forms were used to collect the information on family, mother, and child. The tools (Annexure 5) were mainly classified into four categories viz. general forms, mother form, child form, and others. The general forms (identified as G1, G2, G3 & G4) was used to elicit the consent, family and visit details, and additional information, if any. The mother form (identified as M1) was used to elicit information on the mothers and their antenatal history. The child form (identified as C) was single and unique to elicit the child information for all the ages. Other forms included the consent forms and the forms for review of the maternal and child deaths. The same general and mother forms were repeatedly administered during baseline and end line, and the same child form was repeated through the entire study. The child form was the same for both the HIV-EI and HIV-EU children. The forms used for data collection and their frequency of administration are listed in table 14. The forms for the review of maternal, neonatal and post-neonatal infant deaths were the same as those used by the Government of Karnataka, and hence not included in the Annexure 5.

The data collected on the forms mainly included:

- for the family:
    - demographic information of the family members
    - HIV test details of the family members.
    - birth weight of the children.

Table 14. Tools used in the research study.

Name of the tool	Frequency of use	Used during		
		Baseline	Follow-up	End line
General forms				
G1: Registration, Consent information	Once	√		
G2: Family & Household information	Twice	√		√
G3: Visit and Data collection information	During each visit to family	√	√	√
G4: Additional Information	During each visit to family	√	√	√
Mother forms				
M1: Mother Information	Twice	√		√
Child Form				
C: Child Information	During each visit to the recruited child	√	√	√
Other Forms				
Informed Consent Form for parents/caretakers	Once	√		
Maternal Death Review form	Once, in case of death was reported			
Verbal Autopsy form for neonatal deaths				
Verbal Autopsy form for post-neonatal deaths				
VSA-C: Verbal and Social Autopsy form for child deaths at age 1-5 years				

    - life-death status of the family members.
    - social and economic variables.
    - support services availed by the family.
    - environmental factors: housing, sanitation, water, cooking, etc.
- for the mother:
    - HIV/ARV/ART/CD4/clinical stage.
    - previous/current pregnancy-related information.

    - acute and chronic morbidities and drug/vitamin supplement history.
    - nutritional deficiency signs and symptoms.
    - haemoglobin and anthropometry.
    - psycho-social information.
    - maternal mortality and cause of death.
- for the child:
    - 0-5 years:
        - growth and physical/social/language development.
        - immunization.
        - HIV/ARV/ART/CPT/CD4 status, HIV clinical stage.
        - nutritional deficiency signs and symptoms.
        - anthropometry.
        - acute and chronic morbidities, drug/vitamin supplement history.
        - mortality and cause of death.
        - haemoglobin (twice during the study period at entry and exit; if HIV-infected child, once in 6 months).
    - 0-2 years: dietary recall during every visit.
    - 1.5-5 years: HIV test (for negative children, once a year).
    - 3-5 years: pre-school non-formal education and nutrition.

2.3.5. The regulatory formalities.

The Ph.D. admission was confirmed by the Chairperson, Committee for Advanced Studies and Research on 29 January 2015 (Letter No. SSS/2013-14/887, dated 03.03.2015, School of Social Sciences, JNU), and the approval was obtained from Institutional Ethics Review Board, JNU on 17 March 2015 (IERB Ref. No. 2015/Student/68) (Annexure 6).

2.3.6. The data entry, database, and data analysis.

The manual data collected was cleaned using the written guidelines for the same. Double data entry was done on the customized templates of the study tools on Microsoft® Access

2013. In-built limits and checks were introduced in this interface to ensure the data quality. The database cleaning was done on an exported version on Microsoft® Excel 2013, based on the written guidelines to check the internal (within a form), cross or external (between various forms employed), and logical (e.g., chronological) consistency. In-built functions were incorporated into the fields for cleaning the database, wherever possible (e.g., dates, age, BMI calculation, etc.), to ensure the data quality. Outlier data had been picked up for cross-checking with the manual formats.

The database of various forms was merged using the family and child ID numbers, into a single database. This database was maintained as a long format including information of all the child visits for looking into the patterns of the outcome variables, and as a wide format for ascertaining the inter-linkages and the factors associated with the outcome variables, and was locked for analysis. The anthropometry data was analyzed using WHO Anthro software[117] to deduce the z-scores. The data analysis was done using Microsoft® Excel 2013 (for the patterns) and IBM® SPSS Statistics version 20 (for the binomial logistic regression or BLR).

2.3.7. The variables.

The study had considered 102 (94 independent and 8 outcome) variables. Being a cohort study, the children fell into various categories with the course of the time; there were 21 important categories (based on the characteristics of mother, pregnancy or child) of children, for whom the analysis had been attempted. Not all the independent variables were applicable for all the children. Outcome variables of each of the nutrition, morbidity, and mortality were considered as independent variables for the others, to study the inter-linkages between them. Hence, the independent variables were considered as ‘associated factors’ rather than ‘determinants’ or ‘predictors’. Some of the outcome indicators were too small to be analyzed for having valid results at the end of the study; as such, they were retained as independent variables for other outcome variables studied. The complete list of the variables and its definitions are given in annexure 7.

2.3.7.1. The independent variables.

The independent variables were mainly related to the family, socio-economic, and environmental factors. Most of these were direct and self-explanatory; while some were deduced based on the data elicited on the manual forms (as explained/defined in Annexure 7), which included:

- socio-economic status[118,119]
- food support for the family
- nutritional support for the child of age 3-5 years from institutions
- socio-economic crisis in the family[120]
- safely managed drinking water, sanitation, and cooking in the household[121,122]
- vitamin/mineral deficiency status of the mothers
- Body Mass Index (BMI) of the mothers
- anaemia status of the mothers and children by haemoglobin measurement[123]
- psychosocial status of the mother
- the composite indicator of 'sickness' of mothers
- antenatal care (ANC) for mothers during pregnancy
- provision of ARV/ART to the mothers[21,24]
- coverage of PPTCT strategies for the mothers[124,125]
- percentage duration of the total and known-positive life of the child on ART
- status of ensuring minimum diversity, frequency and acceptability of feeds to children 6 months – 2 years of age[126]
- mixed feeding in children[127].

2.3.7.2. The outcome variables and their measurement.

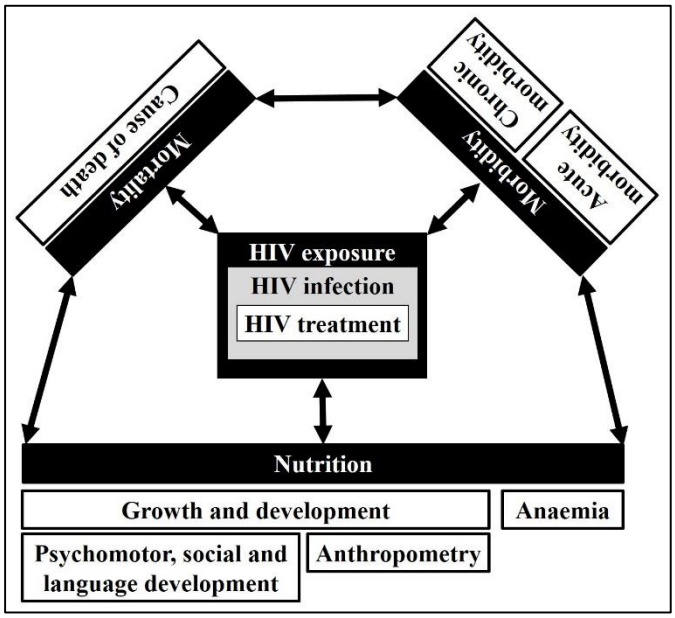
The outcome variables and their indicators for each of the two objectives of the study are listed in table 15. The conceptual diagram for analysis is given in figure 50.

Table 15. Outcome variables and its measurement.

Objective	Area	Outcome variable	Measurement
To study and analyze the real-time course and natural history of the HIV infection	HIV infection	HIV infection	HIV positivity among tested children Proportion of HIV-EU children Proportion of HIV-EI children in various clinical stages Proportion of HIV-EI children on treatment Proportion and patterns of opportunistic infections Factors associated with HIV infection in children
To explore and compare the patterns, and identify the associated factors, of nutrition, growth and development, morbidity and mortality	Nutrition	Growth and development	Proportion of children with psychomotor, social and language development anomalies
			Proportion of children with always-adequate, always-inadequate, and ever-inadequate HFA, WFA, HCFA and MUACFA
			Patterns of HFA, WFA, HCFA, and MUACFA by age, gender and HIV status of children
			Factors associated with ever-inadequate HFA, WFA, HCFA, and MUACFA in children
		Anaemia	Proportion of children with anaemia
			Proportion of children always-anaemic, always-non-anaemic and ever anaemic
			Patterns of anaemia by age, gender and HIV status of children
			Factors associated with anaemia in children
	Morbidity	Acute	Proportion of children with acute morbidities ever
			Proportion of children by frequency of acute morbidities
			Proportion of children always-morbid, always-non-morbid, and ever-morbid

Objective	Area	Outcome variable	Measurement
			Patterns of presence and frequency of morbidity by age, gender and HIV status of children
			Types of acute morbidities
			Factors associated with the presence and burden of acute morbidities in children
		Chronic	Proportion of children with chronic morbidities
	Mortality	Mortality	Proportion of children deaths
			Characteristics and causes of death

Fig. 50. Conceptual diagram for analysis.



HIV infection-related outcomes among children: The natural course of HIV infection among the children were studied in terms of the HIV positivity among the exposed children. Subsequently, the care and treatment indicators were described as proportions. The factors associated with the HIV infection in children were explored, and the differentials between the HIV-EI and the HIV-EU children were outlined.

Growth and physical/social/language development outcomes of children: The screening criteria for eliciting the growth and physical and social development of children were adopted from the Trivandrum Development Screening Chart (TDSC)[128]. However, to be used for the assessment in this cohort study, it was further adapted using a scoring system, as described in Annexure 7, after identifying the critical and non-critical milestones[129]. Based on this, the developmental delay was defined as 'present' if the percent cumulative growth and development score for the critical milestones was <100%, or that for all the milestones was <75%.

The screening criteria for assessing the language development of children were adopted from the Language Evaluation Scale Trivandrum (LEST)[130,131]. However, in order to be used for the assessment in this cohort study, it was further adapted using a scoring system, as described in Annexure 7. Based on this, the developmental delay was defined as 'present', if the percent cumulative language development score for all milestones was <75%.

Anthropometry outcomes: All the children were measured for height, weight, and Mid-Upper Arm Circumference (MUAC), in all the scheduled data collection visits, by adopting standard procedures[132]. Also, for the children <2 years of age, the Head Circumference (HC)[133] was measured. The weight was determined using a digital scale accurate to 0.1 kg. The height/length, HC, and MUAC were measured to the nearest 0.1 cm using a standard measuring tape for children. A portable infantometer that measured both the length and weight from a single platform in the same accuracy as above was used for children <1 year of age. Actual readings on the manual forms were fed into WHO Anthro software[117] to generate the of z-scores for HFA, WFA, Head Circumference-For-Age (HCFA) and Mid Upper Arm Circumference-For-Age (MUACFA). Considering the risk of the HIV-exposed children for slipping into malnutrition, for ascertaining the associated factors, the outcome variables were based on dropping the z-scores of HFA/WFA/HCFA/MUACFA below -2 Standard Deviations (SD); and were defined as 'ever-inadequate HFA/WFA/HCFA/MUACFA', 'always-adequate HFA/WFA/HCFA/ MUACFA', and 'always-inadequate HFA/WFA/HCFA/ MUACFA'. For HCFA of the children >2 years of

age, it was assumed that those with >50 cm circumference had a normal value for age. Mean SD was deduced for each anthropometric measurement.

Anaemia status by haemoglobin measurement: Children were classified as 'non-anaemic' (Hb=≥11.0 g/dl), and with 'mild anaemia' (Hb=10.0-10.9 g/dl), 'moderate anaemia' (Hb=7.0-9.9 g/dl), and 'severe anaemia' (Hb=<7.0 g/dl)[122]. As there were more than one measurement for the child, the variables 'ever anaemic', 'always anaemic' and 'always non-anemic' were created, to represent anaemia any time during the study. Mean Hb values were deduced.

Acute and chronic morbidity outcomes: For the acute morbidity, every type of morbidity (even though more than one occur together) and recurring morbidity (in subsequent visits) were considered as unique and counted. The data from each data collection episode was tallied to generate the total number of acute morbidities for the child. As the data was collected retrospectively since the last visit, this information was expected to cover the full life of the children 0-5 years during the study period. Hence the total number of morbidities were divided by the duration of follow-up of the child as per the last successful visit, to generate a variable 'number of acute morbidities per month of follow-up', to denote both the magnitude and persistence (burden) of acute morbidity. This was classified into nil morbidity, <0.5 and ≥0.5 morbidities per month (the cut-off equivalent to one morbidity in two months), to make the variable categorical. As there were more than one measurement for the child, the variables 'ever morbid', 'always morbid' and 'always non-morbid' was created, to represent morbidity any time during the study. The types of acute morbidity were also categorized (as in Annexure 8) and analyzed.

Chronic diseases would be grossly described in terms of the proportion of children having them, and by type of chronic diseases.

Mortality related outcomes in children: If there were sufficient numbers of mortality to make valid inferences, mortality would have been described in terms of proportion, by age, gender, and HIV status. However, there were only very few child deaths during the

Table 16. Child deaths and verbal autopsies conducted.

Child deaths	Neonatal	Post Neonatal	Child (1-<5 years)	Total
Total deaths	45	48	28	121
Contacted	45	48	28	121
VSA completed	23	31	14	68
Reasons for exclusion				
Refusal	9	8	1	18
Whole family death	2	1	4	7
Whole family permanent migration	9	5	2	16
HIV-unexposed children	2	3	7	12

course of the study. Hence it was planned to include all child deaths below 5 years of age, happening from 01 January 2011 till the end of the study (30 November 2017) to look into the characteristics and causes of death. However, the identification of factors associated with mortality was difficult, as there was be no information available on the 'no-death' group to compare.

The child deaths (from 01 January 2011 to 30 November 2017) eligible for Verbal and Social Autopsy (VSA), and their inclusion/reasons for exclusion are given in table 16.

2.4. Analysis.

A systematic analysis was undertaken based on the objectives of the study, as described in table 15. The analysis included that of patterns and associated factors.

2.4.1. The analysis of patterns.

The database consisted of 660 HIV-exposed children (Fig. 49). The analysis of patterns was done using Microsoft® Excel and WHO Anthro software (chapter 2, section 3.6.). The

background information related to the family, mother, antenatal/intra-natal/post-natal events, child, and their nutrition/morbidity/mortality, were differentially described for the HIV-EI and the HIV-EU children. However, while analyzing the findings from the HIV-EI children, the gender-differentials within the group were not considered as a result, due to very small numbers included in the study, unless otherwise specified.

While analyzing the patterns of the nutritional outcomes of anaemia and anthropometry, and acute morbidity among the HIV-exposed children, they were first categorized by the age of the child at baseline (e.g., <12, 12-23 months, etc.), gender and the result-categories of initial measurement. Further, the trajectory of changes among these unique children were monitored in the subsequent 12-24 months' (e.g., 12-23, 24-35 months for <12 months age at baseline) time period and the children were classified into the more graver (or severe or disadvantaged) group of outcome (if there were more than one follow-up measurements as per study protocol).

However, the trajectory style of analysis typically excluded the last age group of 48+ months of the HIV-exposed children in the study population, as they would be censored before they moved on to the next age category. Hence, a cross-section of the results of the measurements in each of the 12-month age categories (in 0-5 year age group) was also used cumulatively to describe the patterns of anaemia, anthropometry and acute morbidity. Thus, these patterns were described in two ways: by the trajectory of changes among unique children and the cross-sectional age categories.

2.4.2. The analysis of associated factors.

Conceptually, the areas of nutrition, morbidity, and mortality were considered interlinked; hence, an outcome variable of one could influence another. For example, a low Hb status or weight loss were considered as a result of nutritional deficiency or acute morbidity; or, a nutritional deficiency could facilitate acute morbidity and vice versa. Hence, the outcome variables of one area (nutrition, morbidity, or mortality) were also considered as the covariates for the outcome variables of the other areas.

Table 17. Groups and sub-groups of the HIV-exposed children considered for the analysis of the factors associated with the outcome variables.

Sl. No.	Group/sub-group	No. of children	Share among total, %
1	Generic (All HIV-exposed children)	660	100.0
Sub-groups based on the mother's characteristics			
2	Children of the mothers who had undertaken any PPTCT strategy during pregnancy	615	93.2
2.1.	Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy	592	89.7
3	Children of the mothers who were ever initiated on ART	630	95.5
4	Children of the mothers who were alive at any time during the study	644	97.6
4.1.	Children of the mothers who were vitamin/mineral deficient during the study	403	61.1
4.2.	Children of the mothers who were anaemic during the study	585	88.6
4.3.	Children of the mothers who were having acute morbidity during the study	203	30.8
4.4.	Children of the mothers who were identified as 'sick' during the study	341	51.7
Sub-groups based on the child's characteristics			
5	Children who were ever breastfed	546	82.7
5.1.	Children who were ever mix-fed	390	59.1
5.2.	Children of age 0-2 year any time during the study and mix-fed	227	34.4
6	Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children)	653	98.9

Sl. No.	Group/sub-group	No. of children	Share among total, %
6.1.	Children of age 0-2 year any time during the study and started on feeds other than breast milk	316	47.9
6.2.	Children of age 6 months-2 years any time during the study and started on feeds other than breast milk	306	46.4
7	Children of age ≥9 months any time during the study	629	95.3
7.1.	Children of age ≥15 months any time during the study	587	88.9
8	Children who were alive anytime during the study (only for classification purpose; not used for analysis)	654	99.1
8.1.	Children who were vitamin/mineral deficient ever during the study	295	44.7
8.2.	Children who were anaemic ever during the study	495	75.0
8.3.	Children who were having acute morbidity ever during the study	523	79.2
8.3.1.	Children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi	430	65.2
8.4.	HIV-EI children	35	5.3

For the analysis of the factors associated with outcome variables, at first, a bivariate p-value had been ascertained with all the covariates (independent variables), and only those identified with a statistically significant ($p < 0.05$) association were included in the corresponding multivariate models of BLR. However, the three basic covariates of age, gender and HIV status of the child, were statutorily included in all the regression analyses, irrespective of the bivariate significance; with this, the results generated automatically were adjusted Odds Ratios (OR). As this was a cohort study of children, by the end of the study, the children fell into 21 sub-groups by their own or mother's characteristics (Table 17). So, for each outcome variable, a BLR was done for a generic group of HIV-exposed children, and each sub-group of HIV-exposed children, as indicated by the presence of an applicable significant covariate in the bivariate analysis. As such, each sub-group implied a regression

model, in addition to the generic model. This was, in turn, expected to facilitate inferring separately for each situation (as implied by the group/sub-group), so that it would be easier subsequently to decide upon whether to employ a generic intervention or targeted intervention, in case of any health issues. The analysis to explore the associated factors was done using BLR on IBM® SPSS Statistics version 20. Those factors identified with statistically significant p-value and Odds Ratio were considered as a significant association.

Box 3. Summary of conceptual framework and methodology adopted in this study.

The existing care and support services for the HIV-exposed children were predominantly offered by the government HCFs; however, the services were mostly offered for the CLHIV who reached the HCFs for whom limited information was maintained (till 18 months of age). The system neither kept a track nor maintained a record of the health status of the HIV-EU and the CLHIV unregistered at ART centres. Thus, the differentials of the life, health, and nutritional outcomes between the HIV-EI and HIV-EU groups of children were not known. With cumulatively increasing registered CLHIV population over the years, the health care system tends to be skewed more and only towards providing ART to them; this tends to ignore the needs of the unregistered and the HIV-EU children. Hence it was important to increase the scope of the target population and services, to know their issues related to nutrition, health, and life, to plan to customize the services required.

Most of the studies hitherto happened for the CLHIV; some compared it with the HIV-uninfected children. Most of these studies came from Africa and were mostly smaller clinic-based studies which missed the unlinked children. Only a very few had taken up the concept of HIV exposure. By adopting this concept, it would cover the significant source of HIV infection among children (MTCT) and hence, most of the CLHIV and include HIV-EU children also. This also would bring in the concept of mother-child pair to facilitate program delivery, if planned in the future.

As such, a prospective community-based cohort study of the HIV-exposed children (<5 years) was proposed between 1 December 2014 to 30 November 2017; it considered the maternal, pregnancy and child-related factors in addition to the HIV exposure, to study the nutrition, morbidity and mortality aspects in a single research framework. The objectives of the study were to study and analyze the real-time course, and natural history of the HIV infection among the HIV-exposed children 0-5 years of age; and, to explore and compare the patterns, and identify the associated factors, of nutrition, growth and development, morbidity and mortality them, grossly and differentially by HIV infection.

The study was proposed to piggy-back on the simultaneous ICMR (Phase 2) study in Belgaum district, as the Belgaum district HIV scenario was in line with that of the Karnataka state and India, and the investigator was familiar with the ICMR study and the district, and its sample frame was more inclusive and representative of health care and HIV scenario of the district. This included the HIV-exposed children born to the HIV-infected mothers reported from 285 (government and private) HCFs between 2011 and 2017, in addition to those living in the households of HIV positive parents or HIV-infected children detected between 2011-2014 (total 660 children from 537 HHs).

The tools for data collection from the family, mother, and child were prepared, and the regulatory approvals were obtained from competent authorities. All the recruited children were followed up, till the end of the study or censoring. The modus operandi of data collection included planners and micro-plans, data identification using linked (mother-child pair) ID numbers, manual data cleaning, and chronological archiving. The frequency of data collection from the children was weekly in 0-1 months, monthly in 2-12 months, once in two months in 14-58 months, and after the completion of 59 months. The secondary data in HIV-infected pregnant mothers, delivery, and children's HIV test results were simultaneously collected from the HCFs and updated until the end of the study.

Data entry was done using Microsoft® Access 2013, which had in-built limits and checks to ensure the data quality. The database cleaning using Microsoft® Excel 2013 with in-built functions. A single merged database was created and maintained in long and wide

formats. The independent and outcome variables were defined. The anthropometry data was analyzed using WHO Anthro software; the patterns of life, health, and nutrition aspects were done using Microsoft® Excel 2013; and the associated factors were analyzed by BLR using IBM® SPSS Statistics version 20. The patterns were described in two ways: by the trajectory of changes among unique children, and by the cross-sectional age categories. For the analysis of the factors associated with outcome variables, those covariates with significant bivariate p-value were included in the corresponding multivariate models of BLR. The children were categorized into 21 sub-groups by their own or mother's characteristics. Adjusted OR and the p-value was generated in the relevant sub-groups of children for each outcome variable, using BLR.

Verbal and social autopsy inquiry was done on the 68 deaths of HIV-exposed children who expired at an age <5 years, between 01 January 2011-30 November 2017, and read by two different persons. This information was used for characterization and cause of deaths.

CHAPTER 3

RESULTS:

PROFILE OF HIV-EXPOSED CHILDREN AND THE NATURAL COURSE OF HIV INFECTION IN CHILDREN

This chapter includes:

CHAPTER 3

RESULTS: PROFILE OF HIV-EXPOSED CHILDREN AND THE NATURAL COURSE OF HIV INFECTION IN CHILDREN

3.1. Profile of HIV-exposed children.

3.1.1. Age composition.

The study included a total of 660 HIV-exposed children of age 0-5 years, 625 (94.7%) HIV-EI (male=315, female=310) and 35 HIV-EU infected (male=22, female=13). The proportion of the children by age at the baseline of the study were 32.6%, 16.1%, 17.6%, 21.2% and 12.6% in the age groups of <12 months, 12-23 months, 24-35 months, 36-47 months and 48+ months at baseline, respectively (Fig. 51).

There was a higher proportion (32.6%) of children in the <12 month age group, as the HIV-exposed children born during the previous year of the study and those born during the study (both satisfying the inclusion criteria) were also included in this group. The mean age of the children were 25.2 months (HIV-EI: male=26.9, female=23.4, total=25.6; HIV-EU: male=24.3, female=26.0, total=25.1).

Fig. 51. The proportion of HIV-exposed children (N=660) in the study by age.

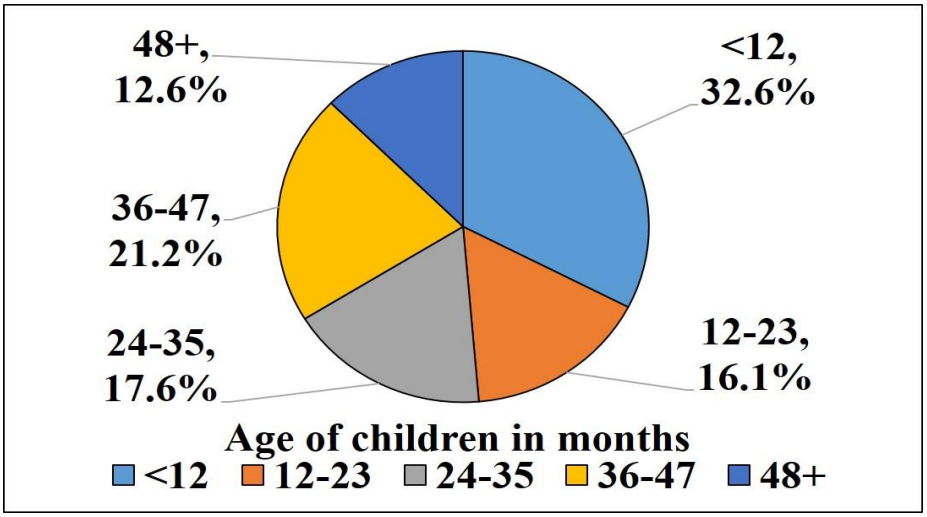
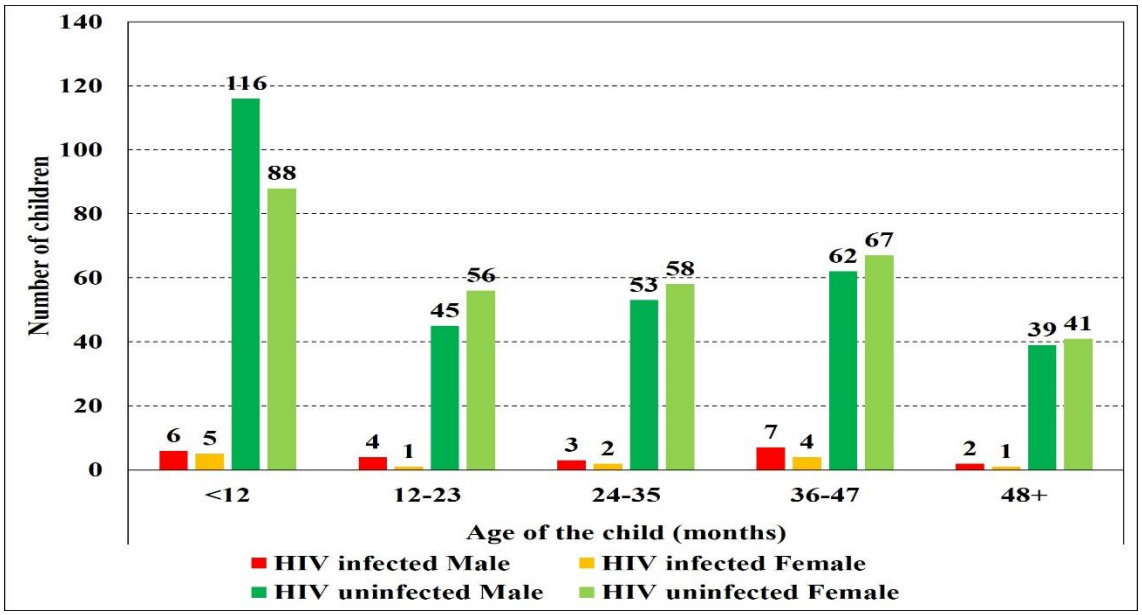


Fig. 52. Distribution of the HIV-exposed children (N=660) in the study, by age, gender, and HIV status.



3.1.2. Age and gender distribution.

The age and gender distribution of the HIV-exposed children in the study is given in figure 52. At the baseline, there were 215 children in the age category of <12 months (HIV-EI: male=2.8%, female=2.3%, total=5.1%; HIV-EU: male=54.0%, female=40.9%, total= 94.9%), 106 children in the 12-23 months of age group (HIV-EI: male=3.8%, female= 0.9%, total=4.7%; HIV-EU: male=42.5%, female=52.8%, total=95.3%), 116 children in the 24-35 months of age group (HIV-EI: male=2.6%, female=1.7%, total=4.3%; HIV-EU: male=45.7%, female=50.0%, total=95.7%), 140 children in the 36-47 months of age group (HIV-EI: male=5.0%, female=2.9%, total=7.9%; HIV-EU: male=44.3%, female=47.9%, total=92.1%), and 83 children in the 48+ months of age group (HIV-EI: male=2.4%, female=1.2%, total=3.6%; HIV-EU: male=47.0%, female=49.4%, total=96.4%). (All percentages are mentioned with respect to the total children in the age group mentioned).

3.2. The family-related characteristics.

The family-related characteristics of HIV-exposed children are described in table 18.

Table 18. Family-related information of the HIV-exposed children included in the study.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Religion	Hindu	95.5	100.0	97.1	95.9	95.5	95.7	632	95.8
	Muslim	4.5	0.0	2.9	3.8	3.2	3.5	23	3.5
	Jain	0.0	0.0	0.0	0.3	1.3	0.8	5	0.8
	Total	22	13	35	315	310	625	660	100.0
Caste	Scheduled Caste	18.2	46.2	28.6	28.6	25.8	27.2	180	27.3
	Scheduled Tribe	4.5	7.7	5.7	11.1	10.6	10.9	70	10.6
	Other Backward Caste	72.7	15.4	51.4	44.4	48.7	46.6	309	46.8
	Others	4.5	30.8	14.3	15.9	14.8	15.4	101	15.3
	Total	22	13	35	315	310	625	660	100.0
Socio-economic status	Below Poverty Line	86.4	100.0	91.4	95.9	93.9	94.9	625	94.7
	Above Poverty Line	13.6	0.0	8.6	4.1	6.1	5.1	35	5.3
	Total	22	13	35	315	310	625	660	100.0
Type of family	Nuclear	50.0	76.9	60.0	56.2	53.5	54.9	364	55.2
	Joint	22.7	0.0	14.3	16.5	15.5	16.0	105	15.9
	Three-generation	27.3	23.1	25.7	27.3	30.6	29.0	190	28.8
	Others	0.0	0.0	0.0	0.0	0.3	0.2	1	0.2
	Total	22	13	35	315	310	625	660	100.0
Family size	3	27.3	0.0	17.1	26.3	23.9	25.1	163	24.7
	4	45.5	23.1	37.1	42.5	41.3	41.9	275	41.7
	5	13.6	46.2	25.7	18.1	21.0	19.5	131	19.8
	6+	13.6	30.8	20.0	13.0	13.9	13.4	91	13.8
	Total	22	13	35	315	310	625	660	100.0
	Average	4.1	5.4	4.6	4.3	4.3	4.3	4.3	
Education of father	Non-literate	31.8	61.5	42.9	26.8	30.6	28.7	194	29.4
	Literate, but no formal education	9.1	0.0	5.7	4.5	1.0	2.7	19	2.9

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
	Standard 1-4	13.6	15.4	14.3	14.0	18.7	16.3	107	16.2
	Standard 5-7	4.5	7.7	5.7	21.3	19.0	20.2	128	19.4
	Standard 8-10	31.8	7.7	22.9	21.7	21.6	21.6	143	21.7
	Standard 11-12/PUC	9.1	7.7	8.6	8.9	6.1	7.5	50	7.6
	Degree	0.0	0.0	0.0	2.5	2.3	2.4	15	2.3
	Post graduate or above	0.0	0.0	0.0	0.3	0.6	0.5	3	0.5
	Total	22	13	35	314	310	524	659	100.0
Education of mother	Non-literate	27.3	53.8	37.1	30.5	25.5	28.0	188	28.5
	Literate, but no formal education	4.5	0.0	2.9	2.5	4.2	3.4	22	3.3
	Standard 1-4	13.6	7.7	11.4	10.8	15.8	13.3	87	13.2
	Standard 5-7	27.3	30.8	28.6	26.3	24.8	25.6	170	25.8
	Standard 8-10	27.3	7.7	20.0	23.8	25.5	24.6	161	24.4
	Standard 11-12/PUC	0.0	0.0	0.0	5.7	2.9	4.3	27	4.1
	Degree	0.0	0.0	0.0	0.0	1.3	0.6	4	0.6
	Post graduate or above	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	22	13	35	315	310	625	660	100.0
Occupation of father	Daily wages	63.6	92.3	74.3	77.4	74.2	75.8	499	75.7
	Salaried	22.7	0.0	14.3	10.8	11.6	11.2	75	11.4
	Business	13.6	7.7	11.4	10.2	13.5	11.9	78	11.8
	Others	0.0	0.0	0.0	1.6	0.6	1.1	7	1.1
	Total	22	13	35	314	310	524	659	100.0
Occupation of mother	Daily wages	13.6	38.5	22.9	29.8	27.1	28.5	186	28.2
	Salaried	0.0	0.0	0.0	1.0	1.9	1.4	9	1.4
	Business	0.0	0.0	0.0	1.6	3.5	2.6	16	2.4
	Housewife	86.4	61.5	77.1	67.3	67.1	67.2	447	67.7
	Sex work	0.0	0.0	0.0	0.3	0.3	0.3	2	0.3

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
	Total	22	13	35	315	310	625	660	100.0
Type of house	Kuccha	31.8	46.2	37.1	34.6	36.8	35.7	236	35.8
	Semi-pukka	59.1	46.2	54.3	54.6	48.1	51.4	340	51.5
	Pukka	9.1	7.7	8.6	10.8	15.2	13.0	84	12.7
	Total	22	13	35	315	310	625	660	100.0
Safely managed drinking water	Lacked	54.5	76.9	62.9	44.4	49.7	47.0	316	47.9
	Used	45.5	23.1	37.1	55.6	50.3	53.0	344	52.1
	Total	22	13	35	315	310	625	660	100.0
Safely managed kitchen/ cooking	Lacked	54.5	61.5	57.1	49.5	48.1	48.8	325	49.2
	Used	45.5	38.5	42.9	50.5	51.9	51.2	335	50.8
	Total	22	13	35	315	310	625	660	100.0
Safely managed sanitation	Lacked	77.3	92.3	82.9	84.1	83.2	83.7	552	83.6
	Used	22.7	7.7	17.1	15.9	16.8	16.3	108	16.4
	Total	22	13	35	315	310	625	660	100.0
Financial support for the family	Absent	90.9	92.3	91.4	94.3	91.3	92.8	612	92.7
	Present	9.1	7.7	8.6	5.7	8.7	7.2	48	7.3
	Total	22	13	35	315	310	625	660	100.0
Food support for the family	Absent	9.1	15.4	11.4	10.2	12.6	11.4	75	11.4
	Present	90.9	84.6	88.6	89.8	87.4	88.6	585	88.6
	Total	22	13	35	315	310	625	660	100.0
Nutritional support for the	Never	0.0	0.0	0.0	3.8	4.5	4.2	26	3.9
	Occasionally	31.8	0.0	20.0	10.5	10.3	10.4	72	10.9
	Always	31.8	53.8	40.0	38.4	44.8	41.6	274	41.5

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
child, 3-5 years, from institutions	Not attending any institution	4.5	0.0	2.9	9.2	9.0	9.1	58	8.8
	Child <3 years of age	31.8	46.2	37.1	38.1	31.3	34.7	230	34.8
	Total	22	13	35	315	310	625	660	100.0
Cooking-in-charge at home	Mother	76.2	84.6	79.4	80.9	82.5	81.7	535	81.6
	Others	23.8	15.4	20.6	19.1	17.5	18.3	121	18.4
	Total	21	13	34	314	308	622	656	100.0
Socio-economic crisis in family	Absent	59.1	53.8	57.1	64.4	64.2	64.3	422	63.9
	Present	40.9	46.2	42.9	35.6	35.8	35.7	238	36.1
	Total	22	13	35	315	310	625	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

3.2.1. Religion, caste and socio-economic status.

Most of the children belonged to the Hindu religion (95.8%; HIV-EI: male=95.5%, female=100.0%, total=97.1%; HIV-EU: male=95.9%, female=95.5%, total=95.7%), the backward castes (scheduled caste=27.3%, scheduled tribe=10.6%, other backward caste=46.8%, total=84.7%; HIV-EI: male=95.5%, female=69.2%, total=85.7%; HIV-EU: male=84.1%, female=85.2%, total=84.6%), and the lower (Below Poverty Line) socio-economic status (94.7%; HIV-EI: male=86.4%, female=100.0%, total=91.4%; HIV-EU: male=95.9%, female=93.9%, total=94.9%).

The distribution of children by religion, caste and socio-economic status were near-similar among the HIV-EI and HIV-EU children, and the male and female children.

3.2.2. Type of family and family size.

Type of family: 55.2% of the HIV-exposed children lived in nuclear families (HIV-EI: male=50.0%, female=76.9%, total=60.0%; HIV-EU: male=56.2%, female=53.5%, total=54.9%), while the rest had a person other than the primary family member living in their households (joint family=15.9%, three-generation family=28.8%, total=44.7%).

Family size: Around three-fourths of the children had at least one sibling in their families (family size >3=75.3%; HIV-EI: male=72.7%, female=100.0%, total=82.9%; HIV-EU: male=73.7%, female=76.1%, total=74.9%), while the remaining quarter of the children were single HIV-exposed children included in the study (family size 3=24.7%). The average family size was 4.3 (HIV-EI: male=4.1, female=5.4, total=4.6; HIV-EU: male=4.3, female=4.3, total=4.3) considering the primary family in the households.

There were no marked differences between the share of the children by type of family and family size between the HIV-EI and HIV-EU children, and the male and female children.

3.2.3. Education and occupation of father and mother.

Education: Around one-third of the fathers (non-literate=29.4%, literate without formal education=2.9%, total=32.3%; HIV-EI: male=40.9%, female=61.5%, total=48.6%; HIV-EU: male=31.2%, female=31.6%, total=31.4%) and mothers (non-literate=28.5%, literate without formal education=3.3%, total=31.8%; HIV-EI: male=31.8%, female=53.8%, total=40.0%; HIV-EU: male=33.0%, female=29.7%, total=31.4%) of the HIV-exposed children had never been to school. Another near-one-third of the fathers (class 1-4=16.2%, class 5-7=19.4%, total=35.7%; HIV-EI: male=18.2%, female=23.1%, total=20.0%; HIV-EU: male=35.4%, female=37.7%, total=36.5%) and mothers (class 1-4=13.2%, class 5-7= 25.8%, total=38.9%; HIV-EI: male=40.9%, female=38.5%, total=40.0%; HIV-EU: male= 37.1%, female=40.6%, total=38.9%) had been to the primary school, while the remaining near-one-third of the fathers (32.0%) and mothers (29.2%) had been educated high school and above.

Occupation: Around three-fourths of the fathers were daily wagers (75.7%; HIV-EI: male=63.6%, female=92.3%, total=74.3%; HIV-EU: male=77.4%, female=74.2%, total= 75.8%), while more than two-thirds of the mothers were house-wives (67.7%; HIV-EI: male=86.4%, female=61.5%, total=77.1%; HIV-EU: male=67.3%, female=67.1%, total= 67.2%). Most of the remaining earning fathers relied mostly on business (11.8%) or salaries (11.4%) for their income. The working mothers (32.3% of total mothers) earned from daily wages (28.2%), business (2.4%), salaried jobs (1.4%), and commercial sex work (0.3%).

The share of children by education and occupation of father and mother were not much dissimilar between the HIV-EI and HIV-EU children, and the male and female children.

3.2.4. Housing and environment.

Type of house: One-eighth of the families of the HIV-exposed children resided in pukka houses (12.7%; HIV-EI: male=9.1%, female=7.7%, total=8.6%; HIV-EU: male=10.8%, female=15.2%, total=13.0%), while the remaining children resided in semi-pukka (51.5%) or kuccha (35.8%) houses.

Safe water, cooking, sanitation: Around a half of these households used safely managed drinking water (52.1%; HIV-EI: male=45.5%, female=23.1%, total=37.1%; HIV-EU: male=55.6%, female=50.3%, total=53.0%) and kitchen facilities for cooking (50.8%; HIV-EI: male=45.5%, female=38.5%, total=42.9%; HIV-EU: male=50.5%, female=51.9%, total=51.2%). On the other hand, only 16.4% of these households used safely managed sanitation facilities (HIV-EI: male=22.7%, female=7.7%, total=17.1%; HIV-EU: male=15.9%, female=16.8%, total=16.3%). As such, around half of the households lacked safely managed drinking water and kitchen facilities, while more than four-fifths lacked safely managed sanitation options.

The HIV-EI and HIV-EU and the male and female children had more-or-less similar distribution by type of residence and living environment (safe water, food, and sanitation).

3.2.5. Financial and food support for the family.

Support for the family: Despite their poor socio-economic status, around 92.7% of the families had not reported any external financial support for their living (HIV-EI: male=90.9%, female=92.3%, total=91.4%; HIV-EU: male=94.3%, female=91.3%, total=92.8%). However, 88.6% of these families had an external support system for food supplies (HIV-EI: male=90.9%, female=84.6%, total=88.6%; HIV-EU: male=89.8%, female=87.4%, total=88.6%).

Support for the child: About a third of the HIV-exposed children in the study were of age less than 3 years, and hence not directly entitled for nutrition support from institutions like schools or anganwadis (34.8%; HIV-EI: male=31.8%, female=46.2%, total=37.1%; HIV-EU: male=38.1%, female=31.3%, total=34.7%). Also, about one-eighth of these children were not receiving nutritional services from these institutions (not attending any institution=8.8%, never availing services despite enrollment=3.9%, total=12.7%; HIV-EI: male=4.5%, female=0.0%, total=2.9%; HIV-EU: male=13.0%, female=13.5%, total= 13.3%), despite being entitled. Among the remaining children, 10.9% had availed the nutrition services from institutions irregularly (HIV-EI: male=4.5%, female=0.0%, total= 2.9%; HIV-EU: male=9.2%, female=9.0%, total=9.1%), and hence 41.5% of the HIV-exposed children had regular nutritional support (HIV-EI: male=31.8%, female=53.8%, total=40.0%; HIV-EU: male=38.4%, female=44.8%, total=41.6%).

Thus, the external food and financial support for the families and children were more-or-less similar across the HIV-EU and HIV-EI children, and the male and female children.

3.2.6. Cooking in-charge in the family.

Around four-fifths of the HIV-exposed children had their mothers cooking food for them (81.6%; HIV-EI: male=76.2%, female=84.6%, total=79.4%; HIV-EU: male= 80.9%, female=82.5%, total=81.7%), while someone else cooked in 18.4% of the families. The distribution was similar among the HIV-EI, HIV-EU, male and female children.

3.2.7. Socio-economic crisis in the family.

About a third of the families of the HIV-exposed children had reported socio-economic crisis in their families (36.1%; HIV-EI: male=40.9%, female=46.2%, total=42.9%; HIV-EU: male=35.6%, female=35.8%, total=35.7%). This crisis was slightly higher among the families of the HIV-EI children, compared to those of the HIV-EU children.

3.3. The mother-related characteristics.

The mother-related information of the children included in the study is given in table 19.

3.3.1. Age of the mother (at the start of the study).

Around one-third of the mothers were of age <25 years (<20 years=2.9%, 20-24 years=31.4, total=31.4%; HIV-EI: male=45.5%, female=23.1%, total=37.1%; HIV-EU: male=34.0%, female=34.2%, total=34.1%) and three-fifths were of age 25-34 years (<25-29 years=42.0%, 30-34 years=19.7, total=61.7%; HIV-EI: male=54.5%, female=76.9%, total=62.9%; HIV-EU: male=61.9%, female=61.3%, total=61.6%). The remaining mothers were of age 35+ years (35-39 years=3.8%, 40+ years=0.3%, total=4.1%). All mothers of HIV-EI children belonged to the 20-34 year age group.

The mean age of the mothers were 26.4 years (HIV-EI: male=25.6, female=27.8, total=26.4; HIV-EU: male=26.3, female=26.4, total=26.3). As such, despite a similar mean age of mothers across HIV-EI and HIV-EU, and male and female children, the mothers of HIV-EI children belonged to the median subset age group of 20-34 years.

3.3.2. Age of the mother at the marriage.

More than 90% of the mothers were married at the age before 25 years (<15 years=14.2%, 15-19 years=59.9%, 20-24 years=18.4%, total=92.4%; HIV-EI: male=95.5%, female= 100.0%, total=97.1%; HIV-EU: male=91.9%, female=92.5%, total=92.2%); the remaining

Table 19. Mother-related information of the HIV-exposed children included in the study.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Age of the mother (at baseline) (years)	<20	0.0	0.0	0.0	3.5	2.6	3.0	19	2.9
	20-24	45.5	23.1	37.1	30.5	31.6	31.0	207	31.4
	25-29	40.9	38.5	40.0	41.9	42.3	42.1	277	42.0
	30-34	13.6	38.5	22.9	20.0	19.0	19.5	130	19.7
	35-39	0.0	0.0	0.0	3.5	4.5	4.0	25	3.8
	40+	0.0	0.0	0.0	0.6	0.0	0.3	2	0.3
	Total	22	13	35	315	310	625	660	100.0
	Average	25.6	27.8	26.4	26.3	26.4	26.3	26.4	
Age of the mother at the marriage (years)	<15	9.1	15.4	11.4	14.7	14.1	14.4	92	14.2
	15-19	63.6	69.2	65.7	61.2	57.8	59.5	388	59.9
	20-24	22.7	15.4	20.0	16.0	20.6	18.3	119	18.4
	25-29	4.5	0.0	2.9	6.2	5.9	6.0	38	5.9
	30-34	0.0	0.0	0.0	1.6	1.3	1.5	9	1.4
	35-39	0.0	0.0	0.0	0.0	0.3	0.2	1	0.2
	40+	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	22	13	35	307	306	613	648	100.0
	Average	18.5	17.1	18.0	18.3	18.5	18.4	18.4	
Age of mother when detected HIV infection (years)	15-19	31.8	30.8	31.4	23.5	27.3	25.4	169	25.7
	20-24	54.5	38.5	48.6	48.6	46.4	47.5	313	47.6
	25-29	13.6	30.8	20.0	21.0	20.1	20.5	135	20.5
	30-34	0.0	0.0	0.0	6.0	5.8	5.9	37	5.6
	35-39	0.0	0.0	0.0	0.6	0.3	0.5	3	0.5
	40+	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	22	13	35	315	308	623	658	100.0
	Average	21.9	23.0	22.3	23.1	22.7	22.9	22.8	3.5
	1	22.7	7.7	17.1	27.7	26.5	27.1	174	26.6

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
HIV clinical stage of mother during study period	2	72.7	92.3	80.0	69.1	70.6	69.8	461	70.4
	3	4.5	0.0	2.9	2.9	2.9	2.9	19	2.9
	4	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	22	13	35	314	306	620	655	100.0
Mother ever initiated on ART	No	4.8	0.0	2.9	4.8	3.6	4.2	27	4.1
	Yes	95.2	100.0	97.1	94.9	95.8	95.3	625	95.4
	Not linked to ART	0.0	0.0	0.0	0.3	0.6	0.5	3	0.5
	Total	21	13	34	313	308	621	655	100.0
Age of mother at start of ART (years)	15-19	10.0	15.4	12.1	18.5	17.4	17.9	108	17.6
	20-24	55.0	30.8	45.5	44.9	48.3	46.6	285	46.5
	25-29	30.0	30.8	30.3	24.7	24.7	24.7	153	25.0
	30-34	5.0	23.1	12.1	10.6	9.4	10.0	62	10.1
	35-39	0.0	0.0	0.0	1.0	0.3	0.7	4	0.7
	40+	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	20	13	33	292	288	580	613	100.0
	Average	24.0	25.6	24.6	24.2	23.8	24.0	24.0	
Delay in starting ART to mother after detecting HIV infection (days)	≤30	40.0	7.7	27.3	49.7	41.7	45.7	274	44.7
	31-182	5.0	15.4	9.1	11.6	13.2	12.4	75	12.2
	183-364	0.0	15.4	6.1	7.2	7.6	7.4	45	7.3
	365+	55.0	61.5	57.6	31.5	37.5	34.5	219	35.7
	Total	20	13	33	292	288	580	613	100.0
	Average	755.1	948.6	831.3	411.6	435.7	423.6	445.5	
ART status of mother during study period	ART started, and on ART	76.5	75.0	75.9	91.0	91.0	91.0	508	90.2
	ART started, but stopped/lost to follow-up	23.5	25.0	24.1	9.0	9.0	9.0	55	9.8

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
	Total	17	12	29	268	266	534	563	100.0
Pregnancy status of mother during study period	Pregnant	15.8	15.4	15.6	21.4	20.0	20.7	126	20.5
	Not pregnant	84.2	84.6	84.4	78.6	80.0	79.3	490	79.5
	Total	19	13	32	294	290	584	616	100.0
Chronic disease status ever	Absent	85.7	92.3	88.2	95.4	94.7	95.1	610	94.7
	Present	14.3	7.7	11.8	4.6	5.3	4.9	34	5.3
	Total	21	13	34	307	303	610	644	100.0
	Average chronic diseases per mother having chronic disease	1.3	1.0	1.1	1.0	1.2	1.1	1.1	
Acute disease status ever of mother during study period	Absent	61.9	61.5	61.8	70.7	67.0	68.9	441	68.5
	Single disease present	19.0	15.4	17.6	16.3	21.1	18.7	120	18.6
	Multiple disease present	19.0	23.1	20.6	13.0	11.9	12.5	83	12.9
	Total	21	13	34	307	303	610	644	100.0
Maximum deficient vitamins/minerals indicated among mothers ever during study period	No deficiency	28.6	23.1	26.5	38.8	37.3	38.0	241	37.4
	1-6	38.1	30.8	35.3	31.9	29.0	30.5	198	30.7
	7+	33.3	46.2	38.2	29.3	33.7	31.5	205	31.8
	Total	21	13	34	307	303	610	644	100.0
	Average deficient vit./min. indicated among indicated mothers	6.9	7.0	6.9	6.3	6.6	6.4	6.5	
	Underweight	85.0	46.2	69.7	53.9	50.2	52.1	337	53.0

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
BMI status of mother ever during study period	Normal and above	15.0	53.8	30.3	46.1	49.8	47.9	299	47.0
	Total	20	13	33	304	299	603	636	100.0
Anaemia status of mother ever during study period	No anaemia	11.1	8.3	10.0	10.8	8.2	9.5	59	9.6
	Mild anaemia	0.0	8.3	3.3	13.9	16.8	15.3	91	14.7
	Moderate anaemia	66.7	66.7	66.7	59.0	63.4	61.2	379	61.4
	Severe anaemia	22.2	16.7	20.0	16.3	11.6	14.0	88	14.3
	Total	18	12	30	295	292	587	617	100.0
Psychosocial status of mother ever during study period	Non-stressed	70.0	92.3	78.8	88.5	86.6	87.6	554	87.1
	Mothers with stress	5.0	0.0	3.0	2.6	3.0	2.8	18	2.8
	Distressed mothers	25.0	7.7	18.2	8.9	10.4	9.6	64	10.1
	Total	20	13	33	304	299	603	636	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

were married later (25-29 years=5.9%, 30-34 years=1.4%, 35-39 years & 40+ years=0.2%, total=7.6%). 14.2% of all the mothers were married at <15 years of age. All the mothers of the HIV-EI children, except one, was married at <25 years of age. Of the 480 mothers married at age <20 years, 5.6% had an HIV-EI child; and, of the remaining 168 mothers married at age ≥20 years of age, 4.8% of them had an HIV-EI child.

The mean age of the mothers at marriage was 18.4 years (HIV-EI: male=18.5, female=17.1, total=18.0; HIV-EU: male=18.3, female=18.5, total=18.4). As such, despite a similar mean age of mothers at marriage across HIV-EI and HIV-EU, and male and female children, the age of the mothers of HIV-EI children were <25 years at marriage.

3.3.3. Age of the mother when HIV infection was detected.

Around three-fourths of the mothers were detected as HIV-infected at age <25 years (15-19 years=25.7%, 20-24 years=47.6%, total=73.3%; HIV-EI: male=86.4%, female=69.2%, total=80.0%; HIV-EU: male=72.1%, female=73.7%, total=72.9%); the remaining mothers were detected later (25-29 years=20.5%, 30-34 years=5.6%, 35-39 years=0.5%, 40+ years=0.2%, total=26.7%; HIV-EI=20.0%, HIV-EU=27.1%). One-third of the mothers of the HIV-EI children were detected as HIV-infected in 15-19 years age (31.4%), while another near-half (47.6%) between 20 and 24 years.

The mean age of the mothers at detection of HIV infection were 22.8 years (HIV-EI: male=21.9, female=23.0, total=22.3; HIV-EU: male=23.1, female=22.7, total=22.9). As such, despite a similar mean age of the mothers at detection of HIV infection across HIV-EI and HIV-EU, and male and female children, the mothers of HIV-EI children belonged to the early subset age group of <25 years at HIV detection.

3.3.4. HIV clinical stage of the mother.

About a quarter of the mothers were of HIV clinical stage 1 (26.6%; HIV-EI: male=22.7%, female=7.7%, total=17.1%; HIV-EU: male=27.7%, female=26.5%, total=27.1%); while the remaining mothers belonged to clinical stage $\geq$2 (stage 2=70.4%, stage 3=2.9%, stage 4=0.2%, total=73.4%). A higher share of the mothers of the HIV-EI children belonged to clinical stage $\geq$2 (82.9%), compared those of the HIV-EU children (72.9%).

3.3.5. Initiation of ART to mothers, and ART status during the study period.

ART initiation: Almost all (99.5%) of the mothers were linked to an ART centre, and 95.4% of them were ever initiated on ART (HIV-EI: male=95.2%, female=100.0%, total=97.1%; HIV-EU: male=94.9%, female=95.8%, total=95.3%). A total of 4.6% of mothers were never initiated on ART (not linked to ART centre=0.5%, linked-but-not-initiated on ART=4.1%, total 4.6%), of which 96.7% of them were the mothers of the HIV-

EU children. On the other hand, 97.1% of the mothers of the HIV-EI children were ever initiated on ART.

Age of mothers at ART initiation: Around two-thirds of the mothers were initiated on ART at age <25 years (15-19 years=17.6%, 20-24 years=46.5%, total=64.1%; HIV-EI: male=65.0%, female=46.2%, total=57.6%; HIV-EU: male=63.4%, female=65.6%, total=64.5%); the remaining one-third had been initiated on ART later (25-29 years= 25.0%, 30-34 years=10.1%, 35-39 years=0.7%, 40+ years=0.2%, total=35.9%; HIV-EI=42.4%, HIV-EU=35.3%). 57.6% of the mothers of the HIV-EI children and 64.5% of those of the HIV-EU children were started on ART at age <25 years. However, comparing to the age of detection of HIV infection, 88.5% of the mothers of the HIV-EU children who were detected as HIV-infected at age <25 years were initiated on ART in the same age group, while it was only 72.0% for the mothers of the HIV-EI children. This was suggestive of a delay in starting the ART to the mothers of the HIV-EI children.

The mean age of the mothers at start of the ART were 24.0 years (HIV-EI: male=24.0, female=25.6, total=24.6; HIV-EU: male=24.2, female=23.8, total=24.0). Comparing it with the mean age of detection of HIV infection in the mothers, there was a delay of 1.2 years in starting the ART after detecting the HIV infection (HIV-EI=2.3, HIV-EU: 1.1). As such, despite a similar mean age of the mothers upon detection of HIV infection and initiation of ART across the HIV-EI and HIV-EU, and the male and female children, the HIV infection among the mothers of the HIV-EI children were detected early; but there was a longer delay among them to be initiated on the ART, compared to the mothers of the HIV-EU children.

Delay in ART initiation after HIV detection: Below a half of the mothers were initiated on ART within 30 days of detecting the HIV infection (44.7%; HIV-EI: male=40.0%, female=7.7%, total=27.3%; HIV-EU: male=49.7%, female=41.7%, total=45.7%); the remaining majority were initiated on ART later (31-182 days=12.2%, 183-364 days=7.3%, 365+ days=35.7%, total=55.3%; HIV-EI=72.7%; HIV-EU=54.3%). This corroborates with the earlier finding on longer delay among the mothers of the HIV-EI children.

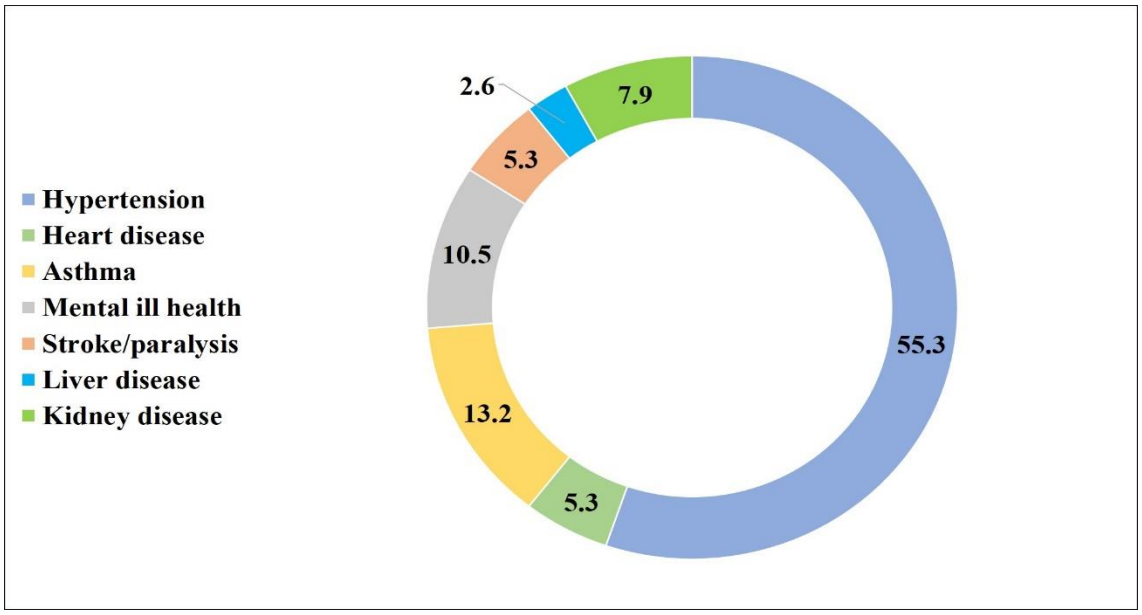
On an average, there was a delay of 445.5 days in starting ART to mothers after detecting the HIV infection (HIV-EI: male=755.1, female=948.6, total=831.3; HIV-EU: male= 411.6, female=435.7, total=423.6). This confirms the delay of ART initiation among the mothers of the HIV-EI children, as nearly two-times as that of the mothers of the HIV-EU children. In other words, the delay in initiation of ART to the mothers of the HIV-EI children, despite getting infected earlier in their life, could have contributed to the MTCT.

ART status during the study period: During the analysis of ART status of the mothers during the study period, only 85.3% of total mothers were considered. The dead mothers (N=44), the mothers not linked to ART centre (N=3), the mothers never initiated on ART (N=27), and the mothers initiated on ART during the study (N=23) were excluded from the analysis. Of the mothers ever started on ART before the study period, 90.2% of them were on ART during the study period (HIV-EI: male=76.5%, female=75.0%, total=75.9%; HIV-EU: male, female & total=91.0%). That is, despite a high enrolment and initiation of ART for mothers ever, there was around a one-in-ten drop-out from ART. Moreover, the share of drop-out mothers from ART was higher among the mothers of the HIV-EI children (24.1%) compared to those of the HIV-EU children (9.0%). Thus, even though a slightly higher share of the mothers of the HIV-EI children were initiated on ART, there was more share of drop-outs also among them, compared to the mothers of the HIV-EU children. In other words, those mothers of the HIV-EU children who were initiated on ART, tend to continue on ART, despite a lower share adopting ART.

3.3.6. Pregnancy status of the mothers.

One-fifth (20.5%) of the mothers were pregnant ever during the study period (HIV-EI: male=15.8%, female=15.4%, total=15.6%; HIV-EU: male=21.4%, female=20.0%, total= 20.7%). Of these, a proportion of 70.6% (N=89) was enrolled as first pregnancy, and the live-born children were included as HIV-exposed children in the study. The rest (29.4%) were subsequent pregnancies among the mothers of an already-recruited HIV-exposed child. Pregnancy was considered as an increased physiological strain for the mother and hence included in the composite criteria of sickness of the mothers.

Fig. 53. Share and types of chronic diseases reported among the mothers (N=38).



3.3.7. Chronic diseases among the mothers.

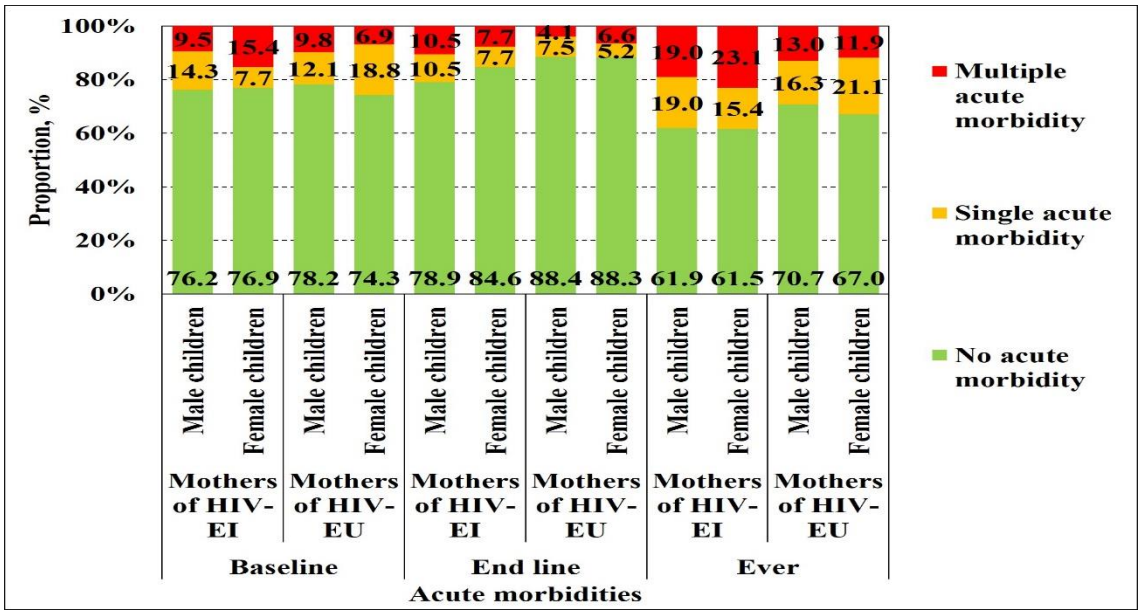
5.3% of the mothers were reported to have chronic diseases (HIV-EI: male=14.3%, female=7.7%, total=11.8%; HIV-EU: male=4.6%, female=5.3%, total=4.9%). As such, a higher share of the mothers of the HIV-EI children reported chronic diseases, compared to the HIV-EI children's.

A total of 38 chronic diseases were reported. The average number of chronic diseases among the mothers having any chronic disease(s) was 1.1 (HIV-EI=1.1; HIV-EU=1.1). The proportion of various types of chronic diseases reported among mothers is shown in figure 53. Most common chronic disease reported was hypertension (55.3%), followed by bronchial asthma (13.2%) and mental ill-health (10.5%).

3.3.8. Acute diseases among the mothers.

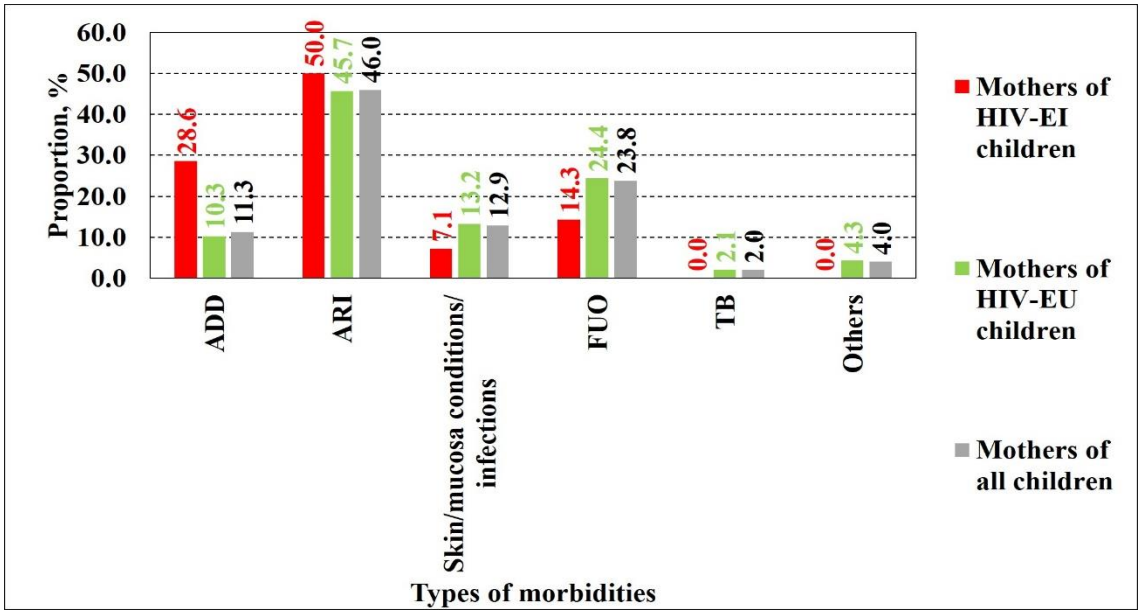
Based on the two measurements (baseline and end-line) of acute morbidity, the mothers were classified into the graver group of disease, while analyzing the morbidity 'ever'. 68.5% of the mothers never had acute morbidity; in other words, about a third of the

Fig. 54. Share of unique mothers by the presence and severity of acute diseases.



N of mothers of children: Baseline: N1=HIV-EI male=21, N2=HIV-EI female=13, N3=HIV-EU male=307, N4=HIV-EU female=303; End line: N1=19, N2=13, N3=294, N4=290; Ever: N1=21, N2=13, N3=307, N4=303.

Fig. 55. Share and types of acute diseases reported among the mothers.



N of acute diseases among mothers of children: HIV-EI=14; HIV-EU=234; all=248.

mothers ever had acute morbidities (single morbidity= 18.6%, multiple morbidities= 12.9%, total=31.5%; HIV-EI: male=38.1%, female=38.5%, total=38.2%; HIV-EU: male=29.3%, female=33.0%, total=31.1%). That is, a higher share of the mothers of the HIV-EI children experienced acute diseases, compared to the HIV-EU children's. Also, a higher share of ever-morbid mothers of the HIV-EI children reported multiple morbidities (53.8%), compared to ever-morbid mothers of the HIV-EU children (40.0%).

The baseline and end line measurements had independently revealed a share of 23.8% and 12.0% of morbid mothers, respectively. The share of acute diseases by unique mothers and the types of diseases are shown in figures 54 and 55. Generally, the share of the mothers having multiple morbidities was equal to or less than the share of the mothers with single morbidity, among all the groups and in all the measurements, except among the mothers of female HIV-EI (at baseline) and HIV-EU children (at end line). There was a two-times-higher share of the mothers of the female HIV-EI children morbid with multiple diseases, compared to the mothers of the female HIV-EU children, ever (23.1% and 11.9%) and at baseline (15.4% and 6.9%).

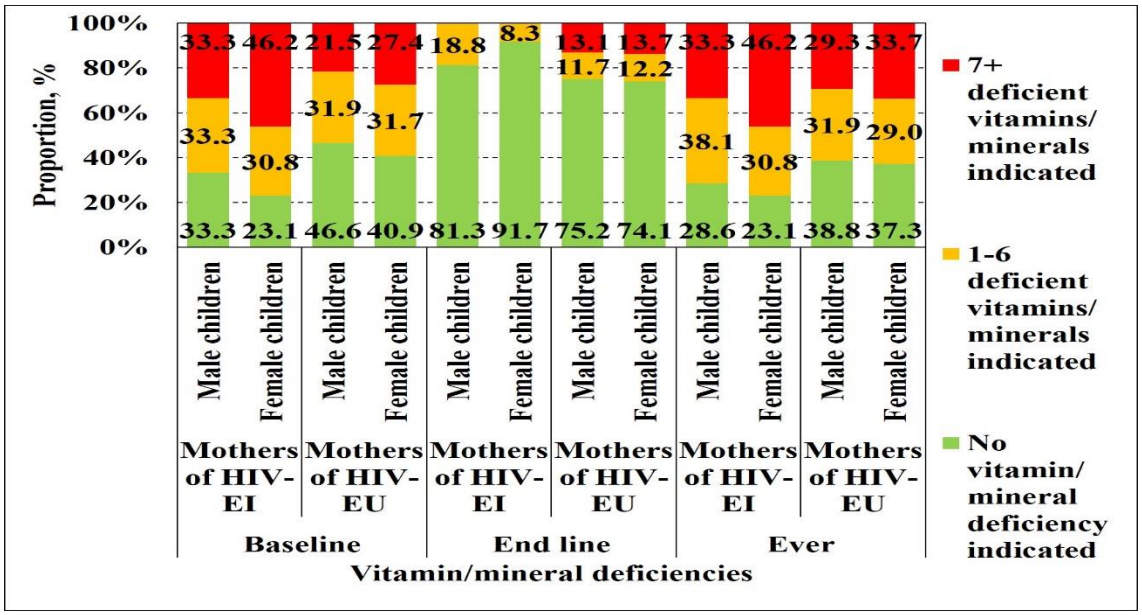
The mean number of acute disease events was 1.0 among the morbid mothers of the HIV-EI children and 1.1 among those of HIV-EU children (both at baseline and end line).

Acute Respiratory Infections (ARI; HIV-EI=50.0%, HIV-EU=45.7%, total=46.0%), Fever of Unknown Origin (FUO; HIV-EI=14.3%, HIV-EU=24.4%, total=23.8%), Skin/mucosal conditions/infections (HIV-EI=7.1%, HIV-EU=13.2%, total=12.9%), and Acute Diarrheal Diseases (ADD; HIV-EI=28.6%, HIV-EU=10.3%, total=11.3%) were the common acute morbidities among the mothers. ARI and ADD together formed 78.6% of acute morbidities in the mothers of HIV-EI children and 56.0% among those of the HIV-EU children.

3.3.9. Vitamin/mineral deficiencies among the mothers.

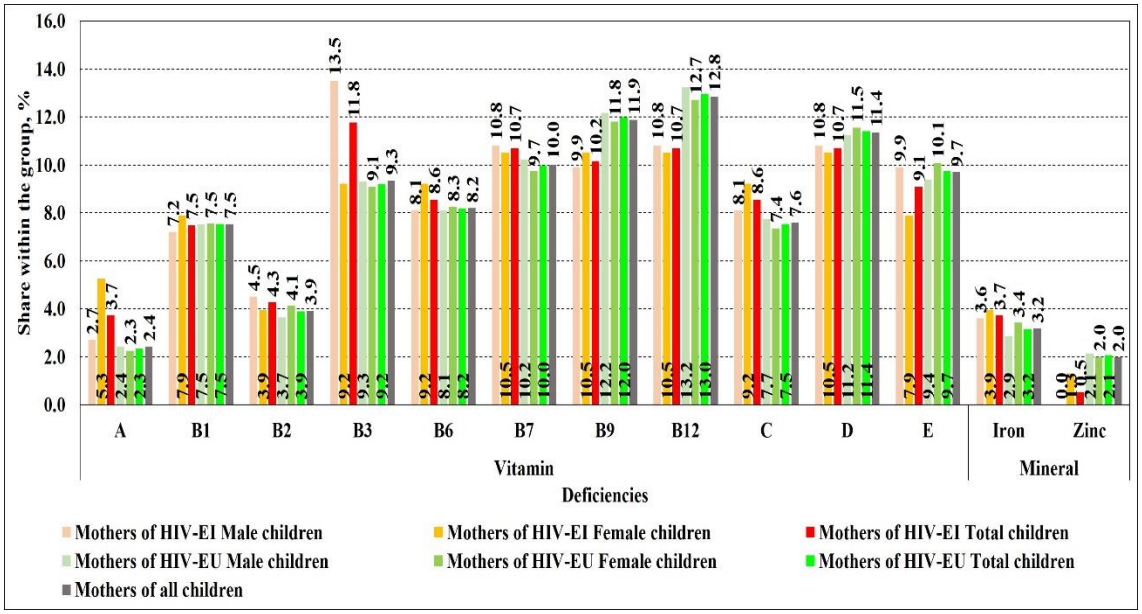
Based on the two measurements (baseline and end-line) of vitamin/mineral deficiencies, the mothers were classified into the graver group of deficiency, while analyzing the

Fig. 56. Share of unique mothers by the presence and severity of vitamin/mineral deficiencies.



N of mothers of children: Baseline: N1=HIV-EI male=21, N2=HIV-EI female=13, N3=HIV-EU male=307, N4=HIV-EU female=303; End line: N1=16, N2=12, N3=274, N4=263; Ever: N1=21, N2=13, N3=307, N4=303.

Fig. 57. Share and types of vitamin/mineral deficiencies among mothers.



N of deficiencies among mothers of children: HIV-EI male=111, HIV-EI female=76, all HIV-EI=187, HIV-EU male=1397, HIV-EU female=1550, all HIV-EU=2947, all=3134.

maximum deficiency ‘ever’. 37.4% of the mothers never had a vitamin/mineral deficiency; and more than three-fifths of the mothers ever had them (1-6 deficiencies=30.7%, 7+ deficiencies=31.8%, total=62.6%; HIV-EI: male=71.4%, female=76.9%, total=73.5%; HIV-EU: male=61.2%, female=62.7%, total=62.0%). That is, a higher share of the mothers of the HIV-EI children experienced vitamin/mineral deficiencies (in 1-6, 7+, and total categories), compared to the HIV-EU children’s.

The baseline and end line measurements had independently revealed a share of 57.0% and 24.8% of vitamin/mineral deficient mothers, respectively. The share of vitamin/mineral deficiencies by unique mothers and the types of deficiencies are shown in figures 56 and 57. The share of vitamin/mineral deficient mothers of the HIV-EI and HIV-EU children were not similar and comparable between the baseline and end-line measurement. Hence, the ‘combined’ share of unique mothers ‘ever’ deficient for vitamins/minerals could be used as a better indicator. There was a higher share of the mothers of the female HIV-EI children deficient with 7+ deficiencies, compared to the mothers of the female HIV-EU children, ever (46.2% and 33.7%) and at baseline (46.2% and 27.4%).

The mean number of deficient vitamins/minerals among all the mothers was 6.5 (HIV-EI=6.9; HIV-EU=6.4).

The B (HIV-EI=63.6%, HIV-EU=63.7%, total=63.7%), D (HIV-EI=10.7%; HIV-EU= 11.4%, total=11.4%), E (HIV-EI=9.1%; HIV-EU=9.7%, total=9.7%), and C (HIV-EI= 8.6%, HIV-EU=7.5%, total=7.6%) vitamins were mostly indicated as deficient among the mothers. Among the B vitamins, B12 (HIV-EI=10.7%, HIV-EU=13.0%, total=12.8%), B9 (HIV-EI=10.2%, HIV-EU=12.0%, total=11.9%), and B7 (HIV-EI=10.7%, HIV-EU= 10.0%, total=10.0%) were the frequently indicated as deficient, while the B2 (3.9%) deficiency was the least indicated. The B1, B2, B6, B7, D and E vitamins, and iron were almost near-equally indicated as deficient among the mothers of all categories of children. However, the vitamins A (HIV-EI=3.7%, HIV-EU=2.3%, total=2.4%), B3 (HIV-EI= 11.8%, HIV-EU=9.2%, total=9.3%) and C (HIV-EI=8.6%, HIV-EU=7.5%, total=7.6%) were indicated as deficient more among the mothers of the HIV-EI children, compared to

those of the HIV-EU children. On the other hand, the vitamins B9 and B12 and zinc (2.0%; HIV-EI=0.5%, HIV-EU=2.1%) were indicated as deficient more among the mothers of the HIV-EU children, compared to those of the HIV-EI children.

3.3.10. Body Mass Index (BMI) of the mothers.

The twice-measured BMI (at baseline and end-line) of the mothers were also classified into the graver group of BMI while analyzing the BMI status 'ever'. About one-half of the mothers (47.0%) had adequate BMI or above, while the other half were underweight, ever during the study (53.0%; HIV-EI: male=85.0%, female=46.2%, total=69.7%; HIV-EU: male=53.9%, female=50.2%, total=52.1%). A higher share of the mothers of the HIV-EI children was underweight, compared to the HIV-EU children's.

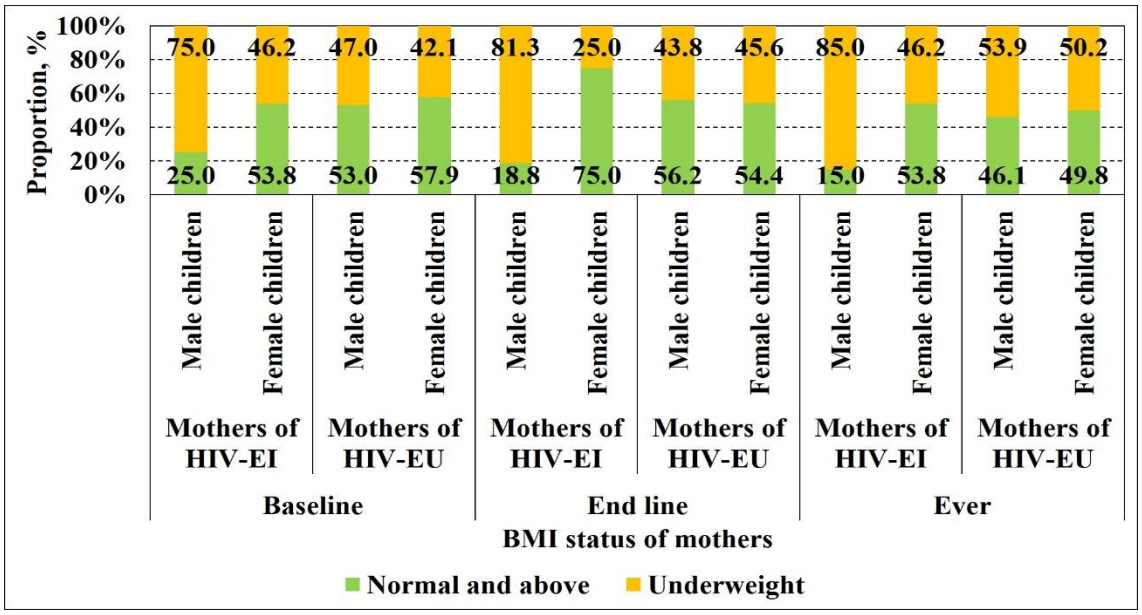
The baseline and end line measurements had independently revealed a share of 45.5% and 45.3% of underweight mothers, respectively. The share of unique mothers by BMI status is shown in figure 58. The share of underweight mothers among the mothers of the male HIV-EI children were typically high, ever (85%.0), and in both the measurements (75.0% and 25.0%), compared to their HIV-EU counterpart, and within the HIV-EI group, probably because of the smaller number of mothers included in the group.

The mean BMI of all and underweight mothers were 19.4 and 16.8 kg/m^2 (respectively) (HIV-EI: male=17.3 and 16.6, female=18.8 and 17.3, total=17.9 and 16.8; HIV-EU: male= 19.5 and 16.8, female=19.4 and 16.8, total=19.4 and 16.8%). The mean BMI among all the mothers of the HIV-EI children was lower than that for all the mothers of the HIV-EU children; while, that of the underweight mothers were the same.

3.3.11. Anaemia among the mothers.

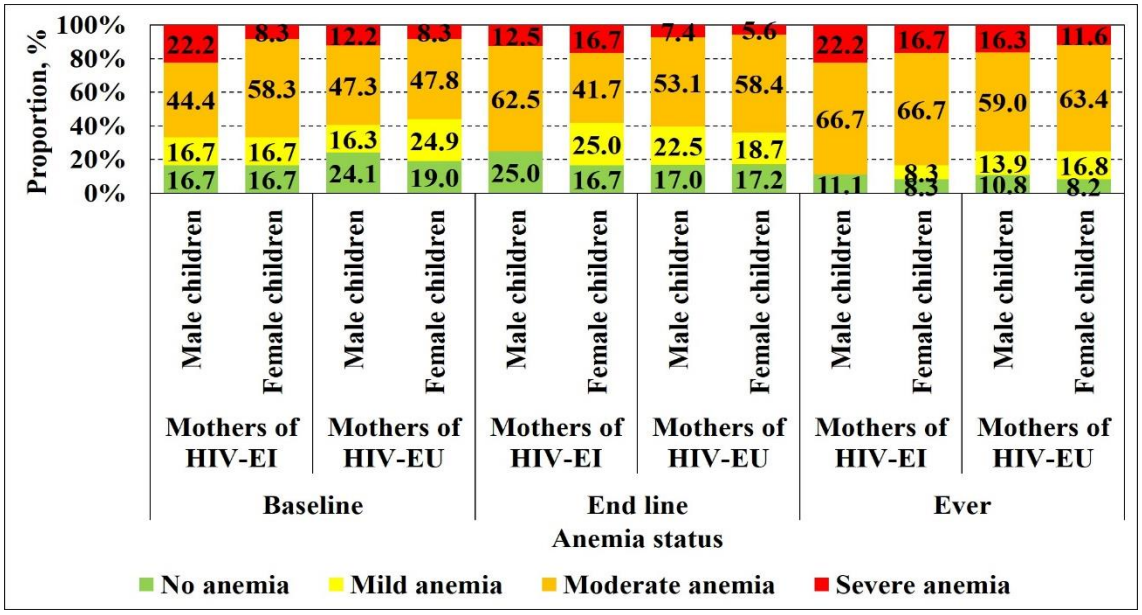
Anaemia was measured for 93.5% (N=617) of all mothers. As there were two Hb measurements (at baseline and end line), the mothers were classified into the graver group of anaemia, while analyzing the anaemia status 'ever'. 9.6% of the mothers never had

Fig. 58. Share of unique mothers by BMI status.



N of mothers of children: Baseline: N1=HIV-EI male=20, N2=HIV-EI female=13, N3=HIV-EU male=304, N4=HIV-EU female=299; End line: N1=16, N2=12, N3=274, N4=263; Ever: N1=20, N2=13, N3=304, N4=299.

Fig. 59. Share of unique mothers by anaemia status.



N of mothers of children: Baseline: N1=HIV-EI male=18, N2=HIV-EI female=12, N3=HIV-EU male=294, N4=HIV-EU female=289; End line: N1=16, N2=12, N3=271, N4=267; Ever: N1=18, N2=13, N3=295, N4=292.

anaemia; in other words, more than 90% of the mothers had anaemia (mild anaemia=14.7%; moderate anaemia=61.4%, severe anaemia=14.3%, total=90.4%; HIV-EI: male=88.9%, female=91.7%, total=90.0%; HIV-EU: male=89.2%, female=91.8%, total=90.5%). The share of mothers with moderate anaemia (61.4%; HIV-EI: male, female and total=66.7%; HIV-EU: male=59.0%, female=63.4%, total=61.2%) was higher compared to those having mild and severe anaemia, and across all categories of children during every measurement. The severe anaemia among the mothers was highest (22.2%) among the mothers of the male HIV-EI children; and higher among the mothers of the male children (HIV-EI=22.2%, HIV-EU=16.3%) compared to those of the female children (HIV-EI=16.7%, HIV-EU=11.6%).

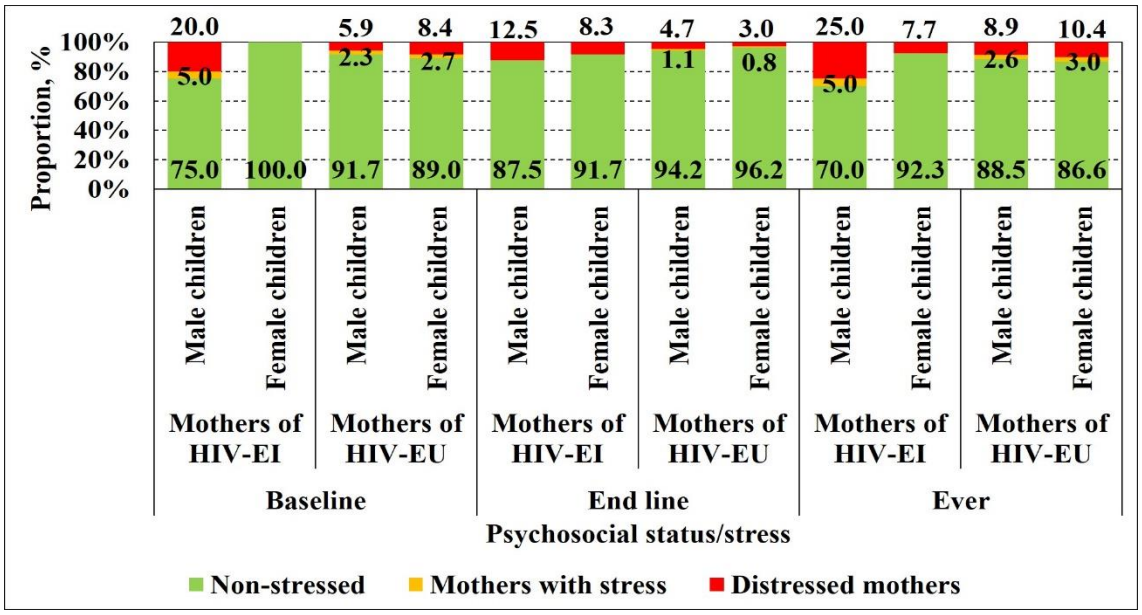
The baseline and end line measurements had independently revealed a share of 78.6% and 82.7% of anaemic mothers, respectively. The share of unique mothers by anaemia status is shown in figure 59.

The mean Hb values of all and anemic mothers were 10.3 mg/dl (HIV-EI: male= 9.9, female and total=9.8; HIV-EU: male, female and total=10.4) and 9.8 mg/dl (HIV-EI: male, female and total=9.2; HIV-EU: male=9.8, female=9.9, total=9.8) respectively; in both, the mothers of the HIV-EI children had it lesser than those of the HIV-EU children. There were no marked differentials in the mother's mean Hb values by the gender of the child.

3.3.12. Psychosocial status/stress among the mothers.

87.1% of the mothers had minimal or no psychosocial stress; however, around one-in-eight of the mothers were found to be having stress (mothers with stress=2.8%, distressed mothers=10.1%, total=12.9%; HIV-EI: male=30.0%, female=7.7%, total=21.2%; HIV-EU: male=11.5%, female=13.4%, total=12.4%). The mothers of the HIV-EI children were having more stress than those of the HIV-EU children. The share of stressed mothers was highest among the mothers of the male HIV-EI children; however, it was based on very small numbers and could change elsewhere. More than three-fourths of the mothers having stress in all the categories were 'distressed' (78.0%; HIV-EI=85.7%, HIV-EU=77.5%).

Fig. 60. Share of unique mothers by psychosocial status/stress.



N of mothers of children: Baseline: N1=HIV-EI male=20, N2=HIV-EI female=13, N3=HIV-EU male=303, N4=HIV-EU female=299; End line: N1=16, N2=12, N3=274, N4=263; Ever: N1=20, N2=13, N3=304, N4=299.

The baseline and end line measurements had independently revealed a share of 9.9% and 5.1% of mothers having psychosocial stress, respectively. The share of unique mothers by grades of psychosocial stress is shown in figure 60. The share of 'stressed' mothers of the HIV-EI and HIV-EU children were not similar and comparable between the baseline and end-line measurement. Hence, the 'combined' share of the unique mothers 'ever stressed' could be used as a better indicator.

3.3.13. The composite indicator of sickness among the mothers.

The composite indicator of sickness computed based on the criteria of pregnancy, morbidity, nutrition, and psychosocial stress of the mothers is described in table 20.

Morbidity component: The composite morbidity indicator of sickness indicated a share of 16.5% of all mothers as sick (HIV-EI: male=33.3%, female=30.8%, total=32.4%; HIV-EU: male=15.6%, female=15.5%, total=13.6%). As such, the share of morbid-sick mothers

Table 20. The composite indicator of sickness among the mothers.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Composite morbidity indicator of sickness	Indicated	33.3	30.8	32.4	15.6	15.5	15.6	106	16.5
	Not indicated	66.7	69.2	67.6	84.4	84.5	84.4	538	83.5
	Total	21	13	34	307	303	610	644	100.0
Composite nutrition indicator of sickness	Indicated	52.4	38.5	47.1	23.8	24.8	24.3	164	25.5
	Not indicated	47.6	61.5	52.9	76.2	75.2	75.7	480	74.5
	Total	21	13	34	307	303	610	644	100.0
Composite indicator of sickness by type of criteria	P alone	4.8	7.7	5.9	12.7	13.2	13.0	81	12.6
	M alone	0.0	15.4	5.9	4.9	5.6	5.2	34	5.3
	N alone	19.0	30.8	23.5	13.0	13.5	13.3	89	13.8
	S alone	4.8	0.0	2.9	3.3	4.6	3.9	25	3.9
	P+M	4.8	15.4	8.8	3.6	3.0	3.3	23	3.6
	P+N	4.8	0.0	2.9	2.6	2.3	2.5	16	2.5
	P+S	0.0	0.0	0.0	1.3	1.3	1.3	8	1.2
	M+N	9.5	0.0	5.9	3.9	4.6	4.3	28	4.3
	M+P	0.0	0.0	0.0	0.7	0.7	0.7	4	0.6
	N+S	9.5	7.7	8.8	1.0	2.0	1.5	12	1.9
	P+M+N	4.8	0.0	2.9	1.0	0.7	0.8	6	0.9
	P+M+S	4.8	0.0	2.9	0.3	0.0	0.2	2	0.3
	P+N+S	0.0	0.0	0.0	1.0	0.7	0.8	5	0.8
	M+N+S	4.8	0.0	2.9	1.3	1.0	1.1	8	1.2
	Not indicated	28.6	23.1	26.5	49.5	46.9	48.2	303	47.0
	Total	21	13	34	307	303	610	644	100.0
Composite indicator of	Indicated by one criteria	28.6	53.8	38.2	33.9	37.0	35.4	229	35.6

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
sickness by number of criteria	Indicated by two criteria	28.6	23.1	26.5	13.0	13.9	13.4	91	14.1
	Indicated by three criteria	14.3	0.0	8.8	3.6	2.3	3.0	21	3.3
	Not indicated	28.6	23.1	26.5	49.5	46.9	48.2	303	47.0
	Total	21	13	34	307	303	610	644	100.0
Composite indicator of sickness by component	P	18.5	23.1	20.0	31.8	29.5	30.6	141	29.7
	M	22.2	30.8	25.0	22.1	21.7	21.9	105	22.2
	N	40.7	38.5	40.0	33.6	34.6	34.1	164	34.6
	S	18.5	7.7	15.0	12.4	14.3	13.4	64	13.5
	Total N (indications)	27	13	40	217	217	434	474	
	Total N (children)	15	10	25	155	161	316	341	

P=Pregnancy. M=Morbidity. N=Nutrition. S=Psychosocial stress. All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

of the HIV-EI children were almost two-times that of the mothers of the HIV-EU children (in each category by child's gender and the total category).

Nutrition component: The composite nutrition indicator of sickness indicated a share of 25.5% of all mothers as sick (HIV-EI: male=52.4%, female=38.5%, total=47.1%; HIV-EU: male=23.8%, female=24.8%, total=24.3%). As such, the share of nutritionally sick mothers of the HIV-EI children were almost 1.5-2 times that of the mothers of the HIV-EU children (in each category by child's gender and the total category).

Composite indicator: The composite indicator of sickness indicated a share of 53.0% of all mothers as sick due to all reasons (indicated by one criteria=35.6%, indicated by two criteria=14.1%, indicated by three criteria=3.3%; HIV-EI: male=71.4%, female=76.9%,

total=73.5%; HIV-EU: male=50.5%, female=53.1%, total=51.8%). As such, the total share of sick mothers of the HIV-EI children was almost 1.5 times the corresponding share among the mothers of the HIV-EU children (in each category by child's gender and the total category). More than one reason in combination identified the lesser share of sick mothers in each category HIV-EI, HIV-EU, and total children. However, the combination of more than one criteria was involved in defining sickness of the mothers of the HIV-EI children (35.3%) almost twice as that for the mothers of the HIV-EU children (16.4%). This suggested that the mothers of the HIV-EI children were sick by more number of reasons than the mothers of the HIV-EU children.

Among the mothers indicated as sick (N=341), there were a total of 474 indications (1.4 per mother; HIV-EI: male=1.8, female=1.3, total=1.6; HIV-EU: male=1.4, female=1.3, total=1.4). Roughly, one-third of the mothers were defined as sick by nutrition criteria (HIV-EI=40.0%, HIV-EU=34.1%, total=34.6%), another near-one-third by pregnancy (HIV-EI=20.0%, HIV-EU=30.6%, total=29.7%), another near one-fifths by morbidity criteria (HIV-EI=25.0%, HIV-EU=21.9%, total=22.2%), and the remaining by psychosocial stress (HIV-EI=15.0%, HIV-EU=13.4%, total=13.5%).

3.4. The pregnancy-related characteristics.

The pregnancy-related information of the HIV-exposed children included in the study is given in table 21.

3.4.1. Status of antenatal care.

Nearly three-fifths of the mothers had full ANC (60.6%; HIV-EI: male=52.4%, female= 30.8%, total=44.1%; HIV-EU: male=59.9%, female=63.0%, total=61.5%). As such, the remaining two-fifths of the mothers had nil/partial ANC; the share of mothers of the HIV-EI children (55.9%) was higher than those of the HIV-EU children (38.5%) in this category.

Table 21. Pregnancy-related information of the HIV-exposed children.

Characte-ristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
ANC received by mother	No/partial care	47.6	69.2	55.9	40.1	37.0	38.5	258	39.4
	Full care	52.4	30.8	44.1	59.9	63.0	61.5	396	60.6
	Total	21	13	34	312	308	620	654	100.0
Place of delivery	Government hospital	81.0	61.5	73.5	86.2	89.0	87.6	567	86.8
	Private hospital	19.0	7.7	14.7	8.7	7.8	8.2	56	8.6
	Home	0.0	30.8	11.8	4.8	3.2	4.0	29	4.4
	Others	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Total	21	13	34	311	308	619	653	100.0
Type of delivery of mother	Normal vaginal	90.5	100.0	94.1	87.4	89.9	88.7	580	89.0
	Caesarean	9.5	0.0	5.9	12.6	10.1	11.3	72	11.0
	Total	21	13	34	310	308	618	652	100.0
Birth type	Single	100.0	100.0	100.0	98.7	95.1	96.9	633	97.1
	Twins	0.0	0.0	0.0	1.3	4.9	3.1	19	2.9
	Total	21	13	34	311	307	618	652	100.0
Ante/Intra/ Post-natal complications	Present	38.1	23.1	32.4	23.4	30.2	26.8	175	27.0
	Absent	61.9	76.9	67.6	76.6	69.8	73.2	472	73.0
	Total	21	13	34	308	305	613	647	100.0
Breastfeeding duration for the child (weeks)	<24	19.0	15.4	17.6	8.0	8.8	8.4	58	8.9
	24-28	23.8	30.8	26.5	24.7	28.2	26.5	173	26.5
	29-51	14.3	7.7	11.8	17.6	17.5	17.6	113	17.3
	52+	42.9	46.2	44.1	31.4	26.9	29.2	196	30.0
	Breastfeeding not started	0.0	0.0	0.0	18.3	18.5	18.4	114	17.4
	Total	21	13	34	312	308	620	654	100.0
	Average duration	45.3	48.3	46.4	47.7	45.6	46.7	46.6	

Characte-ristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Duration of exclusive breastfeeding (weeks)	<24	33.3	38.5	35.3	22.9	28.3	25.6	141	26.2
	24-28	52.4	53.8	52.9	58.1	58.6	58.3	312	58.0
	29+	14.3	7.7	11.8	19.0	13.1	16.1	85	15.8
	Total	21	13	34	253	251	504	538	100.0
	Average duration	22.3	20.2	21.5	25.9	24.9	25.4	24.9	
Weaning at ≤6 months and within two weeks	Done	20.0	15.4	18.2	25.0	29.6	27.3	141	26.7
	Not done	80.0	84.6	81.8	75.0	70.4	72.7	387	73.3
	Total	20	13	33	248	247	495	528	100.0
Duration of mixed feeding (weeks)	≤2	10.0	7.7	9.1	8.5	11.5	10.0	64	10.0
	>2-25	25.0	23.1	24.2	20.0	21.4	20.7	134	20.9
	26+	40.0	38.5	39.4	28.5	26.6	27.6	181	28.2
	No mixed feeding	25.0	30.8	27.3	43.0	40.5	41.7	263	41.0
	Total	20	13	33	305	304	609	642	100.0
	Average duration	28.0	38.4	32.1	29.9	28.8	29.4	29.5	
CD4 count of mother closest to the date of delivery	<300	41.2	44.4	42.3	20.3	21.4	20.8	129	21.8
	300-499	41.2	22.2	34.6	37.4	34.9	36.2	214	36.1
	500+	17.6	33.3	23.1	42.3	43.8	43.0	250	42.2
	Total	17	9	26	286	281	567	593	100.0
	Average CD4 count	359.6	460.6	394.6	503.6	510.3	506.9	502	
Maternal PPTCT strategies undertaken	ARV/ART alone	47.6	53.8	50.0	41.2	38.6	39.9	265	40.5
	Caesarean alone	0.0	0.0	0.0	0.3	0.0	0.2	1	0.2
	Breastfeeding alone	0.0	7.7	2.9	3.8	3.9	3.9	25	3.8
	ARV/ART & Caesarean	4.8	0.0	2.9	3.5	4.5	4.0	26	4.0
	ARV/ART & Breastfeeding	14.3	30.8	20.6	36.4	42.9	39.6	253	38.6

Characte-ristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
	Caesarean & Breastfeeding	0.0	0.0	0.0	0.6	0.6	0.6	4	0.6
	All the three	4.8	0.0	2.9	8.0	4.9	6.4	41	6.3
	None	28.6	7.7	20.6	6.1	4.5	5.3	40	6.1
	Total	21	13	34	313	308	621	655	100.0
Duration of ARV/ART given to mother during pregnancy (days)	≤30	28.6	15.4	23.5	24.8	22.2	23.5	151	23.5
	31-182	23.8	30.8	26.5	38.4	37.7	38.1	241	37.5
	183-364	0.0	7.7	2.9	5.2	7.9	6.6	41	6.4
	365+	14.3	30.8	20.6	21.8	22.5	22.2	142	22.1
	Not given	33.3	15.4	26.5	9.8	9.6	9.7	68	10.6
	Total	21	13	34	307	302	609	643	100.0
	Mean ARV/ART duration	313.1	502.4	385.5	282.5	319.3	300.7	305	
Provision of ARV/ART to mother during breastfeeding period	Fully covered	66.7	61.5	64.7	82.4	81.1	81.8	520	80.9
	Partially or not covered	33.3	38.5	35.3	17.6	18.9	18.2	123	19.1
	Total	21	13	34	307	302	609	643	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

3.4.2. Delivery-related characteristics.

Place of delivery: More than 95% of the mothers had an institutional delivery (government HCF=86.8%, private HCF=8.6%, total=95.4%; HIV-EI: male=100.0%, female=69.2%, total=88.2%; HIV-EU: male=94.9%, female=96.8%, total= 95.8%). The rest of the

deliveries happened elsewhere (4.6%); the share of mothers of the HIV-EI children (11.8%) was higher than those of the HIV-EU children (4.0%) in this category. The government HCFs were used by 86.8% of all mothers (HIV-EI=73.5%, HIV-EU=87.6%), and 91.0% of the mothers who had institutional deliveries (HIV-EI=83.3%, HIV-EU= 91.4%). The share of the mothers not using the government HCFs was higher among those of the HIV-EI children (26.5%), compared to those of the HIV-EU children (12.4%).

Type of delivery: Around 90% of the mothers had vaginal delivery (89.0%; HIV-EI: male=90.5%, female=100.0%, total=94.1%; HIV-EU: male=87.4%, female=89.9%, total= 88.7%). The rest of the deliveries were Caesarean (11.0%); the share of mothers of the HIV-EU children (11.3%) was higher than those of the HIV-EI children (5.9%).

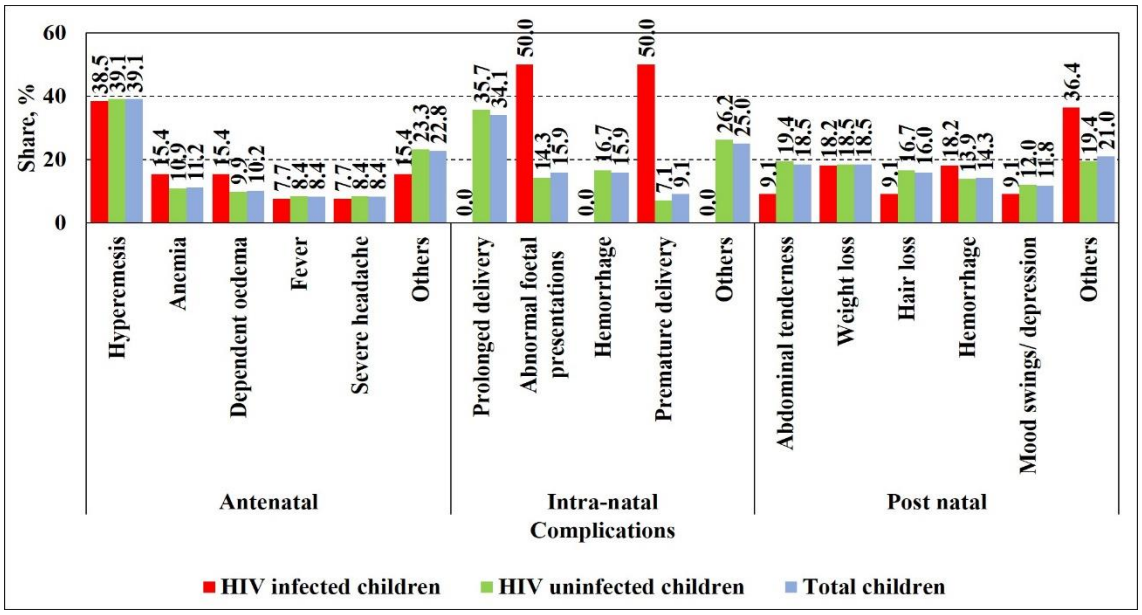
Type of birth: 97.1% of the children were born as single child (HIV-EI: male, female and total=100.0%, HIV-EU: male=98.7%, female=95.1%, total=96.9%). While all the HIV-EI children were born single, 3.1% of the HIV-EU children were born as twins.

3.4.3. Complications associated with pregnancy.

Around a quarter of all the pregnancies were associated with a reported complication-antenatal, intra-natal or post natal (27.0%; HIV-EI: male=38.1%, female=23.1%, total= 32.4%; HIV-EU: male=23.4%, female=30.2%, total=26.8%). The common antenatal, intra-natal and post natal complications reported are shown in figure 61.

The common antenatal complications among all pregnancies were hyperemesis (HIV-EI=38.5%, HIV-EU=39.1%, total=39.1%), anaemia (HIV-EI=15.4%, HIV-EU=10.9%, total=11.2%) and dependent edema (HIV-EI=15.4%, HIV-EU=9.9%, total=10.2%); of these, anaemia and dependent edema tend to be present more among the mothers of the HIV-EI children. The common intra-natal complications were prolonged delivery (HIV-EI=0.0%, HIV-EU=35.7%, total=34.1%), abnormal fetal presentations (HIV-EI=50.0%, HIV-EU=14.3%, total=15.9%) and hemorrhage (HIV-EI=0.0%, HIV-EU=16.7%, total= 15.9%). Intra-natal complications in general, and prolonged delivery and hemorrhage, was

Fig. 61. Share and types of pregnancy-related complications.



N of complications associated with pregnancy of children: Antenatal: HIV-EI=13, HIV-EU=202, total=215; Intra-natal: HIV-EI=2, HIV-EU=42, total=44; Post natal: HIV-EI=11, HIV-EU=108, total=119.

more among the mothers of the HIV-EU children. The common post-natal complications were abdominal tenderness (HIV-EI=9.1%, HIV-EU=19.4%, total=18.5%), weight loss (HIV-EI=18.2%, HIV-EU=18.5%, total=18.5%), hair loss (HIV-EI=9.1%, HIV-EU= 16.7%, total=16.0%), and hemorrhage (HIV-EI=18.2%, HIV-EU=13.9%, total=14.3%); of these, abdominal tenderness and hair loss was more among the mothers of the HIV-EU children, while hemorrhage tends to be more among the mothers of the HIV-EI children.

3.4.4. Breastfeeding and weaning.

Breastfeeding initiation: Breastfeeding was not initiated for nearly one-in-six HIV-exposed children (17.4%; HIV-EI: male, female and total=0.0%; HIV-EU: male=18.3%, female=18.5%, total=18.4%). On the reverse, all the HIV-EI children and 81.6% of the HIV-EU children had been breastfed. Both the male and female children had a near-equal chance of being initiated on breast milk (male=82.9%, female=82.3%).

Duration of breastfeeding: Around one-third of all the children (or 42.7% of the breastfed children) were breastfed for ≤7 months (or <29 weeks; <24weeks=8.9%, 24-28 weeks= 26.5%, total=35.3%; HIV-EI: male=42.9%, female=46.2%, total=44.1%; HIV-EU: male=32.7%, female=37.0%, total=34.8%), while the rest (64.7% of all the children, or 57.3% of the breastfed children) were breastfed for >7 months (29+ weeks). Compared to their HIV counterparts, there was a higher share of the HIV-EI children breastfed in the duration subset of <6 months (or 24 weeks; HIV-EI=17.6%, HIV-EU=8.4%, total=8.9%) and >1 year (or 52+ weeks; HIV-EI=44.1%, HIV-EU=29.2%, total=30.0%), while there was a higher share of the HIV-EU children in the duration subset of 8-11 months (or 29-51 weeks; HIV-EI=11.8%, HIV-EU=17.6%, total=17.3%). The male children had a slightly higher chance of being breastfed longer (29+ weeks; male=66.7%, female=62.6%), compared to the female children.

The mean duration of breastfeeding among all children was 46.6 weeks (HIV-EI: male=45.3, female=48.3, total=46.4; HIV-EU: male=47.7, female=45.6, total=46.7; male=47.5, female-45.7 weeks).

Duration of exclusive breastfeeding (or age at weaning): Excluding the 114 never breastfed children and the 7 children for whom the information was missing, the exclusive breastfeeding had been analyzed for 538 (81.5%) of the HIV-exposed children. The duration of exclusive breastfeeding approximately indicated the age of start of other feeds to the children (as there were only an excludable 1% children who were not yet started other feeds by the end of the study).

More than four-fifths of the breastfed children were exclusively breastfed for ≤7 months (<24 weeks=26.2%, 24-28 weeks=58.0%, total=84.2%; HIV-EI: male=85.7%, female= 92.3%, total=88.2%; HIV-EU: male=81.0%, female=86.9%, total=83.9%), while the rest (15.8%) were exclusively breastfed for >7 months (29+ weeks). Compared to their HIV counterparts, a higher share of the HIV-EI children were exclusively breastfed for <6 months (or 24 weeks; HIV-EI=35.3%, HIV-EU=25.6%, total=26.2%), while a higher share of the HIV-EU children were exclusively breastfed for >7 months (HIV-EI=11.8%, HIV-

EU=16.1%, total=15.8%). This suggested that the HIV-EI children tend to be weaned earlier (shorter exclusive breastfeeding) than the HIV-EU children (longer duration of exclusive breastfeeding), despite a near-equal mean duration of 46 weeks of breastfeeding. Among the HIV-EU children, there was a higher share of the female children exclusively breastfed for <6 months (or 24 weeks; male=22.9%, female=28.3%, total=25.6%), and a higher share of the male children exclusively breastfed for >7 months (or 29+ weeks; male=19.0%, female=13.1%, total= 16.1%). This suggested that the female HIV-EU children tend to be weaned earlier (shorter exclusive breastfeeding), than the male HIV-EU children (longer duration of (exclusive) breastfeeding). The male children, in general, had a higher chance of being exclusively breastfed longer (29+ weeks; male=18.6%, female=12.9%), compared to the female children.

The mean duration of exclusive breastfeeding among all the children was 24.9 weeks (HIV-EI: male=22.3, female=20.2, total=21.5; HIV-EU: male=25.9, female=24.9, total=25.4; male=25.6, female-24.7 weeks), but was shorter for the HIV-EI and the male children.

Weaning: Almost a quarter of all the children were weaned at $\leq$6 months and within a period of 2 weeks (26.7%; HIV-EI: male=20.0%, female=15.4%, total=18.2%; HIV-EU: male=25.0%, female=29.6%, total=27.3%). The weaning was delayed, or its duration was more (than 2 weeks) in the remaining children (HIV-EI=81.8%, HIV-EU=72.7%, total= 73.3%), and was higher among the HIV-EI children. The male children had a lesser chance of being weaned at $\leq$6 months and within 2 weeks (male=24.6%, female=28.9%), compared to the female children.

Mixed feeding: The mixed feeding was analyzed both by including and excluding the children who were never breastfed; former for all the regression analysis, while latter for a better understanding of the processes. Including them, the mixed feeding was not employed for two-fifths of all the children (41.0%; HIV-EI: male=25.0%, female=30.8%, total= 27.3%; HIV-EU: male=43.0%, female=40.5%, total=41.7%). Excluding the never-breastfed group, the mixed feeding was not employed for more than a quarter of all the breastfed children (28.3%; HIV-EI: male=25.0%, female=30.8%, total=27.3%; HIV-EU:

male=29.8%, female=26.7%, total=28.3%). As all the HIV-EI children were initiated on breastfeeds, the difference between the results of these analyses was bound only to the HIV-EU children's sub-group and the totals. As such, all the HIV-EI children in the study were breastfed and mix-fed; but among the HIV-EU children, 81.6% were breastfed, and 71.7% of breastfed children were also mix-fed. In short, three-fifths of all children were mix-fed (59.0%; HIV-EI: male=75.0%, female=69.2%, total=72.7%; HIV-EU: male= 57.0%, female=59.5%, total=58.3%; male=70.5%, female=73.1%); the HIV-EI children (in total and by gender categories) and the female children tend to be mix-fed more, compared to their counterparts.

Duration of mixed feeding: One-in-ten of all the children had been mix-fed for ≤2 weeks (the duration recommended for adequate and appropriate weaning; 10.0%; HIV-EI: male=10.0%, female=7.7%, total=9.1%; HIV-EU: male=8.5%, female=11.5%, total= 10.0%). The remaining (>2-25 weeks=20.9%, 26+ weeks=28.2%, total=49.1%; male= 60.0%, female=59.2%) of the children had longer mixed feeding, with near-nil gender differentials. Comparatively, a higher share of the HIV-EI children were mix-fed for ≥6 months (26+ weeks; HIV-EI: male=40.0%, female=38.5%, total=39.4%; HIV-EU: male= 28.5%, female=26.6%, total=27.6%) in total and by gender categories.

The mean duration of mixed feeding among all children was 29.5 weeks (HIV-EI: male=28.0, female=38.4, total=32.1; HIV-EU: male=29.9, female=28.8, total=29.4; male= 29.8, female=29.3 weeks), but was longer for the HIV-EI children.

Infant and young child feed: The results of analyzing the 24-hour dietary recalls for infants and young children (6 months-2 years) are given in table 22. The quality and quantity of feeds for the infant and young children were analyzed in terms of the minimum recommended diversity, frequency and acceptability threshold of 50%; for a total subset of 301, 306 and 308 children (respectively) of age 0.5-2 years anytime during the study period; for whom a total number of 1327, 1458 and 1458 measurements were made (respectively) during the study period.

Table 22. Characteristics of infant and young child feeding (6 months-2 years).

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Food with minimum dietary diversity	Ensured every time	0.0	0.0	0.0	9.2	14.9	11.9	34	11.3
	Unmet occasionally	11.1	16.7	13.3	16.4	11.2	14.0	42	14.0
	Unmet most of the time	44.4	16.7	33.3	30.3	38.1	33.9	102	33.9
	Unmet always	44.4	66.7	53.3	44.1	35.8	40.2	123	40.9
	Total, N (children)	9	6	15	152	134	286	301	100.0
	Total, N (measurements)	49	18	67	694	566	1260	1327	
	Measurements with minimum diversity	28.6	33.3	29.9	30.8	37.3	33.7	33.5	
Food with minimum dietary frequency	Ensured every time	44.4	16.7	33.3	27.7	22.8	25.4	31	25.8
	Unmet occasionally	11.1	0.0	6.7	20.6	18.4	19.6	25	19.0
	Unmet most of the time	44.4	66.7	53.3	35.5	33.8	34.7	46	35.6
	Unmet always	0.0	16.7	6.7	16.1	25.0	20.3	34	19.6
	Total, N (children)	9	6	15	155	136	291	306	100.0
	Total, N (measurements)	52	22	74	776	608	1384	1458	
	Measurements with minimum frequency	40.4	27.3	36.5	52.6	47.2	50.2	49.5	
Minimum acceptable food	Ensured every time	0.0	0.0	0.0	8.3	7.3	7.8	23	7.5
	Unmet occasionally	11.1	16.7	13.3	10.3	11.7	10.9	34	11.0
	Unmet most of the time	55.6	16.7	40.0	33.3	37.2	35.2	109	35.4
	Unmet always	33.3	66.7	46.7	48.1	43.8	46.1	142	46.1
	Total, N (children)	9	6	15	156	137	293	308	100.0
	Total, N (measurements)	52	22	74	776	608	1384	1458	
	Measurements with minimum acceptability	28.8	27.3	28.4	27.1	30.8	28.7	28.7	

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

(a) Dietary diversity: Among the total unique 301 children, the minimum dietary diversity was always ensured in the everyday food for nearly one-eighth of the children (11.3%; HIV-EI: male, female and total=0.0%; HIV-EU: male=9.2%, female=14.9%, total=11.9%; male=8.7%, female=14.3%). It was never ensured in everyday food for all the remaining children (unmet occasionally=14.0%, unmet most of the time=33.9%, unmet always=40.9%, total=88.7%). As such, none of the HIV-EI children had feeds with the minimum recommended dietary diversity in their food; and, a lower share of the male children were ensured the same, compared to the females among the HIV-EU and the total children. On the other end of the spectrum, two-fifths of the children were never ensured the minimum dietary diversity throughout the study (40.9%; HIV-EI: male=44.4%, female=66.7%, total=53.3%; HIV-EU: male=44.1%, female=35.8%, total=40.2%). That is, a higher share of the HIV-EI children and the male HIV-EU children were having less-than-recommended-diversity feeds all the time, compared to their counterparts. All these results indicated that the dietary diversity was compromised for the vast majority of all the children, and was never met all through the study for a higher share of the HIV-EI children and the male children, especially the male HIV-EU children.

On the whole, a total of 1327 24-hour dietary recalls were analyzed for all the (N=301) children, of which 33.5% revealed that minimum diversity was ensured in the feeds (HIV-EI: male=28.6%, female=33.3%, total=29.9%; HIV-EU: male=30.8%, female=37.3%, total=33.7%; male=30.7%, female=37.2%). That is, there was a higher chance for the HIV-EI children, the male children, and the male HIV-EU children, to be having less-than-recommended-diversity feed on a particular day, compared to their counterparts.

(b) Dietary frequency: Among the total unique 306 children, the minimum dietary frequency was always ensured in the everyday food for nearly a quarter of children (25.8%; HIV-EI: male=44.4%, female=16.7%, total=33.3%; HIV-EU: male=27.7%, female= 22.8%, total=25.4%; male=28.7%, female=22.5%). It was never ensured in the everyday food for all the remaining children (unmet occasionally=19.0%, unmet most of the time=35.6%, unmet always=19.6%, total=74.2%). As such, a lower share of the HIV-EU, and the female children among the HIV-EU and the total children were ensured the same,

compared to their in-group counterparts. On the other end of the spectrum, one-fifth of the children were never ensured the minimum dietary frequency throughout the study (19.6%; HIV-EI: male=0.0%, female=16.7%, total=6.7%; HIV-EU: male=16.1%, female=25.0%, total=20.3%). That is, a higher share of HIV-EU children and the female HIV-EU children were having less-than-recommended-frequency of feeds all the time, compared to their counterparts. All these results indicated that the dietary frequency was compromised for a majority of all children, and was never met all through the study for a higher share of HIV-EU children and the female children, especially the female HIV-EU children.

On the whole, a total of 1458 24-hour dietary recalls were analyzed for all the (N=306) children, of which 49.5% revealed that minimum frequency was ensured in the feeds (HIV-EI: male=40.4%, female=27.3%, total=36.5%; HIV-EU: male=52.6%, female=47.2%, total=50.2%; male=51.8%, female=46.6%). That is, there was a higher chance for the HIV-EI children, the female children, and the female HIV-EU children, to be having less-than-recommended-frequency feed on a particular day, compared to their counterparts.

(c) Dietary acceptability: Among the total unique 308 children, the minimum dietary acceptability was always ensured in the everyday food for 7.5% of all the children (HIV-EI: male, female and total=0.0%; HIV-EU: male=8.3%, female=7.3%, total=7.8%; male= 7.8%, female=7.0%). It was never ensured in the everyday food for all the remaining children (unmet occasionally=11.0%, unmet most of the time=35.4%, unmet always= 46.1%, total=92.5%). As such, none of the HIV-EI children had food with the minimum recommended dietary acceptability, while it was ensured/not ensured near-equally among the male and the female children. On the other end of the spectrum, 46.1% of the children were never ensured the minimum dietary acceptability throughout the study (HIV-EI: male=33.3%, female=66.7%, total=46.7%; HIV-EU: male=48.1%, female=43.8%, total= 46.1%). That is, the share of HIV-EI and HIV-EU children who missed acceptable feeds all the time was similar, but more male HIV-EU children tend to miss it than the female counterpart. All these results indicated that the dietary acceptability was compromised for the vast majority of all children, and was never met all through the study for a near-half of all the children.

On the whole, a total of 1458 24-hour dietary recalls were analyzed for all the (N=308) children, of which 28.7% had revealed that minimum acceptability was ensured in the feeds (HIV-EI: male=28.8%, female=27.3%, total=28.4%; HIV-EU: male=27.1%, female= 30.8%, total=28.7%; male=27.2%, female=30.7%). That is, there was a near-75% chance for all the children to be having a less-acceptable feed on a particular day, but the chance was higher for the male children compared to the female children.

3.4.5. CD4 count of mother closest to the delivery.

The CD4 count of the mother near to the date of delivery was available only for 593 (89.8%) mothers. Around two-fifths of the mothers had CD4 count $\geq$500 close to the date of delivery (42.2%; HIV-EI: male=17.6%, female=33.3%, total=23.1%; HIV-EU: male=42.3%, female=43.8%, total=43.0%), while another one-fifth had it <300 (21.8%; HIV-EI: male=41.2%, female=44.4%, total=42.3%; HIV-EU: male=20.3%, female= 21.4%, total=20.8%). As such, there was a higher share of the mothers of the HIV-EI and the HIV-EU children having their CD4 count <300 and $\geq$500 (respectively); that is, the immunological situation of the mothers were unfavorable for the HIV-EI children.

The mean CD4 count among all the mothers was 502 (HIV-EI: male=360, female=461, total=395; HIV-EU: male=504, female=510, total=507), but lower among the mothers of the HIV-EI children.

3.4.6. PPTCT strategies adopted by mothers.

PPTCT adoption: 6.1% of the mothers had never adopted any PPTCT strategy during their pregnancy or after delivery (HIV-EI: male=28.6%, female=7.7%, total=20.6%; HIV-EU: male=6.1%, female=4.5%, total=5.3%). A higher share of the mothers of the HIV-EI children had not adopted any PPTCT strategy, compared to those of the HIV-EU children.

On the reverse, >90% of the mothers had adopted some PPTCT strategy (ARV/ART alone=40.5%, Caesarean alone=0.2%, breastfeeding alone=3.8%, ARV/ART and

Caesarean=4.0%, ARV/ART and breastfeeding=38.6%, Caesarean and breastfeeding= 0.6%, all the three=6.3%, total=93.9%). That is, the two predominantly adopted options of PPTCT programs were the ARV/ART alone (HIV-EI: male=47.6%, female=53.8%, total= 50.0%; HIV-EU: male=41.2%, female=38.6%, total=39.9%) and the ARV/ART in combination with breastfeeding (HIV-EI: male=14.3%, female=30.8%, total=20.6%; HIV-EU: male=36.4%, female=42.9%, total=39.6%). A higher share of the mothers of the HIV-EI children had adopted the 'ARV/ART alone' strategy, compared to those of the HIV-EU mothers; and a higher share of the mothers of the HIV-EU children had adopted the 'ARV/ART in combination with breastfeeding' strategy, compared to those of the HIV-EI mothers. Also, there was a relatively higher proportion of the mothers of the female children adopting 'ARV/ART in combination with breastfeeding' strategy, compared to the mothers of the male children, in both the HIV-EI and the HIV-EU categories.

44.4% (HIV-EI=52.9%; HIV-EU=44.0%) of the mothers had adopted a single PPTCT strategy, 43.2% (HIV-EI=23.5%; HIV-EU=44.3%) had adopted two strategies, and 6.3% (HIV-EI=2.9%; HIV-EU=6.4%) had adopted all the three strategies. There was lesser adoption of more than one PPTCT strategies among the mothers of the HIV-EI children, compared to those of the HIV-EU children, which could have resulted in the MTCT.

Without considering the elective Caesarean section as a PPTCT strategy, 44.9% of the mothers had adopted the ARV/ART and breastfeeding strategies to prevent the MTCT (HIV-EI: male=19.0%, female=30.8%, total=23.5%; HIV-EU: male=44.4%, female= 47.7%, total=46.1%); the share of the mothers of the HIV-EU children were higher than those of the HIV-EU children. On the reverse, the rest of the mothers (55.1%) were not effectively covered by the PPTCT program.

ARV/ART during pregnancy: ARV/ART was not provided to one-in-ten mothers during pregnancy (10.6%; HIV-EI: male=33.3%, female=15.4%, total=26.5%; HIV-EU: male= 9.8%, female=9.6%, total=9.7%); a higher share of the mothers of the HIV-EI children had not received it, compared to those of the HIV-EU children. On the reverse, 89.4% of all the mothers had received ARV/ART of some duration during pregnancy.

23.5% of mothers received ARV/ART for ≤30 days during pregnancy (HIV-EI: male= 28.6%, female=15.4%, total=23.5%; HIV-EU: male=24.8%, female=22.2%, total=23.5%), while the rest received it for >30 days (31-182 days=37.5%, 183-364 days=6.4%, 365+ days=22.1%, total=65.9%; HIV-EI: male=38.1%, female=69.2%, total=50.0%; HIV-EU: male=65.5%, female=68.2%, total=66.8%). A longer duration of ARV/ ART was adopted by the mothers of the HIV-EU children, compared to those of the HIV-EI children.

The mean duration of the ARV/ART provided to the mothers during the pregnancy was 304.9 days (HIV-EI: male=313.1, female=502.4, total=385.5; HIV-EU: male=282.5, female=319.3, total=300.7), but was lesser for the mothers of the HIV-EU children.

ARV/ART during breastfeeding period: ARV/ART was provided to 80.9% of all the mothers during the whole duration of breastfeeding (HIV-EI: male=66.7%, female=61.5%, total=64.7%; HIV-EU: male=82.4%, female=81.1%, total=81.8%); the share of the mothers of the HIV-EI children was smaller, compared to those of the HIV-EU children. The remaining one-fifth of the mothers did not have their breastfeeding period fully covered with the ARV/ART.

3.5. The child-related characteristics.

Age and gender-related information of the HIV-exposed children in the study are described in section 3.1. The rest of the important characteristics is given in table 23.

3.5.1. Duration of follow-up of the child in the study.

Even though the study period was 29 months, 75.6% of the children were followed up for 6-23 months (HIV-EI: male=81.8%, female=84.6%, total=82.9%; HIV-EU: male=89.2%, female=73.5%, total=75.2%); the highest share being in the 18-23 month category (38.2%). The mean duration of follow-up of children was 16.4 months (HIV-EI: male=17.0, female=16.1, total=16.7; HIV-EU: male=16.0, female=16.7, total=16.3), nearly similar for the HIV-EI and HIV-EU children, and the male and female children.

Table 23. Child-related characteristics.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total	
		Male	Female	Total	Male	Female	Total	N	%
Duration of child follow-up (months)	<5	9.1	7.7	8.6	10.8	12.9	11.8	77	11.7
	6-11	9.1	23.1	14.3	22.5	16.8	19.7	128	19.4
	12-17	31.8	23.1	28.6	21.3	13.5	17.4	119	18.0
	18-23	40.9	38.5	40.0	33.0	43.2	38.1	252	38.2
	24+	9.1	7.7	8.6	12.4	13.5	13.0	84	12.7
	Total, N	22	13	35	315	310	625	660	100.0
	Average, months	17.0	16.1	16.7	16.0	16.7	16.3	16.4	
Birth weight of the child (kg)	<2.5	25.0	27.3	25.8	16.9	21.8	19.4	116	19.7
	≥2.5	75.0	72.7	74.2	83.1	78.2	80.6	473	80.3
	Total, N	20	11	31	278	280	558	589	100.0
	Average, kg	2.8	2.8	2.8	2.8	2.7	2.7	2.7	
Availability of parental care for child	Both parents alive	77.3	76.9	77.1	82.9	82.3	82.6	543	82.3
	Orphan	22.7	23.1	22.9	17.1	17.7	17.4	117	17.7
	Total, N	22	13	35	315	310	625	660	100.0
Environment where the child lives	With mother	90.9	100.0	94.3	92.4	91.9	92.2	609	92.3
	Without mother's care	9.1	0.0	5.7	7.6	8.1	7.8	51	7.7
	Total, N	22	13	35	315	310	625	660	100.0
Immunization status	Immunized for age	68.2	61.5	65.7	64.1	70.3	67.2	443	67.1
	Under-immuni-sed for age	31.8	38.5	34.3	35.9	29.7	32.8	217	32.9
	Total, N	22	13	35	315	310	625	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

3.5.2. Birth weight of the child.

Birth weight was available only for 589 (89.2%) of the children. Around four-fifths of the children had adequate birth weight (≥2.5 kg; 80.3%; HIV-EI: male=75.0%, female=72.7%, total=74.2%; HIV-EU: male=83.1%, female=78.2%, total=80.6%). The share of the children born with LBW was higher among the HIV-EI children (25.8%) compared to the HIV-EU children (19.4%), and among the female children compared to male children. The mean birth weight was 2.7 kg, which was near-equal for the HIV-EI and HIV-EU children, and the male and female children.

3.5.3. Care-takers of the child.

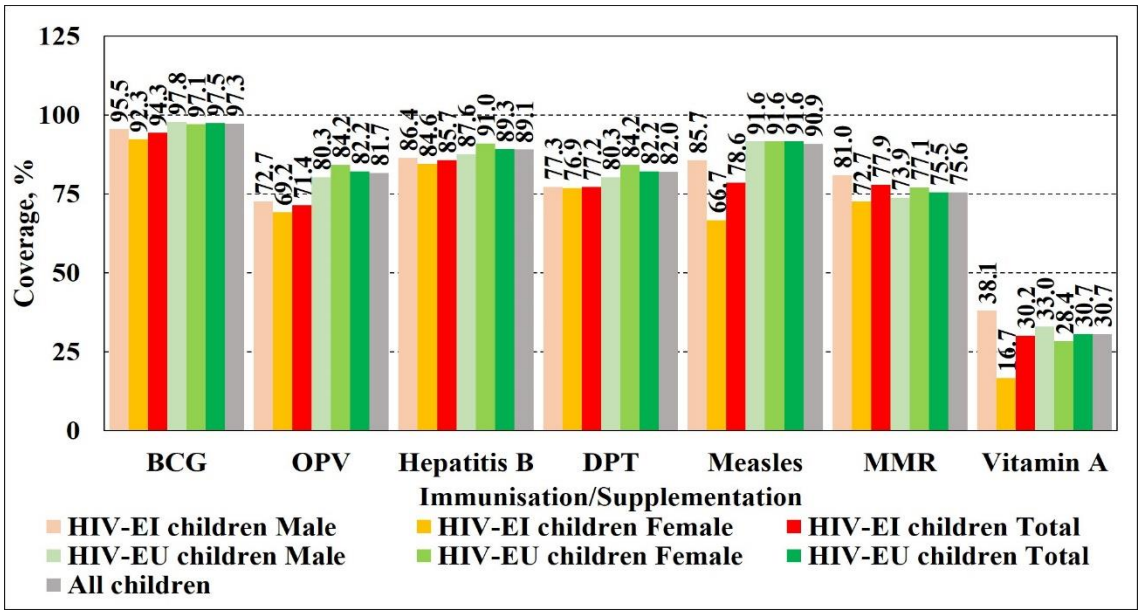
More than four-fifths of all the children had both parents alive to take care of them (82.3%; HIV-EI: male=77.3%, female=76.9%, total=77.1%; HIV-EU: male=82.9%, female= 82.3%, total=82.6%). The remaining 17.7% of the children were (single or double) orphans. There was a higher share of orphans among the HIV-EI children (22.9%) compared to the HIV-EU children (17.4%) but was similar by gender.

Of all the children, 92.3% lived with the mother (HIV-EI: male=90.9%, female=100.0%, total=94.3%; HIV-EU: male=92.4%, female=91.9%, total=92.2%). The remaining 7.7% of the children lived without the mother's care and was a near-similar by the differentials of gender and HIV status.

3.5.4. Immunization status of children.

Near two-thirds of all the children were immunized for age (67.1%; HIV-EI: male=68.2%, female=61.5%, total=65.7%; HIV-EU: male=64.1%, female=70.3%, total=67.2%); the rest (32.9%) were under-immunized. The share of the children immunized for age tend to be higher for the female children (69.9%), compared to male children (64.4%) but was near-similar by HIV status. The coverage of the various immunizations and vitamin A supplementation is shown in figure 62.

Fig. 62. Coverage of immunization and vitamin A supplementation among children.



N of children: BCG, OPV, Hepatitis B, DPT: N1=HIV-EI male=22, N2=HIV-EI female=13, N3=HIV RI total=35, N4=HIV-EU male=315, N5=HIV-EU female=310, N6=HIV-EU total=625, N7=All=660; Measles and vitamin A: N1=21, N2=12, N3=33, N4=297, N5=299, N6=596, N7=629; MMR: N1=21, N2=11, N3=32, N4=276, N5=279, N6=555, N7=587.

The coverage was highest for the BCG immunization (97.3%), followed by measles (90.9%), hepatitis B (89.1%), DPT (82.0%), OPV (81.7%), MMR (75.6%) and vitamin A supplementation (30.7%), among all the children. However, coverage of all the immunizations and the vitamin A supplementation was similar for the HIV-EI and HIV-EU children, and the male and female children, except for OPV and measles (the share was lower for the HIV-EI children) and vitamin A supplementation (the share was lower among the female children (27.9%)).

3.6. The natural course of HIV infection among children during the study period.

The HIV-related outcomes of the HIV-exposed children in terms of the proportions of the HIV infection, and the children belonging to different clinical stages and on treatment were ascertained. The HIV-related information on the HIV-EI children is given in table 24.

Table 24. HIV-related characteristics of the children.

Characteristics	Attributes	HIV-EI children		
		Male	Female	Total
Child HIV status in relation to the study period	Known HIV-EI at baseline	68.2	61.5	65.7
	Identified HIV infection during the study period, but not a seroconversion	22.7	15.4	20.0
	Seroconversion during the study period	9.1	23.1	14.3
	Total, N	22	13	35
Age of child when detected HIV infection (months)	<18	40.9	53.8	45.7
	18+	59.1	46.2	54.3
	Total, N	22	13	35
	Average age	15.8	14.7	15.4
HIV clinical stage of child	1	18.2	53.8	31.4
	2	81.8	46.2	68.6
	Total, N	22	13	35
Age of child at start of ART (months)	<18	18.2	23.1	20.0
	18+	50.0	46.2	48.6
	Not started	31.8	30.8	31.4
	Total, N	22	13	35
	Average age	25.6	23.2	24.6
Delay in starting ART to child after detecting HIV infection (days)	<90	40.9	53.8	45.7
	90+	59.1	46.2	54.3
	Total, N	22	13	35
	Average delay (excluding non-initiated)	193.9	201.7	196.8
	Average delay (including non-initiated)	380.3	308.2	353.5
ART status of the child during the study period	On ART, N	100.0	77.8	91.7
	ART stopped/LFU	0.0	22.2	8.3
	Total, N	15	9	24
	<50	53.3	55.6	54.2

Characteristics	Attributes	HIV-EI children		
		Male	Female	Total
Percentage dura-tion of total life of child on ART	50+	46.7	44.4	45.8
	Total, N	15	9	24
	Average	32.9	32.4	32.7
Percentage duration of known-positive life on ART	<80	53.3	44.4	50.0
	80+	46.7	55.6	50.0
	Total, N	15	9	24
	Average	68.3	65.4	67.4

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

All children in the study had been HIV-tested, and the proportion of HIV-infected children was 5.3%. Of the 35 HIV-EI children, two-thirds (65.7%) of them were known as HIV-infected at the beginning of the study. The remaining one third were either not tested for the HIV infection before the start of the study (not seroconversion; 20.0%), or tested negative for HIV earlier (seroconversion; 14.3%); and they were tested during the study period to be detected as HIV-EI children. The share of the seroconversion typically represented the MTCT through breastfeeding in the study population.

Considering the age of the child at detecting the HIV infection, nearly half of the children were identified before the age of 18 months (45.7%), while the remaining were identified in the 18+ months of age. The mean age of detection of the HIV infection among the children was 15.4 months. During the study period, about one-third (31.4%) of them were in HIV clinical stage 1, while the rest of them were in stage 2.

ART had not been initiated to a third (31.4%) of all the HIV-EI children, despite detecting the HIV infection. ART was started for 20.0% of all the HIV-EI children (or 29.1% of the children initiated on ART) before the age of 18 months, while, it was started after 18 months for 48.6% of all the HIV-EI children (or 70.9% of the children initiated on ART).

The mean age of ART initiation was 24.6 months. The delay is starting ART after detecting the HIV infection was 90+ days for more than half (54.3%) of the children (including the never-started). The mean delay in starting ART after detecting the HIV infection was 196.8 days (excluding the never-started) and 353.5 days (including the never-started) till the end of the study). Despite starting ART, 8.3% of the children had dropped out of the ART, and were not on ART during the study period; 91.7% were retained on ART. Considering the children who were initiated on ART as on the date of closure of this study/censoring, nearly half of them (45.8%) were already on ART through half of their whole life. The mean duration of life on ART as a part of that of their whole life was 32.7%. On the other hand, half of the HIV-EI children were on ART for <80% of their life after detecting the HIV infection, while another half were on ART for >80% of their known-positive life. The mean duration of life on ART as a part of that of known-positive life was 67.4%. The gender differentials were not considered due to the small numbers of the HIV-EI children included in the study.

Box 4. Summary of the profile of HIV-exposed children and the natural course of HIV infection.

Majority for the HIV-exposed children were born in the Hindu families in backward castes and lived in poor socio-economic status. Their fathers and mothers were mostly from backward educational and occupational status. Three-quarters of these families had more than one child, while half of these families were having people other than primary family members living with them. Majority of these children lived in poor housing and environment standards, lacking safe water, food, sanitation, and hygiene. Despite being poor, these families did not have external financial support. Even the food security was compromised in about one-in-eight households, and only about two-fifths of children were utilizing the nutritional support available from the schools and anganwadis regularly. Mostly, the mothers were in charge of cooking at home. Adding to these limited life opportunities, more than a third of these families faced a socio-economic crisis, the burden of which was slightly higher among the families with HIV-EI children.

The mothers were mostly of age 20-34 years, with a mean age of 26.4 years at the beginning of the study. Three-fourths of the mothers were married before 20 years of age, with the mean age of marriage at 18.4 years. There was an indication of higher MTCT in the mothers who were married at a younger age. Near four-fifths of these mothers were detected as HIV-infected before 25 years of age, and the mean age of HIV detection was 22.8 years. ART was started for 95% of the mothers at a mean age of 24.0 years. The average delay of starting ART after detecting the HIV infection was 445 days; but the delay was double among the mothers of the HIV-EI children, compared to those of HIV-EU children. Probably this could be a reason for MTCT among them.

The majority of the mothers were in HIV clinical stage 2. There was a near-10% dropout from the already-initiated ART. One-fifth of the total mothers were pregnant during the 30-month calendar study period, of which one-third were subsequent pregnancies. Psychosocial stress was present among one-in-eight mothers, with higher preponderance among the mothers of the HIV-EI and the male children. The share of distressed mothers was more among the total stressed mothers.

Around 5% of mothers had chronic illnesses like hypertension, bronchial asthma, and mental ill-health. One-third of the mothers experienced acute morbidities, which was higher among the mothers of HIV-EI children. Multiple morbidities were also higher among this sub-group. The common acute morbidities were ARI, FUO, skin/mucosal conditions/infections, and ADD. The ARI and ADD together contributed to three-fourths of the morbidities among the mothers of the HIV-EI children and more than half of the morbidities among the mothers of the HIV-EU children.

Half of the mothers were underweight, and the mean BMI was 19.4 kg/m^2. The share of the underweight mothers was more among the mothers of HIV-EI children. More than 90% of the mothers were anaemic, and it was predominantly moderate anaemia. A higher share of the mothers of the female children was indicated as anaemic, when compared to those of male children. Severe anaemia was commoner among the mothers of HIV-EI children. The mean haemoglobin value was 10.3 mg/dl, and this was lower among the

mothers of the HIV-EI children. Around two-thirds of the mothers had vitamin/mineral deficiencies. Like acute morbidity, a higher share of the mothers of the HIV-EI children had the presence of vitamin/mineral deficiencies and in its severe forms. Common vitamins indicated as deficient were vitamin B, C, D and E. Vitamins A and C was indicated as deficient among a higher share of the mothers of the HIV-EI children, while vitamin B9 and B12 and zinc were more deficient among the mothers of the HIV-EU children.

In the effort to identify the mothers who were sick due to various reasons, a composite indicator of sickness was defined. Half of the mothers satisfied the set criteria, of which near-one-third each were sick by nutrition, pregnancy, and morbidity/psychosocial stress. Sick mothers (and the sick mothers identified by multiple criteria) were higher among the mothers of the HIV-EI children, compared to those of the HIV-EU children.

Three-fifths of the pregnant mothers received full ANC, while a higher share of the mothers of the HIV-EI children missed it. The deliveries happened mostly vaginally in HCFs, and the government HCFs were mostly utilized by the mothers. A higher share of the mothers of the HIV-EI children had used non-government facilities for delivery, which could be associated with the lesser provision of PPTCT services, thereby resulting in MTCT. The common antenatal complications were hyperemesis, anaemia, and dependent edema; intra-natal complications were prolonged delivery, abnormal fetal presentations hemorrhage; and post-natal complications were abdominal tenderness (suggestive of non-involution of the uterus), weight loss, hair loss, and hemorrhage. Of these, the anaemia, dependent edema, and post-partum hemorrhage tend to be more prevalent among the mothers of the HIV-EI children, and the intrapartum complications (prolonged delivery and hemorrhage), abdominal tenderness and hair loss were commoner among those of the HIV-EU children. On the whole, a quarter of all the mothers experienced a complication during pregnancy or delivery/after delivery.

17% of the children were not breastfed; all the HIV-EI children had been breastfed. The mean duration of breastfeeding and exclusive breastfeeding among all the children were

46.6 (near-equal for the HIV-EI and HIV-EU children) and 24.9 (shorter for the HIV-EI children) weeks, suggesting the mixed feeding. A higher share of the HIV-EI children was breastfed for >1 year but exclusively breastfed only for <7 months. The HIV-EI children and the female HIV-EU children tend to be weaned earlier, while the male HIV-EU children were exclusively breastfed longer (>7 months). Only a quarter of children were weaned at or before 6 months and within 2 weeks, as recommended for the HIV-exposed children. Those who adhered to were mostly the mothers of HIV-EU children. Two-fifths of all (and three-quarters of breastfed) children were mix-fed. A higher share of the HIV-EI children was mix-fed, and for a duration of >6 months. The mean duration of mixed feeding among all children was 29.5 weeks. In short, longer breastfeeding, early weaning, and longer duration of mixed feeding could have resulted in MTCT. Considering the gender of the child, both the male and female children had a similar chance of breastfeeding initiation and longer mixed feeding, and mean duration of mixed feeding. However, despite the female children running a higher chance of being ever mix-fed, the males had a higher chance of being breastfed longer, exclusively breastfed longer, and not weaned at $\leq$6 months and within 2 weeks, and hence, with longer mean duration of breastfeeding and exclusive breastfeeding; all of which could have facilitated a higher MTCT among the male children.

The dietary diversity, frequency, and acceptability of the feeds offered to children 0.5-2 years of age were grossly compromised in a vast majority of children. Considering the HIV status of the child, the dietary diversity and acceptability of the feeds were ensured to a higher share of the HIV-EU children, while the dietary frequency was better for the HIV-EI children. Also, the chance of finding a 24-hour dietary recall indicative of less-than-recommended standards for the dietary diversity and frequency in a cross-sectional survey was higher for the HIV-EI children, while that for acceptability were near-equal for the HIV-EI and HIV-EU children. The dietary diversity of the feeds were ensured to a higher share of the female children, while the dietary frequency and acceptability were better for the male children. Also, the chance of finding a 24-hour dietary recall indicative of less-than-recommended standards for dietary diversity and acceptability in a cross-sectional survey was higher for the male children, while that for frequency was higher for the female

children. The result of dietary frequency was also consistent with longer breastfeeding among the HIV-EI and the male children.

The CD4 count of the mothers close to the delivery was 500+ for a majority of mothers. However, a higher share of the mothers of the HIV-EI children had their CD4 count <300 and a higher share of the mothers of the HIV-EU children had their count ≥500. More than 90% of the mothers had adopted some PPTCT strategy, of which the most common were ARV/ART alone and ARV/ART in combination with breastfeeding. However, only 45% of the mothers were effectively covered by the combination of ARV/ART and breastfeeding strategies to prevent MTCT. The Caesarean section was done only for 11.0% of mothers. A higher share of the mothers of the HIV-EI children had adopted a single PPTCT strategy, mostly the isolated ARV/ART strategy, while a higher share of the mothers of the HIV-EU children had adopted the ARV/ART-breastfeeding combination strategy. Also, there was a higher share of the mothers of the female children who had adopted the ARV/ART-breastfeeding combination strategy. Around 90% of mothers were provided ARV/ART of some duration during pregnancy and through breastfeeding. A higher share of the HIV-EI mothers had not received ARV/ART during pregnancy and through breastfeeding period; while among those who received it, a higher share had it for a less duration (≤30 days during pregnancy or less than breastfeeding duration). Thus, the lower immunological status of the mother, non-initiation of ARV/ART, and shorter ARV/ART duration (during pregnancy and/or breastfeeding) could have been associated with the MTCT.

The study had included 660 children (HIV-EI=5.3%, HIV-EI=94.7%; male=51.1%, female=48.9%). The mean duration of the follow-up was 16.4 months. Four-fifths of the children were born with adequate birth weight; LBW was slightly higher among the HIV-EI children. The mean birth weight was 2.7 kg. Nearly four-fifths of all children had alive parents to take care of them, while 17.7% of them were single or double orphans. More than 90% of the children lived under the mother's care. There was a higher share of the HIV-EI children who were orphans, and a higher share of the HIV-EU children who were separated from their mothers.

Near two-thirds of all the children were immunized for age; a higher share of the male children and the HIV-EU children were under-immunized, compared to their counterparts. The coverage was near-90% or more for BCG, Hepatitis B, and measles vaccines, while it was a more than 75% for the rest of the vaccines. Vitamin A supplementation reached only one-third of the children. Except for the OPV and measles vaccines, for which the coverage was relatively lower among the HIV-EI children, and the vitamin A supplementation, for which the coverage was lower among the female children, the coverage of all others were similar in all the sub-groups of children.

Two-thirds of the HIV-EI children entered the study after testing positive; two-thirds of the children were in HIV clinical stage 2 and on ART during the study. Near-half of the children had detected their HIV infection before 18 months, but only 30% were initiated on ART before 18 months. The delay in starting ART after detecting the HIV infection was 90+ days for more than half of the HIV-EI children. The mean age of detection of HIV infection was 15.4 months, and of ART initiation was 24.6 months, and the mean delay was 196.8 days. Despite starting ART, 8.3% of children had been dropped out of the ART at the time of the study, while 91.7% were retained on ART. For about half of the HIV-EI children initiated on ART, the drugs had been on for $\geq$50% of the total lifetime and $\geq$80% of the life after HIV detection.

CHAPTER 4

RESULTS:

PATTERNS OF GROWTH AND DEVELOPMENT, NUTRITION, MORBIDITY AND MORTALITY IN HIV-EXPOSED CHILDREN

This chapter includes:

CHAPTER 4
RESULTS: PATTERNS OF GROWTH AND DEVELOPMENT, NUTRITION, MORBIDITY AND MORTALITY IN HIV-EXPOSED CHILDREN

The results of the patterns of growth and development, nutrition, morbidity, and mortality among the HIV-exposed children is narrated in this chapter. The inclusion, and the reasons for exclusion, of measurements during the analysis of outcomes is given in Annexure 9.

4.1. The patterns of physical growth and development (by anthropometry).

The patterns of the outcomes of the physical growth and development of the HIV-exposed children in terms of the anthropometric measurements and z-scores were ascertained, grossly, and by age-groups and trajectory of changes.

4.1.1. The gross patterns of physical growth and development.

There were anthropometric assessments for all the children (0-59 months of age) on every data collection schedule. The anthropometric assessments were converted to the z-scores of HFA (HAZ), WFA (WAZ), HCFA (HCAZ) and MUACFA (MCAZ), and categorized into the graver (disadvantaged) group of growth and development criteria, while analyzing the patterns as 'ever-inadequate for age'. The characteristics of unique children ever identified as 'ever-inadequate for age' using anthropometry is described in table 25.

The HAZ was <-2SD for about three-quarters of all the children ever during the study (73.3%; HIV-EI: male=86.4%, female=84.6%, total=85.7%; HIV-EU: male=73.0%, female=72.3%, total=72.6%; total: male=73.9%, female=72.8%). The share of the children with ever-inadequate HFA was higher among the HIV-EI children compared to the HIV-EU children. There was no marked gender differentials within the HIV-EU sub-group and whole total group of the HIV-exposed children.

Table 25. Unique children (0-59 months) ever identified as having anthropometric measurements inadequate for age.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Inadequate HFA ever	Present	86.4	84.6	85.7	73.0	72.3	72.6	73.9	72.8	484	73.3
	Absent	13.6	15.4	14.3	27.0	27.7	27.4	26.1	27.2	176	26.7
	Total	22	13	35	315	310	625	337	323	660	100.0
Inadequate WFA ever	Present	68.2	69.2	68.6	60.3	64.8	62.6	60.8	65.0	415	62.9
	Absent	31.8	30.8	31.4	39.7	35.2	37.4	39.2	35.0	245	37.1
	Total	22	13	35	315	310	625	337	323	660	100.0
Inadequate HCFA ever	Present	31.8	30.8	31.4	29.2	19.7	24.5	29.4	20.1	164	24.8
	Absent	68.2	69.2	68.6	70.8	80.3	75.5	70.6	79.9	496	75.2
	Total	22	13	35	315	310	625	337	323	660	100.0
Inadequate MUACFA ever	Present	54.5	53.8	54.3	28.9	22.9	25.9	30.6	24.1	181	27.4
	Absent	45.5	46.2	45.7	71.1	77.1	74.1	69.4	75.9	479	72.6
	Total	22	13	35	315	310	625	337	323	660	100.0
Ever any inadequate anthro-pometry score for age	Yes	90.9	92.3	91.4	81.0	81.9	81.4	81.6	82.4	541	82.0
	No	9.1	7.7	8.6	19.0	18.1	18.6	18.4	17.6	119	18.0
	Total	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

The WAZ was <-2SD for about two-thirds of all the children ever during the study (62.9%; HIV-EI: male=68.2%, female=69.2%, total=68.6%; HIV-EU: male=60.3%, female=64.8%, total=62.6%; total: male=60.8%, female=65.0%). The share of the children with ever-inadequate WFA was slightly higher among the HIV-compared to the HIV-EU

children. There was no marked gender differentials within the HIV-EU sub-group and the total group of the HIV-exposed children.

The HCAZ was <-2SD for a quarter all the children ever during the study (24.8%; HIV-EI: male=31.8%, female=30.8%, total=31.4%; HIV-EU: male=29.2%, female=19.7%, total=24.5%; total: male=29.4%, female=20.1%). The share of the children with ever-inadequate HCFA was slightly higher among the HIV-EI children compared to the HIV-EU children, and slightly among the male children compared to the female children in the total group and the HIV-EU sub-group of the HIV-exposed children.

The MCAZ was <-2SD for about one-fourth of all the children ever during the study (27.4%; HIV-EI: male=54.5%, female=53.8%, total=54.3%; HIV-EU: male=28.9%, female=22.9%, total=25.9%; total: male=30.6%, female=24.1%). The share of the children with ever-inadequate MUACFA was higher among the HIV-EI children compared to HIV-EU children, and slightly among the male children compared to the female children in the total group and the HIV-EU sub-group of the HIV-exposed children.

So, 82.0% of all the children had any of the anthropometric scores ever-inadequate for age during the study (HIV-EI: male=90.9%, female=92.3%, total=91.4%; HIV-EU: male=81.0%, female=81.9%, total=81.4%; total: male=81.6%, female=82.4%). The share of the children with any anthropometric score ever-inadequate for age was higher among the HIV-EI children compared to the HIV-EU children. There was no marked gender differentials within the HIV-EU sub-group and total group of the HIV-exposed children.

4.1.2. The patterns of physical growth and development in various age cross-sections.

The anthropometric z-scores (HAZ, WAZ, HCAZ, and MCAZ) were classified as adequate and inadequate for age. Every child reaching a particular age cross-section ever during the study, for whom (a) measurement(s) was/were available, was included in the analysis of total measurements made for that age cross-section. As such, a child could be counted in different age cross-sections and for multiple times of measurements.

4.1.2.1. Height for age.

The status of the HFA z-scores for the total measurements in various age cross-sections is given in table 26 and figure 63. Grossly, more than half (55.1%) of all the HFA measurements (N=4395) done for the children of 0-59 months of age (N=1401) had identified an inadequate HFA status with a mean SD of -3.1, while the remaining (44.9%) measurements revealed an adequate HFA status with a mean SD of -1.1. The share of the measurements which revealed an inadequate HFA status was highest in the 12-23 months of the life of the HIV-exposed children, followed by 24-35, 0-11, 36-47 and 48+ months in the decreasing order (0-11 months=54.0%, 12-23 months=66.1%, 24-35 months=59.6%, 36-47 months=52.0%, 48+ months=46.2%). The mean SD of the inadequate HFA measurements remained constant in 0-23 months, and then bettered with the increase in the age of the child from 24+ months of age; that of the adequate HFA measurements worsened in 0-35 months period and then improved slightly in the 36+ months of age; and that of the overall HFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -3.3, -0.9, -2.2; 12-23 months= -3.3, -1.1, -2.5; 24-35 months= -3.2, -1.2, -2.4; 36-47 months= -3.0, -1.1, -2.1; 48+ months= -2.8, -1.1, -1.9). All these suggested that the ages of 12-23 and 24-35 months were mostly affected with an inadequate HFA in the life of the HIV-exposed children, and the HFA status became increasingly adequate at higher ages.

Of the total, 224 (5.1%) measurements were made for the 74 HIV-EI children (0-59 months); 72.8% of these measurements exposed an inadequate HFA status with a mean SD of -3.4, and 27.2% measurements were declared as adequate HFA with a mean SD of -1.0. The share of the measurements which revealed an inadequate HFA status was highest in the 24-35 months of age of the HIV-EI children, followed by 12-23, 36-47, 0-11 and 48+ months of age in the decreasing order (0-11 months=66.7%, 12-23 months=75.0%, 24-35 months=83.8%, 36-47 months=75.0%, 48+ months=65.5%). The mean SD of the inadequate HFA measurements worsened in 0-23 months, and then bettered with the increase in the age of the child from 24+ months of age; that of the adequate HFA measurements worsened in 0-35 months period and then improved in the 36+ months of

Table 26. HFA measurements in various age cross-sections of children, by gender, HIV, and HFA status.

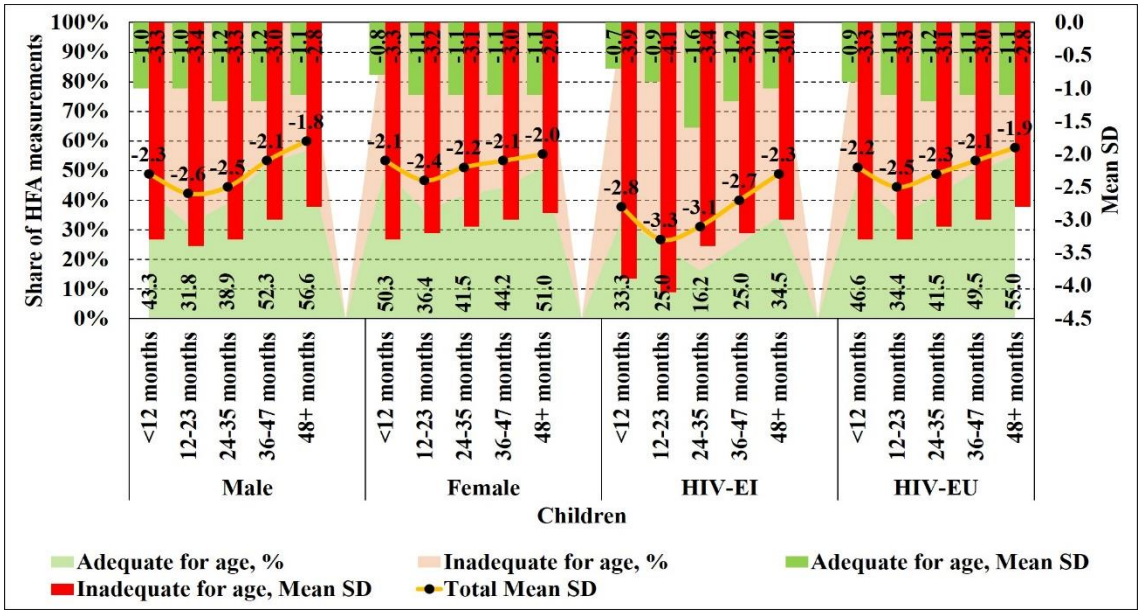
Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
<12 months	Male	HIV-EI	6	18	11.1	-1.0	88.9	-3.9	-3.6
		HIV-EU	116	483	44.5	-1.0	55.5	-3.3	-2.3
		Total	122	501	43.3	-1.0	56.7	-3.3	-2.3
	Female	HIV-EI	4	15	60.0	-0.7	40.0	-3.8	-1.9
		HIV-EU	87	303	49.8	-0.8	50.2	-3.3	-2.1
		Total	91	318	50.3	-0.8	49.7	-3.3	-2.1
	Total	HIV-EI	10	33	33.3	-0.7	66.7	-3.9	-2.8
		HIV-EU	203	786	46.6	-0.9	53.4	-3.3	-2.2
		Total	213	819	46.0	-0.9	54.0	-3.3	-2.2
12-23 months	Male	HIV-EI	9	32	21.9	-0.7	78.1	-4.2	-3.5
		HIV-EU	133	414	32.6	-1.0	67.4	-3.3	-2.6
		Total	142	446	31.8	-1.0	68.2	-3.4	-2.6
	Female	HIV-EI	4	8	37.5	-1.4	62.5	-3.7	-2.8
		HIV-EU	122	374	36.4	-1.1	63.6	-3.2	-2.4
		Total	126	382	36.4	-1.1	63.6	-3.2	-2.4
	Total	HIV-EI	13	40	25.0	-0.9	75.0	-4.1	-3.3
		HIV-EU	255	788	34.4	-1.1	65.6	-3.3	-2.5
		Total	268	828	33.9	-1.1	66.1	-3.3	-2.5
24-35 months	Male	HIV-EI	10	23	13.0	-1.2	87.0	-3.6	-3.3
		HIV-EU	133	342	40.6	-1.3	59.4	-3.2	-2.4
		Total	143	365	38.9	-1.2	61.1	-3.3	-2.5
	Female	HIV-EI	5	14	21.4	-2.0	78.6	-3.0	-2.8
		HIV-EU	150	446	42.2	-1.1	57.8	-3.1	-2.3
		Total	155	460	41.5	-1.1	58.5	-3.1	-2.2

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
	Total	HIV-EI	15	37	16.2	-1.6	83.8	-3.4	-3.1
		HIV-EU	283	788	41.5	-1.2	58.5	-3.1	-2.3
		Total	298	825	40.4	-1.2	59.6	-3.2	-2.4
36-47 months	Male	HIV-EI	13	39	28.2	-1.2	71.8	-3.4	-2.8
		HIV-EU	144	395	54.7	-1.2	45.3	-3.0	-2.0
		Total	157	434	52.3	-1.2	47.7	-3.0	-2.1
	Female	HIV-EI	6	17	17.6	-1.0	82.4	-2.7	-2.4
		HIV-EU	164	478	45.2	-1.1	54.8	-3.0	-2.1
		Total	170	495	44.2	-1.1	55.8	-3.0	-2.1
	Total	HIV-EI	19	56	25.0	-1.2	75.0	-3.2	-2.7
		HIV-EU	308	873	49.5	-1.1	50.5	-3.0	-2.1
		Total	327	929	48.0	-1.1	52.0	-3.0	-2.1
48+ months	Male	HIV-EI	10	36	47.2	-1.2	52.8	-2.8	-2.0
		HIV-EU	134	466	57.3	-1.1	42.7	-2.8	-1.8
		Total	144	502	56.6	-1.1	43.4	-2.8	-1.8
	Female	HIV-EI	7	22	13.6	0.1	86.4	-3.2	-2.7
		HIV-EU	144	470	52.8	-1.1	47.2	-2.9	-2.0
		Total	151	492	51.0	-1.1	49.0	-2.9	-2.0
	Total	HIV-EI	17	58	34.5	-1.0	65.5	-3.0	-2.3
		HIV-EU	278	936	55.0	-1.1	45.0	-2.8	-1.9
		Total	295	994	53.8	-1.1	46.2	-2.8	-1.9
0-5 years	Male	HIV-EI	48	148	27.0	-1.1	73.0	-3.6	-2.9
		HIV-EU	660	2100	46.3	-1.1	53.7	-3.1	-2.2
		Total	708	2248	45.0	-1.1	55.0	-3.2	-2.2
	Female	HIV-EI	26	76	27.6	-0.9	72.4	-3.1	-2.5
		HIV-EU	667	2071	45.3	-1.1	54.7	-3.1	-2.2

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
		Total	693	2147	44.7	-1.1	55.3	-3.1	-2.2
	Total	HIV-EI	74	224	27.2	-1.0	72.8	-3.4	-2.8
		HIV-EU	1327	4171	45.8	-1.1	54.2	-3.1	-2.2
		Total	1401	4395	44.9	-1.1	55.1	-3.1	-2.2

* Excluding outliers. Number of outliers: <12 months: N1=Male HIV-EI=3, N2=Male HIV-EU=25, N3=Female HIV-EI=2, N4=Female HIV-EU=7; 12-23 months: N1=1, N2=8, N3=6, N4=8; 24-35 months: N1=2, N2=7, N3=4, N4=3; 36-47 months: N1=0, N2=1, N3=0, N4=0; 48+ months: N1=0, N2=2, N3=0, N4=1. ≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 63. Share of HFA measurements by HFA status and mean SD.



N of measurements: Male: N1=<12 months=501, N2=12-23 months=446, N3=24-35 months=365, N4=36-47 months=434, N5=48+ months=502; Female: N1=318, N2=382, N3=460, N4=495, N5=492; HIV-EI: N1=33, N2=40, N3=37, N4=56, N5=58; HIV-EU: N1=786, N2=788, N3=788, N4=873, N5=936.

age; and that of the overall HFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -3.9, -0.7, -2.8; 12-23 months= -4.1, -0.9, -3.3; 24-35 months= -3.4, -1.6, -3.1; 36-47 months= -3.2, -1.2, -2.7; 48+ months= -3.0, -1.0, -2.3). All these suggested that the ages of 12-23 and 24-35 months were mostly affected with an inadequate HFA in the life of the HIV-EI children, and the HFA status became increasingly adequate at higher ages.

Among the total, 4171 (94.9%) measurements were made for the 1327 HIV-EU children (0-59 months), which had identified inadequate HFA in 54.2% of the measurements with a mean SD of -3.1, while the remaining (45.8%) measurements revealed an adequate HFA with a mean SD of -1.1. The share of the measurements which revealed an inadequate HFA status was highest in the 12-23 months of the life of the HIV-EU children, followed by 24-35, 0-11, 36-47 and 48+ months of age in the decreasing order (0-11 months=53.4%, 12-23 months=65.6%, 24-35 months=58.5%, 36-47 months=50.5%, 48+ months=45.0%). The mean SD of the inadequate HFA measurements remained constant in 0-23 months, and then bettered with the increase in the age of the child from 24+ months of age; that of the adequate HFA measurements worsened between 0-11 and 12-23 months, and then remained constant in the 24+ months of age; and that of the overall HFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -3.3, -0.9, -2.2; 12-23 months= -3.3, -1.1, -2.5; 24-35 months= -3.1, -1.1, -2.2; 36-47 months= -3.0, -1.1, -2.1; 48+ months= -2.8, -1.1, -1.9). All these suggested that the age of 12-23 months were mostly affected with an inadequate HFA in the life of the HIV-EU children, and the HFA status became increasingly adequate at higher ages.

As such, compared to the HIV-EU counterpart:

- the chance of being of inadequate HFA status was higher for the HIV-EI children in all the age groups;
- the mean SD of overall and inadequate HFA measurements was unfavorable for the HIV-EI children in all the age groups; and,
- the mean SD of adequate HFA measurements was unfavorable for the HIV-EI children in the 25-47 months of age, despite adequate HFA status.

2248 (51.1%) of the total measurements were made on 708 male children (0-59 months), to reveal inadequate HFA status among 55.0% of the measurements with a mean SD of -3.2 and adequate HFA status among 45.0% of the measurements with a mean SD of -1.1. The share of the measurements which revealed an inadequate HFA status was highest in the 12-23 months of the life of the male children, followed by 24-35, 0-11, 36-47 and 48+ months of age in the decreasing order (0-11 months=56.7%, 12-23 months=68.2%, 24-35 months= 61.1%, 36-47 months=47.7%, 48+ months=43.4%). The mean SD of the inadequate HFA measurements worsened in 0-23 months, and then bettered with the increase in the age of the child from 24+ months of age; that of the adequate HFA measurements worsened in 0-23 months, and then remained constant in the 24-47 months of age, to better in the 48+ months of age; and that of the overall HFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -3.3, -1.0, -2.3; 12-23 months= -3.4, -1.0, -2.6; 24-35 months= -3.3, -1.2, -2.5; 36-47 months= -3.0, -1.2, -2.1; 48+ months= -2.8, -1.1, -1.8). All these suggested that the age of 12-23 months were mostly affected with an inadequate HFA in the life of the male children, and the HFA status became increasingly adequate at higher ages.

For the 693 female children (0-59 months), 2147 (48.9%) measurements were made; 55.3% of them were of inadequate HFA status with a mean SD of -3.1, and 44.7% were of adequate HFA status with a mean SD of -1.1. The share of the measurements which revealed an inadequate HFA status was highest in the 12-23 months of the life of the female children, followed by 24-35, 36-47, 0-11 and 48+ months of age in the decreasing order (0-11 months=49.7%, 12-23 months=63.6%, 24-35 months= 58.5%, 36-47 months=55.8%, 48+ months=49.0%). The mean SD of the inadequate HFA measurements bettered with increasing age; that of the adequate HFA measurements worsened in 0-23 months, and then remained constant in the 24+ months of age; and that of the overall HFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -3.3, -0.8, -2.1; 12-23 months= -3.2, -1.1, -2.4; 24-35 months= -3.1, -1.1, -2.2; 36-47 months= -3.0, -1.1, -2.1; 48+ months= -2.9, -1.1, -2.0). All these suggested that the age of 12-23 months were mostly affected with an inadequate HFA in the life of the female children, and the HFA status became increasingly adequate at higher ages.

As such, compared to the female counterpart:

- the chance of being of inadequate HFA status was higher for the male children in the 0-35 months age and lesser in the age of 36+ months;
- the mean SD of inadequate HFA measurements was unfavorable for the male children in the 12-35 months of age and favorable in the age of 48+ months;
- the mean SD of adequate HFA measurements was unfavorable for the male children in the 0-11 and 25-47 months, and favorable in the 12-23 months of age; and,
- the mean SD of overall HFA measurements was unfavorable for the male children in the 0-35 months of age, and favorable in the 48+ months of age.

4.1.2.2. Weight for age.

The status of the WFA z-scores for the total measurements in various age cross-sections is given in table 27 and figure 64. Grossly, around two-fifths (41.4%) of all the WFA measurements (N=4637) done for the children of 0-59 months of age (N=1401) had identified an inadequate WFA status with a mean SD of -2.9, while the remaining (58.6%) measurements revealed an adequate WFA status with a mean SD of -0.9. The share of the measurements which revealed an inadequate WFA status was highest in the 36-47 months of the life of the HIV-exposed children, followed by 48+, 0-11, 24-35 and 12-23 months in the decreasing order (0-11 months=41.5%, 12-23 months=39.0%, 24-35 months=41.1%, 36-47 months=43.1%, 48+ months=41.9%). The mean SD of the inadequate WFA measurements bettered slowly with the increase in the age; that of the adequate WFA measurements worsened with the increase in the age; and that of the overall WFA measurements remained nearly constant with age (0-11 months= -3.2, -0.7, -1.7; 12-23 months= -2.9, -0.9, -1.7; 24-35 months= -2.9, -1.0, -1.8; 36-47 months= -2.8, -1.0, -1.8; 48+ months= -2.8, -1.1, -1.8). All these suggested that the ages of 36-47 and 48+ months were mostly affected with an inadequate WFA in the life of the HIV-exposed children, and the WFA status became increasingly inadequate at higher ages.

Of the total, 245 (5.3%) measurements were made for the 74 HIV-EI children (0-59 months); 56.7% of these measurements exposed an inadequate WFA status with a mean

Table 27. WFA measurements in various age cross-sections of children, by gender, HIV, and WFA status.

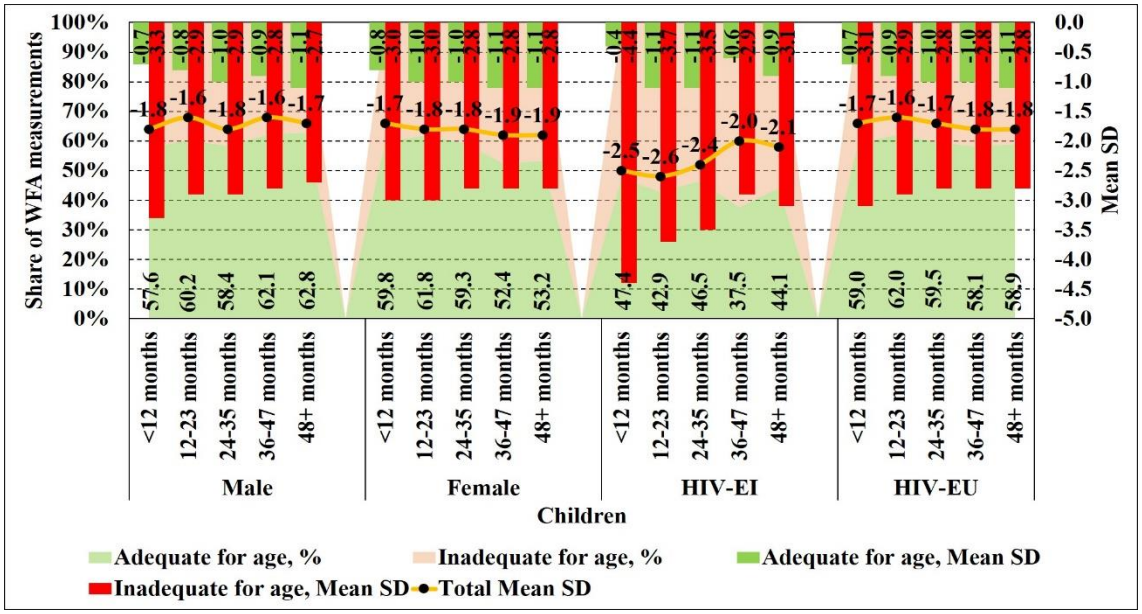
Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
<12 months	Male	HIV-EI	6	21	42.9	-0.3	57.1	-4.6	-2.8
		HIV-EU	116	517	58.2	-0.7	41.8	-3.2	-1.7
		Total	122	538	57.6	-0.7	42.4	-3.3	-1.8
	Female	HIV-EI	4	17	52.9	-0.4	47.1	-4.0	-2.1
		HIV-EU	87	329	60.2	-0.7	39.8	-2.9	-1.6
		Total	91	346	59.8	-0.8	40.2	-3.0	-1.7
	Total	HIV-EI	10	38	47.4	-0.4	52.6	-4.4	-2.5
		HIV-EU	203	846	59.0	-0.7	41.0	-3.1	-1.7
		Total	213	884	58.5	-0.7	41.5	-3.2	-1.7
12-23 months	Male	HIV-EI	9	36	44.4	-1.2	55.6	-3.1	-2.3
		HIV-EU	133	429	61.5	-0.7	38.5	-2.9	-1.6
		Total	142	465	60.2	-0.8	39.8	-2.9	-1.6
	Female	HIV-EI	4	13	38.5	-0.6	61.5	-5.0	-3.3
		HIV-EU	122	401	62.6	-1.0	37.4	-2.8	-1.7
		Total	126	414	61.8	-1.0	38.2	-3.0	-1.8
	Total	HIV-EI	13	49	42.9	-1.1	57.1	-3.7	-2.6
		HIV-EU	255	830	62.0	-0.9	38.0	-2.9	-1.6
		Total	268	879	61.0	-0.9	39.0	-2.9	-1.7
24-35 months	Male	HIV-EI	10	26	38.5	-1.4	61.5	-3.2	-2.5
		HIV-EU	133	363	59.8	-1.0	40.2	-2.9	-1.7
		Total	143	389	58.4	-1.0	41.6	-2.9	-1.8
	Female	HIV-EI	5	17	58.8	-0.8	41.2	-4.0	-2.1
		HIV-EU	150	467	59.3	-1.0	40.7	-2.8	-1.7
		Total	155	484	59.3	-1.0	40.7	-2.8	-1.8

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
	Total	HIV-EI	15	43	46.5	-1.1	53.5	-3.5	-2.4
		HIV-EU	283	830	59.5	-1.0	40.5	-2.8	-1.7
		Total	298	873	58.9	-1.0	41.1	-2.9	-1.8
36-47 months	Male	HIV-EI	13	38	36.8	-0.4	63.2	-3.1	-2.1
		HIV-EU	144	410	64.4	-0.9	35.6	-2.7	-1.6
		Total	157	448	62.1	-0.9	37.9	-2.8	-1.6
	Female	HIV-EI	6	18	38.9	-1.1	61.1	-2.4	-1.9
		HIV-EU	164	493	52.9	-1.1	47.1	-2.8	-1.9
		Total	170	511	52.4	-1.1	47.6	-2.8	-1.9
	Total	HIV-EI	19	56	37.5	-0.6	62.5	-2.9	-2.0
		HIV-EU	308	903	58.1	-1.0	41.9	-2.8	-1.8
		Total	327	959	56.9	-1.0	43.1	-2.8	-1.8
48+ months	Male	HIV-EI	10	37	43.2	-0.7	56.8	-3.3	-2.1
		HIV-EU	134	492	64.2	-1.1	35.8	-2.7	-1.7
		Total	144	529	62.8	-1.1	37.2	-2.7	-1.7
	Female	HIV-EI	7	22	45.5	-1.3	54.5	-2.8	-2.1
		HIV-EU	144	491	53.6	-1.1	46.4	-2.8	-1.9
		Total	151	513	53.2	-1.1	46.8	-2.8	-1.9
	Total	HIV-EI	17	59	44.1	-0.9	55.9	-3.1	-2.1
		HIV-EU	278	983	58.9	-1.1	41.1	-2.8	-1.8
		Total	295	1042	58.1	-1.1	41.9	-2.8	-1.8
0-5 years	Male	HIV-EI	48	158	41.1	-0.8	58.9	-3.4	-2.3
		HIV-EU	660	2211	61.6	-0.9	38.4	-2.9	-1.7
		Total	708	2369	60.2	-0.9	39.8	-2.9	-1.7
	Female	HIV-EI	26	87	47.1	-0.9	52.9	-3.5	-2.2
		HIV-EU	667	2181	57.3	-1.0	42.7	-2.8	-1.8

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
		Total	693	2268	56.9	-1.0	43.1	-2.8	-1.8
	Total	HIV-EI	74	245	43.3	-0.8	56.7	-3.4	-2.3
		HIV-EU	1327	4392	59.5	-1.0	40.5	-2.9	-1.7
		Total	1401	4637	58.6	-0.9	41.4	-2.9	-1.8

* Excluding outliers. Number of outliers: <12 months: N1=Male HIV-EI=0, N2=Male HIV-EU=8, N3=Female HIV-EI=1, N4=Female HIV-EU=0; 12-23 months: N1=0, N2=0, N3=1, N4=0; 24-35 months: N1=0, N2=2, N3=1, N4=0; 36-47 months: N1=1, N2=2, N3=0, N4=1; 48+ months: N1=0, N2=2, N3=0, N4=0. ≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 64. Share of WFA measurements by WFA status and mean SD.



N of measurements: Male: N1=<12 months=538, N2=12-23 months=465, N3=24-35 months=389, N4=36-47 months=448, N5=48+ months=529; Female: N1=346, N2=414, N3=484, N4=511, N5=513; HIV-EI: N1=38, N2=49, N3=43, N4=56, N5=59; HIV-EU: N1=846, N2=830, N3=830, N4=903, N5=983.

SD of -3.4, and 43.3% measurements were declared adequate WFA with a mean SD of -0.8. The share of the measurements which revealed an inadequate WFA status was highest in the 36-47 months of the life of the HIV-EI children, followed by 12-23, 48+, 24-35 and 0-11 months of age in the decreasing order (0-11 months=52.6%, 12-23 months=57.1%, 24-35 months=53.5%, 36-47 months=62.5%, 48+ months=55.9%). The mean SD of the inadequate WFA measurements bettered with the increase in the age; that of the adequate WFA measurements worsened in 0-35 months period, and then improved in the 36-47 months of age, and again declined in 48+ months of age; and that of the overall WFA measurements worsened in 12-23 months and then improved in the subsequent 24+ months of age (0-11 months= -4.4, -0.4, -2.5; 12-23 months= -3.7, -1.1, -2.6; 24-35 months= -3.5, -1.1, -2.4; 36-47 months= -2.9, -0.6, -2.0; 48+ months= -3.1, -0.9, -2.1). All these suggested that the ages of 36+ months were mostly affected with an inadequate WFA in the life of the HIV-EI children, and the WFA status became increasingly inadequate at higher ages.

Among the total, 4392 (94.7%) measurements were made for the 1327 HIV-EU children (0-59 months); 40.5% were of inadequate WFA status (mean SD= -2.9), and 59.5% were of adequate WFA status (mean SD= -1.0). The age of 36-47 months had highest share of the inadequate WFA among the HIV-EU children, followed by 48+, 0-11, 24-35 and 12-23 months, in the decreasing order (0-11 months=41.0%, 12-23 months=38.0%, 24-35 months=40.5%, 36-47 months=41.9%, 48+ months=41.1%). For the inadequate WFA measurements, the mean SD bettered with the increase in the age till 36 months, after which it remained constant; that of the adequate WFA measurements worsened with the increase in the age; and that of the overall WFA measurements improved in 12-23 months and then declined subsequently (0-11 months= -3.1, -0.7, -1.7; 12-23 months= -2.9, -0.9, -1.6; 24-35 months= -2.8, -1.0, -1.7; 36-47 months= -2.8, -1.0, -1.8; 48+ months= -2.8, -1.1, -1.8). Thus, the age of 36-47 months were mostly affected with an inadequate WFA for the HIV-EU children, and the WFA status remained nearly unchanged in higher ages.

As such, compared to the HIV-EU counterpart:

- the chance of being of inadequate WFA status was higher for the HIV-EI children in all the age groups;

- the mean SD of overall and inadequate WFA measurements was unfavorable for the HIV-EI children in all the age groups; and,
- the mean SD of adequate WFA measurements was unfavorable for the HIV-EI children in the 12-35 months, and favorable in the 0-11 and 36+ months of age.

2369 (51.1%) of the total measurements were made on the 708 male children (0-59 months), to reveal inadequate WFA status among 39.8% of the measurements with a mean SD of -2.9 and adequate WFA status among 60.2% of the measurements with a mean SD of -0.9. The share of the measurements which revealed an inadequate WFA status was highest in the 0-11 months of the life of the male children, followed by 24-35, 12-23, 36-47 and 48+ months of age in the decreasing order (0-11 months=42.4%, 12-23 months=39.8%, 24-35 months=41.6%, 36-47 months=37.9%, 48+ months=37.2%). The mean SD of the inadequate WFA measurements bettered with the increase in the age; that of the adequate WFA measurements worsened in 0-35 months period and then improved transiently in 36-47 months of age, to decline further in the 48+ months of age; and that of the overall WFA measurements fluctuated with alternate betterment and decline with the increase in the age (0-11 months= -3.3, -0.7, -1.8; 12-23 months= -2.9, -0.8, -1.6; 24-35 months= -2.9, -1.0, -1.8; 36-47 months= -2.8, -0.9, -1.6; 48+ months= -2.7, -1.1, -1.7). All these suggested that the age of 24-35 and 0-11 months were mostly affected with an inadequate WFA in the life of the male children, and the WFA status became increasingly adequate at higher ages.

For the 693 female children (0-59 months), 2268 (48.9%) measurements were made; 43.1% of them revealed inadequate WFA status (mean SD= -2.8), and 56.9% revealed adequate WFA status (mean SD= -1.0). The share of the measurements which revealed an inadequate WFA status was highest in the 36-47 months of the life of the female children, followed by 48+, 24-35, 0-11 and 12-23 months of age in the decreasing order (0-11 months=40.2%, 12-23 months=38.2%, 24-35 months=40.7%, 36-47 months=47.6%, 48+ months=46.8%). The mean SD of the inadequate WFA measurements remained constant in 0-23 months of age, and then bettered to remain constant in 24+ months of age; that of the adequate WFA measurements worsened with the increase in the age; and that of the

overall WFA measurements worsened with the increase in the age (0-11 months= -3.0, -0.8, -1.7; 12-23 months= -3.0, -1.0, -1.8; 24-35 months= -2.8, -1.0, -1.8; 36-47 months= -2.8, -1.1, -1.9; 48+ months= -2.8, -1.1, -1.9). All these suggested that the age of 36-47 and 48+ months were mostly affected with an inadequate WFA in the life of the female children, and the WFA status became increasingly inadequate at higher ages.

As such, compared to the female counterpart:

- the chance of being of inadequate WFA status was slightly higher for the male children in the 0-35 months age and lesser in the age of 36+ months;
- the mean SD of inadequate WFA measurements was unfavorable for the 0-11, 24-35 and 48+ month male children, and favorable in the 12-23 months of age;
- the mean SD of adequate WFA measurements was favorable for the male children in the 0-23 and 36-47 months of age; and,
- the mean SD of overall WFA measurements was unfavorable for the male children in the 0-11 months of age, and favorable in the 12-23 and 36+ months of age.

4.1.2.3. Head circumference for age.

The status of the HCFA z-scores for the total measurements in various age cross-sections is given in table 28 and figure 65. Grossly, one-third (32.2%) of all the HCFA measurements (N=1588) done for the children of 0-23 months of age (N=481) had identified an inadequate HCFA status with a mean SD of -3.0, while the remaining (67.8%) measurements revealed an adequate HCFA status with a mean SD of -0.7. The share of the measurements which revealed an inadequate HCFA status was higher in the 0-11 months (34.5%) of the life of the HIV-exposed children, compared to the 12-23 months (29.7%) of age. The mean SD of the inadequate HCFA measurements bettered with the increase in the age; that of the adequate HCFA measurements worsened with the increase in the age; and that of the overall HCFA measurements improved with the increase in the age (0-11 months= -3.0, -0.7, -1.5; 12-23 months= -2.8, -0.8, -1.4). All these suggested that the age 0-11 months were mostly affected with an inadequate HCFA in the life of the HIV-exposed children, and the HCFA status became increasingly adequate at higher ages.

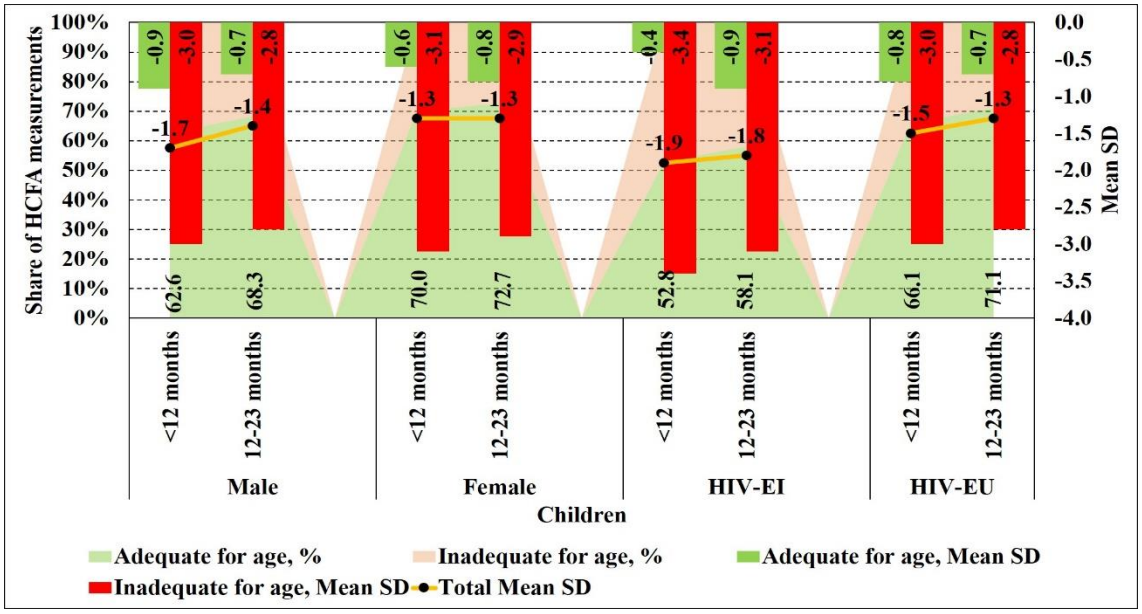
Table 28. HCFA measurements in various age cross-sections of children, by gender, HIV, and HCFA status.

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
<12 months	Male	HIV-EI	6	20	45.0	-1.2	55.0	-3.3	-2.4
		HIV-EU	116	486	63.4	-0.9	36.6	-3.0	-1.6
		Total	122	506	62.6	-0.9	37.4	-3.0	-1.7
	Female	HIV-EI	4	16	62.5	0.3	37.5	-3.7	-1.2
		HIV-EU	87	301	70.4	-0.6	29.6	-3.1	-1.3
		Total	91	317	70.0	-0.6	30.0	-3.1	-1.3
	Total	HIV-EI	10	36	52.8	-0.4	47.2	-3.4	-1.9
		HIV-EU	203	787	66.1	-0.8	33.9	-3.0	-1.5
		Total	213	823	65.5	-0.7	34.5	-3.0	-1.5
12-23 months	Male	HIV-EI	9	32	62.5	-1.1	37.5	-2.7	-1.8
		HIV-EU	133	385	68.8	-0.7	31.2	-2.8	-1.4
		Total	142	417	68.3	-0.7	31.7	-2.8	-1.4
	Female	HIV-EI	4	11	45.5	0.0	54.5	-3.7	-2.0
		HIV-EU	122	337	73.6	-0.8	26.4	-2.8	-1.3
		Total	126	348	72.7	-0.8	27.3	-2.9	-1.3
	Total	HIV-EI	13	43	58.1	-0.9	41.9	-3.1	-1.8
		HIV-EU	255	722	71.1	-0.7	28.9	-2.8	-1.3
		Total	268	765	70.3	-0.8	29.7	-2.8	-1.4
0-2 years	Male	HIV-EI	15	52	55.8	-1.2	44.2	-3.0	-2.0
		HIV-EU	249	871	65.8	-0.8	34.2	-2.9	-1.5
		Total	264	923	65.2	-0.8	34.8	-2.9	-1.5
	Female	HIV-EI	8	27	55.6	0.2	44.4	-3.7	-1.5
		HIV-EU	209	638	72.1	-0.7	27.9	-2.9	-1.3
		Total	217	665	71.4	-0.7	28.6	-3.0	-1.3

Characteristic				No. of measurem-ents done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
	Total	HIV-EI	23	79	55.7	-0.7	44.3	-3.3	-1.8
		HIV-EU	458	1509	68.5	-0.7	31.5	-2.9	-1.4
		Total	481	1588	67.8	-0.7	32.2	-3.0	-1.5

* Excluding outliers. Number of outliers: <12 months: N1=Male HIV-EI=0, N2=Male HIV-EU=6, N3=Female HIV-EI=2, N4=Female HIV-EU=5; 12-23 months: N1=0, N2=0, N3=1, N4=7. ≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 65. Share of HCFA measurements by HCFA status and mean SD.



N of measurements: Male: N1=<12 months=506, N2=12-23 months=417; Female: N1=317, N2=348; HIV-EI: N1=36, N2=43; HIV-EU: N1=787, N2=722.

Of the total, 79 (5.0%) measurements were made for the 23 HIV-EI children (0-23 months); 44.3% of these measurements exposed an inadequate HCFA status with a mean SD of -3.3, and 55.7% measurements were declared adequate HCFA with a mean SD of -0.7. The

share of the measurements which revealed an inadequate HCFA status was higher in the 0-11 months (47.2%) of the life of the HIV-EI children, compared to the 12-23 months (41.9%) of age. The mean SD of the inadequate HCFA measurements bettered with the increase in the age; that of adequate HCFA measurements worsened with the increase in the age, and that of the overall HCFA measurements improved with age (0-11 months= -3.4, -0.4, -1.9; 12-23 months= -3.1, -0.9, -1.8). All these suggested that the age of 0-11 months were mostly affected with an inadequate HCFA in the life of the HIV-EI children, and the HCFA status became increasingly adequate at higher ages.

Among the total, 1509 (95.0%) measurements were made for the 458 HIV-EU children (0-23 months), which had identified inadequate HCFA in 31.5% of the measurements with a mean SD of -2.9, while the remaining (68.5%) measurements revealed an adequate HCFA with a mean SD of -0.7. The share of the measurements which revealed an inadequate HCFA status was higher in the 0-11 months (33.9%) of age, compared to the 12-23 months of age (28.9%). The mean SD of the inadequate, adequate and overall HCFA measurements improved with the increase in the age (0-11 months= -3.0, -0.8, -1.5; 12-23 months= -2.8, -0.7, -1.3). All these suggested that the age of 0-11 months were mostly affected with an inadequate HCFA in the life of the HIV-EU children, and the HCFA status became increasingly adequate at higher ages.

As such, compared to the HIV-EU counterpart:

- the chance of being of inadequate HCFA status was higher for the HIV-EI children in all the age groups;
- the mean SD of overall and inadequate HCFA measurements was unfavorable for the HIV-EI children in all the age groups; and,
- the mean SD of adequate HCFA measurements was favorable for the HIV-EI children in the 0-11 months of age and unfavorable in the 12-23 months of age.

923 (58.1%) of the total measurements were made on 264 male children (0-23 months), to reveal inadequate HCFA status among 34.8% of the measurements with a mean SD of -2.9 and adequate HCFA status among 65.2% of the measurements with a mean SD of -0.8.

The share of the measurements which revealed an inadequate HCFA status was higher in the 0-11 months (37.4%) of the life of the male children, compared to the 12-23 months (31.7%) of age. The mean SD of the inadequate, adequate and overall HCFA measurements improved with the increase in the age (0-11 months= -3.0, -0.9, -1.7; 12-23 months= -2.8, -0.7, -1.4). All these suggested that the age of 0-11 months were mostly affected with an inadequate HCFA in the life of the male children, and the HCFA status became increasingly adequate at higher ages.

For the 217 female children (0-23 months), 665 (41.9%) measurements were made, to identify inadequate HCFA status among 28.6% of the measurements with a mean SD of -3.0 and adequate HCFA status among 71.4% of the measurements with a mean SD of -0.7. The share of the measurements which revealed an inadequate HCFA status was higher in the 0-11 months (30.0%) of the life of the female children, compared to the 12-23 months (27.3%) of age. The mean SD of the inadequate HCFA measurements bettered, and that of the adequate HCFA measurements worsened, and that of the overall HCFA measurements remained constant with the increase in the age (0-11 months= -3.1, -0.6, -1.3; 12-23 months= -2.9, -0.8, -1.3). All these suggested that the age of 0-11 months were mostly affected with an inadequate HCFA in the life of the female children, and the HCFA status became increasingly adequate at higher ages.

As such, compared to the female counterpart:

- the chance of being of inadequate HCFA status was higher for the male children in all the age groups;
- the mean SD of inadequate HCFA measurements was favorable for the male children in all the age groups;
- the mean SD of adequate HCFA measurements was unfavorable for the male children in the 0-11 months of age, and favorable in the 12-23 months of age; and,
- the mean SD of overall HCFA measurements was unfavorable for the male children in all the age groups.

4.1.2.4. Mid upper arm circumference for age.

The status of the MUACFA z-scores for the total measurements in various age cross-sections is given in table 29 and figure 66. Grossly, more than one-tenth (11.4%) of all the MUACFA measurements (N=4481) done for the children of 0-59 months of age (N=1401) had identified an inadequate MUACFA status with a mean SD of -2.9, while the remaining (88.6%) measurements revealed an adequate MUACFA status with a mean SD of -0.7. The share of the measurements which revealed an inadequate MUACFA status was highest in the 0-11 months of the life of the HIV-exposed children, followed by 48+, 36-47, 24-35 and 12-23 months in the decreasing order (0-11 months=16.0%, 12-23 months=8.7%, 24-35 months=10.7%, 36-47 months= 10.9%, 48+ months=11.4%). The mean SD of the overall and inadequate MUACFA measurements bettered in 0-23 months, but tends to worsen subsequently with the increase in the age; but, that of the adequate MUACFA measurements remained constant in 0-23 months and then worsened in 24+ months period (0-11 months= -3.4, -0.5, -0.9; 12-23 months= -2.7, -0.5, -0.7; 24-35 months= -2.8, -0.7, -0.9; 36-47 months= -2.7, -0.7, -0.9; 48+ months= -2.9, -0.9, -1.1). All these suggested that the ages of 0-11 and 48+ months were mostly affected with an inadequate MUACFA in the life of the HIV-exposed children, and the MUACFA status became increasingly inadequate at higher ages after 24 months.

Of the total, 244 (5.4%) measurements were made for the 74 HIV-EI children (0-59 months); 29.1% of these measurements exposed an inadequate MUACFA status with a mean SD of -2.9, and 70.9% measurements were declared adequate MUACFA with a mean SD of -0.8. The share of the measurements which revealed an inadequate MUACFA status was highest in the 36-47 months of the life of the HIV-EI children, followed by 0-11, 24-35, 12-23 and 48+ months of age in the decreasing order (0-11 months=32.4%, 12-23 months=20.0%, 24-35 months=29.5%, 36-47 months=47.4%, 48+ months=16.9%). The mean SD of the inadequate MUACFA measurements bettered in 0-23 months, and then worsened during 24-35 months to better subsequently with the increase in the age during 36+ months; that of the adequate MUACFA measurements bettered in 0-23 months, and then increasingly worsened during 24+ months, and that of the overall MUACFA

Table 29. MUACFA measurements in various age cross-sections of children, by gender, HIV, and MUACFA status.

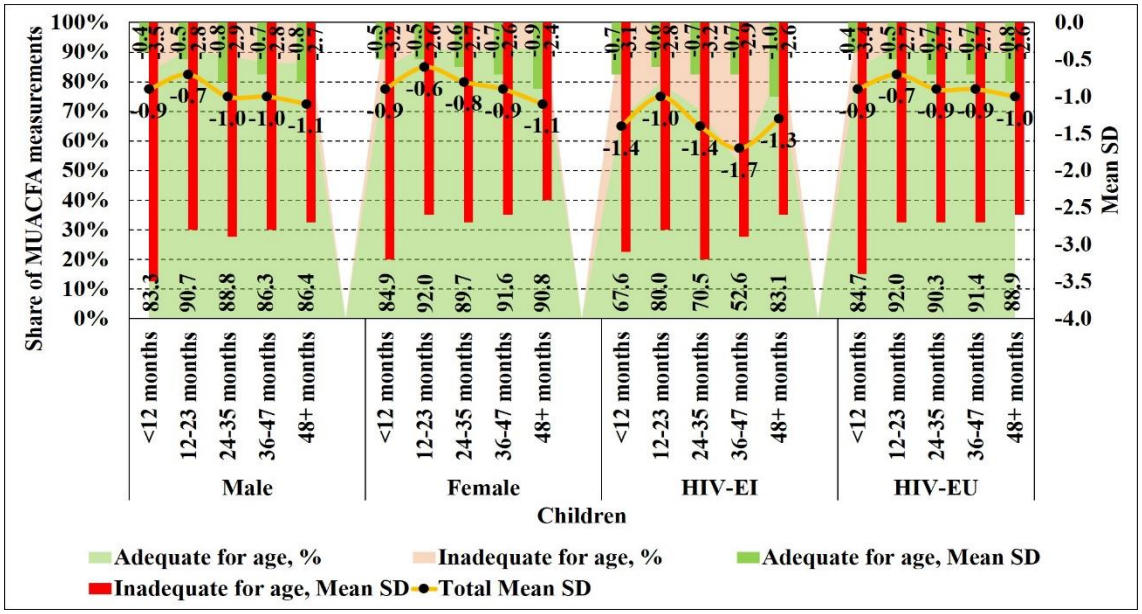
Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	**Gender**	**HIV status**	**No. of children**		**%**	**Mean SD**	**%**	**Mean SD**	**Mean SD**
<12 months	Male	HIV-EI	6	20	60.0	-1.0	40.0	-3.4	-1.9
		HIV-EU	116	424	84.4	-0.4	15.6	-3.5	-0.9
		Total	122	444	83.3	-0.4	16.7	-3.5	-0.9
	Female	HIV-EI	4	14	78.6	-0.3	21.4	-2.4	-0.7
		HIV-EU	87	284	85.2	-0.5	14.8	-3.3	-0.9
		Total	91	298	84.9	-0.5	15.1	-3.2	-0.9
	Total	HIV-EI	10	34	67.6	-0.7	32.4	-3.1	-1.4
		HIV-EU	203	708	84.7	-0.4	15.3	-3.4	-0.9
		Total	213	742	84.0	-0.5	16.0	-3.4	-0.9
12-23 months	Male	HIV-EI	9	36	88.9	-0.6	11.1	-2.7	-0.9
		HIV-EU	133	426	90.8	-0.5	9.2	-2.8	-0.7
		Total	142	462	90.7	-0.5	9.3	-2.8	-0.7
	Female	HIV-EI	4	14	57.1	-0.3	42.9	-2.8	-1.4
		HIV-EU	122	396	93.2	-0.5	6.8	-2.6	-0.6
		Total	126	410	92.0	-0.5	8.0	-2.6	-0.6
	Total	HIV-EI	13	50	80.0	-0.6	20.0	-2.8	-1.0
		HIV-EU	255	822	92.0	-0.5	8.0	-2.7	-0.7
		Total	268	872	91.3	-0.5	8.7	-2.7	-0.7
24-35 months	Male	HIV-EI	10	26	61.5	-0.6	38.5	-3.1	-1.6
		HIV-EU	133	358	90.8	-0.8	9.2	-2.9	-1.0
		Total	143	384	88.8	-0.8	11.2	-2.9	-1.0
	Female	HIV-EI	5	18	83.3	-0.8	16.7	-3.4	-1.2
		HIV-EU	150	466	89.9	-0.6	10.1	-2.6	-0.8
		Total	155	484	89.7	-0.6	10.3	-2.7	-0.8

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
	Total	HIV-EI	15	44	70.5	-0.7	29.5	-3.2	-1.4
		HIV-EU	283	824	90.3	-0.7	9.7	-2.7	-0.9
		Total	298	868	89.3	-0.7	10.7	-2.8	-0.9
36-47 months	Male	HIV-EI	13	39	46.2	-0.8	53.8	-2.9	-1.9
		HIV-EU	144	407	90.2	-0.7	9.8	-2.7	-0.9
		Total	157	446	86.3	-0.7	13.7	-2.8	-1.0
	Female	HIV-EI	6	18	66.7	-0.6	33.3	-2.9	-1.4
		HIV-EU	164	493	92.5	-0.7	7.5	-2.6	-0.9
		Total	170	511	91.6	-0.7	8.4	-2.6	-0.9
	Total	HIV-EI	19	57	52.6	-0.7	47.4	-2.9	-1.7
		HIV-EU	308	900	91.4	-0.7	8.6	-2.7	-0.9
		Total	327	957	89.1	-0.7	10.9	-2.7	-0.9
48+ months	Male	HIV-EI	10	37	78.4	-0.8	21.6	-2.6	-1.2
		HIV-EU	134	494	87.0	-0.8	13.0	-2.7	-1.0
		Total	144	531	86.4	-0.8	13.6	-2.7	-1.1
	Female	HIV-EI	7	22	90.9	-1.3	9.1	-2.7	-1.5
		HIV-EU	144	489	90.8	-0.9	9.2	-2.4	-1.0
		Total	151	511	90.8	-0.9	9.2	-2.4	-1.1
	Total	HIV-EI	17	59	83.1	-1.0	16.9	-2.6	-1.3
		HIV-EU	278	983	88.9	-0.8	11.1	-2.6	-1.0
		Total	295	1042	88.6	-0.9	11.4	-2.6	-1.1
0-5 years	Male	HIV-EI	48	158	67.7	-0.7	32.3	-2.9	-1.5
		HIV-EU	660	2109	88.5	-0.6	11.5	-3.0	-0.9
		Total	708	2267	87.1	-0.6	12.9	-3.0	-0.9
	Female	HIV-EI	26	86	76.7	-0.8	23.3	-2.8	-1.3
		HIV-EU	667	2128	90.7	-0.7	9.3	-2.7	-0.9

Characteristic				No. of measurements done*	≥-2SD		<-2SD		Total
Age group	Gender	HIV status	No. of children		%	Mean SD	%	Mean SD	Mean SD
		Total	693	2214	90.2	-0.7	9.8	-2.7	-0.9
	Total	HIV-EI	74	244	70.9	-0.8	29.1	-2.9	-1.4
		HIV-EU	1327	4237	89.6	-0.6	10.4	-2.8	-0.9
		Total	1401	4481	88.6	-0.7	11.4	-2.9	-0.9

* Excluding outliers. Number of outliers: <12 months: N1=Male HIV-EI=0, N2=Male HIV-EU=1, N3=Female HIV-EI=2, N4=Female HIV-EU=2; 12-23 months: N1=0, N2=2, N3=0, N4=1; 24-35 months: N1=0, N2=6, N3=0, N4=0; 36-47 months: N1=0, N2=5, N3=0, N4=0; 48+ months: N1=0, N2=0, N3=0, N4=0. ≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 66. Share of MUACFA measurements by MUACFA status and mean SD.



N of measurements: Male: N1=<12 months=444, N2=12-23 months=462, N3=24-35 months=384, N4=36-47 months=446, N5=48+ months=531; Female: N1=298, N2=410, N3=484, N4=511, N5=511; HIV-EI: N1=34, N2=50, N3=44, N4=57, N5=59; HIV-EU: N1=708, N2=822, N3=824, N4=900, N5=983.

measurements bettered in 0-23 months, and then increasingly worsened during 24-47 months to better subsequently in 48+ months of age (0-11 months= -3.1, -0.7, -1.4; 12-23 months= -2.8, -0.6, -1.0; 24-35 months= -3.2, -0.7, -1.4; 36-47 months= -2.9, -0.7, -1.7; 48+ months= -2.6, -1.0, -1.3). All these suggested that the ages of 36-47 and 0-11 months were mostly affected with an inadequate MUACFA in the life of the HIV-EI children, and the MUACFA status tend to be increasingly adequate at higher ages, but with fluctuations.

Among the total, 4237 (94.6%) measurements were made for the 1327 HIV-EU children (0-59months), which had identified inadequate MUACFA in 10.4% of the measurements with a mean SD of -2.8, while the remaining (89.6%) measurements revealed an adequate MUACFA with a mean SD of -0.6. The share of the measurements which revealed an inadequate MUACFA status was highest in the 0-11 months of the life of the HIV-EU children, followed by 48+, 24-35, 36-47 and 12-23 months of age in the decreasing order (0-11 months=15.3%, 12-23 months=8.0%, 24-35 months=9.7%, 36-47 months=8.6%, 48+ months=11.1%). The mean SD of the inadequate MUACFA measurements bettered in 0-23 months, and then remained constant till 47 months to better further in 48+ months; that of the adequate MUACFA measurements worsened with the increase in the age of the child; and that of the overall MUACFA measurements improved in 12-23 months and then worsened in the subsequent 24+ months of age (0-11 months= -3.4, -0.4, -0.9; 12-23 months= -2.7, -0.5, -0.7; 24-35 months= -2.7, -0.7, -0.9; 36-47 months= -2.7, -0.7, -0.9; 48+ months= -2.6, -0.8, -1.0). All these suggested that the age of 0-11 and 48+ months were mostly affected with an inadequate MUACFA in the life of the HIV-EU children, and the MUACFA status became increasingly adequate at higher ages with fluctuations.

As such, compared to the HIV-EU counterpart:

- the chance of being of inadequate MUACFA status was higher for the HIV-EI children in all the age groups;
- the mean SD of inadequate MUACFA measurements was unfavorable for the HIV-EI children in the 0-47 months of age;
- the mean SD of adequate MUACFA measurements was unfavorable for the HIV-EI children in the <24 and 48+ months of age; and,

- the mean SD of overall MUACFA measurements was unfavorable for the HIV-EI children in all the age groups.

2267 (50.6%) of the total measurements were made on the 708 male children (0-59months), to reveal inadequate MUACFA status among 12.9% of the measurements with a mean SD of -3.0 and adequate MUACFA status among 87.1% of the measurements with a mean SD of -0.6. The share of the measurements which revealed an inadequate MUACFA status was highest in the 0-11 months of the life of the male children, followed by 36-47, 48+, 24-35 and 12-23 months of age in the decreasing order (0-11 months=16.7%, 12-23 months=9.3%, 24-35 months=11.2%, 36-47 months=13.7%, 48+ months=13.6%). The mean SD of the inadequate MUACFA measurements bettered in 0-23 months, and then declined in 24-35 months to better in 36+ months of age; that of the adequate MUACFA measurements worsened in 0-35 months, and then remained nearly constant in the 36+ months of age; and that of the overall MUACFA measurements bettered in 12-23 months and then declined in the subsequent 24+ months of age (0-11 months= -3.5, -0.4, -0.9; 12-23 months= -2.8, -0.5, -0.7; 24-35 months= -2.9, -0.8, -1.0; 36-47 months= -2.8, -0.7, -1.0; 48+ months= -2.7, -0.8, -1.1). All these suggested that the age of 0-11 and 36+ months were mostly affected with an inadequate MUACFA in the life of the male children, and the MUACFA status became increasingly adequate slowly at higher ages.

For the 693 female children (0-59months), 2214 (49.6%) measurements were made, to identify inadequate MUACFA status among 9.8% of the measurements with a mean SD of -2.7 and adequate MUACFA status among 90.2% of the measurements with a mean SD of -0.7. The share of the measurements which revealed an inadequate MUACFA status was highest in the 0-11 months of the life of the female children, followed by 24-35, 48+, 36-47 and 12-23 months of age in the decreasing order (0-11 months=15.1%, 12-23 months=8.0%, 24-35 months=10.3%, 36-47 months=8.4%, 48+ months=9.2%). The mean SD of the inadequate MUACFA measurements bettered in 0-23 months, and then declined in 24-35 months to better in 36+ months of age; that of the adequate MUACFA measurements worsened with the increase in the age of the child; and that of the overall MUACFA measurements bettered in 12-23 months and then declined in the subsequent

24+ months of age (0-11 months= -3.2, -0.5, -0.9; 12-23 months= -2.6, -0.5, -0.6; 24-35 months= -2.7, -0.6, -0.8; 36-47 months= -2.6, -0.7, -0.9; 48+ months= -2.4, -0.9, -1.1). All these suggested that the age of 0-11 months were mostly affected with an inadequate MUACFA in the life of the female children, and the MUACFA status constantly remained adequate at further higher ages.

As such, compared to the female counterpart:

- the chance of being of inadequate MUACFA status was higher for the male children in all the age groups;
- the mean SD of inadequate MUACFA measurements was unfavorable for the male children in all the age groups;
- the mean SD of adequate MUACFA measurements was favorable for the 0-11 and 48+ month male children, and unfavorable in the 24-35 months of age; and,
- the mean SD of overall MUACFA measurements were unfavorable for the male children in the 12-47 months of age.

4.1.3. The patterns of physical growth and development by the trajectory of anthropometry.

The analysis of the trajectory of changes in the physical growth and development typically included the unique HIV-exposed children of baseline age 0-47 months (allowing the measurements in the subsequent 12-24 months to be considered for the analysis); those of baseline age 48+ months were not included (as they were censored before they moved on to the next age group). For the trajectory analysis of HCFA, the baseline age of the included children was 0-11 months; those of baseline age 12-23 months were without a follow-up measurement as per study protocol (HC was measured for children 0-2 years of age). However, inferring on patterns exclusively for, or comparatively with that of, the HIV-EI children was less relevant due to the smaller numbers of them included in each sub-group by age and gender.

4.1.3.1. Height for age.

The trajectory of HFA status of the unique children (0-47 months of age) through 12-24 months of subsequent life (categorized in the graver group of inadequate HFA) is given in table 30 and figure 67.

(a) Baseline scenario: At the baseline, around one-third (32.5%) of the total children had adequate HFA status, while the remaining two-thirds did not. The share of the total children with adequate HFA was near similar in the baseline age groups of 0-11 and 12-23 months (0-11 months=24.4%, 12-23 months=25.0%). This share of total children increased in the higher age groups at the baseline (24-35 months=36.1%, 36-47 months=45.7%). Thus, at the higher age groups (12+ months), there was an increasing share of the total HIV-exposed children with adequate HFA.

In the total group of HIV-exposed children, around one-fifth (21.4%) of the HIV-EI children and one-third (33.2%) of the HIV-EU children had adequate HFA, while the remaining did not. Thus, the share of the HIV-EI children with adequate HFA was lower than the share of the HIV-EU children. Among the HIV-EI children, almost none (except one child) in the baseline age groups of 0-35 months, and a half (50.0%) in the baseline age group of 36-47 months, had adequate HFA at the baseline. On the other hand, the share of the HIV-EU children with adequate HFA increased with the increase in the baseline age (0-11 months=24.8%; 12-23 months=26.5%; 24-35 months=37.9%; 36-47 months= 45.3%). The share of the HIV-EI children with adequate HFA was lesser than the share of the HIV-EU children in the baseline age groups of 0-11, 12-23 and 24-35 months, while it was higher among the HIV-EI group in the baseline age group of 36-47 months (possibly due to the smaller number of the HIV-EI children in the study). Thus, in all the baseline age groups, the share of the HIV-EI children with adequate HFA tend to be lesser than that of the HIV-EU children. Or in other words, this could indicate the likely higher chance for the HIV-EI children to be having inadequate HFA than the HIV-EU children, in all the yearly baseline age groups, in a cross-sectional approach; and that, a higher share of the HIV-EU children, whose majority were also having inadequate HFA like the HIV-EI

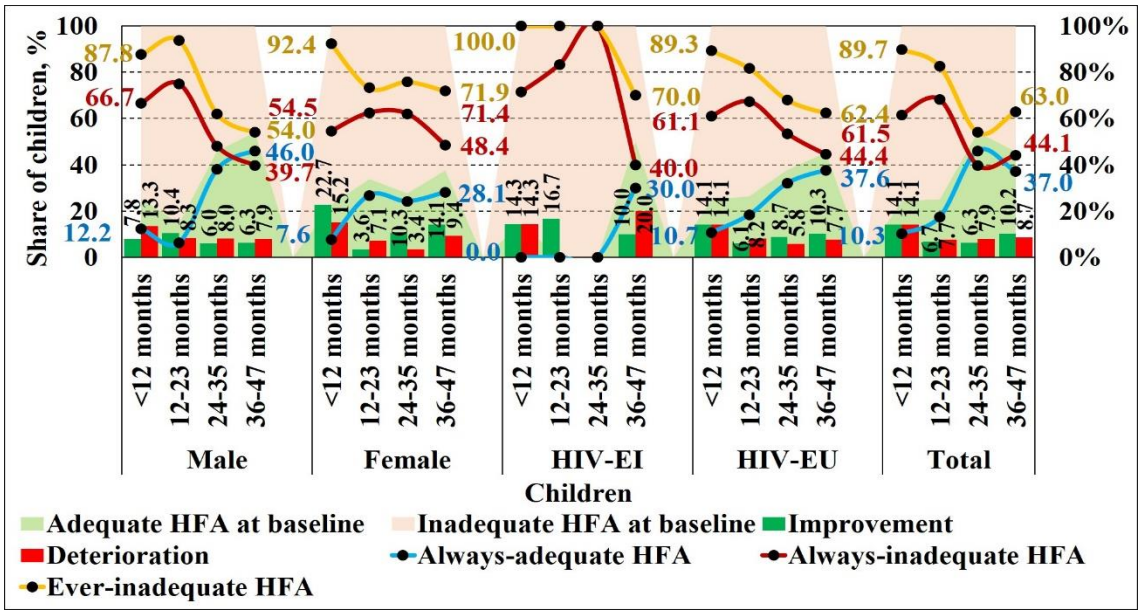
Table 30. The pattern of HFA by the trajectory of HAZ scores of unique children.

Characteristics			No. of children		At baseline		HFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>=-2SD	<-2SD	Always >=-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
<12 months	Male	HIV-EI	6	5	20.0	80.0	0.0	80.0	20.0	0.0	100.0
		HIV-EU	116	85	25.9	74.1	12.9	65.9	12.9	8.2	87.1
		Total	122	90	25.6	74.4	12.2	66.7	13.3	7.8	87.8
	Female	HIV-EI	4	2	0.0	100.0	0.0	50.0	0.0	50.0	100.0
		HIV-EU	88	64	23.4	76.6	7.8	54.7	15.6	21.9	92.2
		Total	92	66	22.7	77.3	7.6	54.5	15.2	22.7	92.4
	Total	HIV-EI	10	7	14.3	85.7	0.0	71.4	14.3	14.3	100.0
		HIV-EU	204	149	24.8	75.2	10.7	61.1	14.1	14.1	89.3
		Total	214	156	24.4	75.6	10.3	61.5	14.1	14.1	89.7
12-23 months	Male	HIV-EI	4	4	0.0	100.0	0.0	75.0	0.0	25.0	100.0
		HIV-EU	45	44	15.9	84.1	6.8	75.0	9.1	9.1	93.2
		Total	49	48	14.6	85.4	6.3	75.0	8.3	10.4	93.8
	Female	HIV-EI	2	2	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	56	54	35.2	64.8	27.8	61.1	7.4	3.7	72.2
		Total	58	56	33.9	66.1	26.8	62.5	7.1	3.6	73.2
	Total	HIV-EI	6	6	0.0	100.0	0.0	83.3	0.0	16.7	100.0
		HIV-EU	101	98	26.5	73.5	18.4	67.3	8.2	6.1	81.6
		Total	107	104	25.0	75.0	17.3	68.3	7.7	6.7	82.7
24-35 months	Male	HIV-EI	3	3	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	53	47	48.9	51.1	40.4	44.7	8.5	6.4	59.6
		Total	56	50	46.0	54.0	38.0	48.0	8.0	6.0	62.0
	Female	HIV-EI	2	2	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	58	56	28.6	71.4	25.0	60.7	3.6	10.7	75.0

Characteristics			No. of children		At baseline		HFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>-2SD	<-2SD	Always >-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
		Total	60	58	27.6	72.4	24.1	62.1	3.4	10.3	75.9
	Total	HIV-EI	5	5	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	111	103	37.9	62.1	32.0	53.4	5.8	8.7	68.0
		Total	116	108	36.1	63.9	30.6	55.6	5.6	8.3	69.4
36-47 months	Male	HIV-EI	7	6	50.0	50.0	33.3	33.3	16.7	16.7	66.7
		HIV-EU	62	57	54.4	45.6	47.4	40.4	7.0	5.3	52.6
		Total	69	63	54.0	46.0	46.0	39.7	7.9	6.3	54.0
	Female	HIV-EI	4	4	50.0	50.0	25.0	50.0	25.0	0.0	75.0
		HIV-EU	67	60	36.7	63.3	28.3	48.3	8.3	15.0	71.7
		Total	71	64	37.5	62.5	28.1	48.4	9.4	14.1	71.9
	Total	HIV-EI	11	10	50.0	50.0	30.0	40.0	20.0	10.0	70.0
		HIV-EU	129	117	45.3	54.7	37.6	44.4	7.7	10.3	62.4
		Total	140	127	45.7	54.3	37.0	44.1	8.7	10.2	63.0
0-4 years	Male	HIV-EI	20	18	22.2	77.8	11.1	66.7	11.1	11.1	88.9
		HIV-EU	276	233	35.6	64.4	25.8	57.1	9.9	7.3	74.2
		Total	296	251	34.7	65.3	24.7	57.8	10.0	7.6	75.3
	Female	HIV-EI	12	10	20.0	80.0	10.0	70.0	10.0	10.0	90.0
		HIV-EU	269	234	30.8	69.2	21.8	56.0	9.0	13.2	78.2
		Total	281	244	30.3	69.7	21.3	56.6	9.0	13.1	78.7
	Total	HIV-EI	32	28	21.4	78.6	10.7	67.9	10.7	10.7	89.3
		HIV-EU	545	467	33.2	66.8	23.8	56.5	9.4	10.3	76.2
		Total	577	495	32.5	67.5	23.0	57.2	9.5	10.3	77.0

≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are in percentage upon the number of children measured twice, except for the number of children.

Fig. 67. Share of unique children by trajectory of HAZ and age.



N of children: Male: N1=<12 months=90, N2=12-23 months=48, N3=24-35 months=50, N4=36-47 months=63; Female: N1=66, N2=56, N3=58, N4=64; HIV-EI: N1=7, N2=6, N3=5, N4=10; HIV-EU: N1=149, N2=98, N3=103, N4=117; Total: N1=156, N2=104, N3=108, N4=127.

children, tend to achieve adequate HFA status in the higher age groups more quickly than the HIV-EI children.

In the total group of HIV-exposed children, around one-third of the male (34.7%) and the female (30.3%) children had adequate HFA, while the remaining did not. Thus, gender differentials appeared to be similar among the children having adequate and inadequate HFA. The share of the male children having adequate HFA was about a quarter (25.6%) in the baseline age group of 0-11 months; this dropped to 14.6% in the baseline age group of 12-23 months, and then increased in the subsequent higher baseline age groups of 24-35 (46.0%) and 36-47 (54.0%) months. That is, there was an increasing trend in the share of male children having adequate HFA with the increase in the age at the baseline, after an initial drop among the children of the baseline age of 12-23 months. On the other hand, the share of the female children having adequate HFA was 22.7%, 33.9%, 27.6% and 37.5% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is,

there was a fluctuating-but-increasing trend in the share of the female children having adequate HFA with the increase in the age at the baseline. The share of the male children having adequate HFA were higher than that of the female children in the baseline age groups of 0-11, 24-35 and 36-47 months, while the share of such female children was higher than that of the male children in the baseline age group of 12-23 months. Or in other words, a higher share of the male children, whose majority were having inadequate HFA like the female children, initially tend to deteriorate in their HFA status in the year 2, but subsequently regain the adequate HFA status more quickly in the higher age groups beyond 24 months; while, compared to the male children, a higher share of the female children had inadequate HFA status in all the age groups (except in year 2, comparatively, due to the deterioration of the male children), and had a slower-but-increasing trend in achieving adequate HFA status with the increase in the age. The differentials and trends observed in the HIV-EU children by gender were similar to that in the total group. The trajectory of the HFA status of the children is described against this background.

(b) Always-adequate and ever-inadequate HFA status: In the 12-24 months of follow-up, 23.0% of the total 0-47 month HIV-exposed children (from among the 32.5% of the initially-HFA-adequate HIV-exposed children; or 70.8% of the initially-HFA-adequate HIV-exposed children) were found to be having always-adequate HFA status throughout the study period, while the remaining 9.5% (or 29.2% of the initially-HFA-adequate HIV-exposed children) deteriorated. The share of the always-HFA-adequate HIV-exposed children among both the total HIV-exposed (0-11 months=10.3%, 12-23 months=17.3%, 24-35 months=30.6%, 36-47 months=37.0%) and the initially-HFA-adequate HIV-exposed children (0-11 months=42.1%, 12-23 months=69.2%, 24-35 months=84.6%, 36-47 months=81.0%) increased with the increase in the baseline age.

That is:

- the chance for having always-adequate HFA (healthy) status for an HIV-exposed child was 23.0%, and this chance increased with the age of the child from 10.3% for 0-11 months of age to 37.0% for 36-47 months of age;

- if the HIV-exposed child was ever-identified with adequate HFA, his/her chance of always remaining so was 70.8%, and this chance also increased with the age of the child from 42.1% for 0-11 months to 81.0% for 36-47 months of age; and,
- 77.0% of the total HIV-exposed children had inadequate HFA ever, and they needed to have support to maintain their HFA status as adequate in their life below 5 years of age; and that this support needs to be continuous and for all the HIV-exposed children, including those with an adequate HFA status, as 29.2% of such children tend to deteriorate.

10.7% of the total HIV-EI (from among the 21.4% of the initially-HFA-adequate HIV-EI children; or 50.0% of the initially-HFA-adequate HIV-EI children) and 23.8% of the total HIV-EU (from among the 33.2% of the initially-HFA-adequate HIV-EU children; or 71.6% of the initially-HFA-adequate HIV-EU children) children had always-adequate HFA, while the remaining 10.7% of the total HIV-EI (or 50.0% of the initially-HFA-adequate HIV-EI children) and 9.4% of the total HIV-EU (or 28.4% of the initially-HFA-adequate HIV-EU children) children deteriorated. Thus, the share of the always-HFA-adequate HIV-EI children (with respect to both the total HIV-EI and the initially-HFA-adequate HIV-EI children) was lower than that of such HIV-EU children (with respect to both the total HIV-EU and the initially-HFA-adequate HIV-EU children).

The share of the always-HFA-adequate HIV-EI children among the total HIV-EI children was nil for 0-35 months of age at baseline, while it was 30.0% for the 36-47 months of age. The corresponding proportions with respect to the initially-HFA-adequate HIV-EI children were 0.0%, 0.0%, 0.0% and 60.0% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-HFA-adequate HIV-EU children among the total HIV-EU children increased with the increase in the baseline age (0-11 months=10.7%; 12-23 months=18.4%; 24-35 months=32.0%; 36-47 months=37.6%). The corresponding proportions with respect to the initially-HFA-adequate HIV-EU children were 43.2%, 69.2%, 84.6% and 83.0% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively, which also increased with the increase in the age at the baseline. Thus, the share of the always-HFA-adequate HIV-EI

children (with respect to both the total HIV-EI and the initially-HFA-adequate HIV-EI children) was lesser than the share of the always-HFA-adequate HIV-EU children (with respect to both the total HIV-EU and the initially-HFA-adequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-adequate HFA (healthy) status for an HIV-EI child was 10.7%; and, this chance increased with the age of the HIV-EI child from 0.0% for 0-11 months of age to 30.0% for 36-47 months of age;
- if the HIV-EI child was ever-identified with adequate HFA, his/her chance of always remaining so was a maximum of 50.0%; and, this increased with the age of such HIV-EI child from 0.0% for 0-11 months to 50.0% for 36-47 months of age;
- the overall chance for having always-adequate HFA (healthy) status for an HIV-EU child was 23.8%; and, this chance increased with the age of the HIV-EU child from 10.7% for 0-11 months of age to 37.6% for 36-47 months of age;
- if the HIV-EU child was ever-identified with adequate HFA, his/her chance of always remaining so was 71.6%; and, this increased with the increase in the age of such HIV-EU child from 43.2% for 0-11 months to 83.0% for 36-47 months of age;
- 89.3% of the HIV-EI and 76.2% of the HIV-EU children were having ever-inadequate HFA, and they needed to have support to maintain their HFA status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all the HIV-EI and HIV-EU children, including those with an adequate HFA status, as 50.0% of such HIV-EI and 28.4% of such HIV-EU children tend to deteriorate.

24.7% of the male (from among the 34.7% of the initially-HFA-adequate male children; or 71.3% of the initially-HFA-adequate male children) and 21.3% of the female (from among the 30.3% of the initially-HFA-adequate female children; or 70.3% of the initially-HFA-adequate female children) children had always-adequate HFA, while the remaining 10.0% of the male (or 28.7% of the initially-HFA-adequate male children) and 9.0% of the female (or 29.7% of the initially-HFA-adequate female children) children deteriorated. Thus, the

share of the always-HFA-adequate female children (with respect to both the total female and the initially-HFA-adequate female children) was lower than the share of the always-HFA-adequate male children (with respect to both the total male and the initially-HFA-adequate male children).

The share of the always-HFA-adequate male children among the total male children were 12.2%, 6.3%, 38.0% and 46.0% for 0-11, 12-23, 24-35, and 36-47 months of baseline age, respectively. The corresponding proportions with respect to the initially-HFA-adequate male children were 47.8%, 42.9%, 82.6% and 85.3% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was an increasing trend in the share of the always-HFA-adequate male children (with respect to both the total male and the initially-HFA-adequate male children) with the increase in the baseline age, after an initial drop among the children of baseline age 12-23 months. On the other hand, the share of the always-HFA-adequate female children among the total female children were 7.6%, 26.8%, 24.1% and 28.1% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. The corresponding proportions with respect to the initially-HFA-adequate female children were 33.3%, 78.9%, 87.5% and 75.0% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was a fluctuating-but-increasing trend in the share of the always-HFA-adequate female children (with respect to both the total female and the initially-HFA-adequate female children) with the increase in the baseline age. Even, the initial low share of always-HFA-adequate female children of baseline age 0-11 months could be due to withholding the otherwise possible higher shares by some reason happening in <12 months of age; the reason could be the same as that is happening for the male children in the 12-23 months of age, thereby reducing the share of always-HFA-adequate male in that age group (like the stopping of breastfeeding or initiation on other foods). Thus, the share of the always-HFA-adequate male children (with respect to both the total male and the initially-HFA-adequate male children) was higher than that of the always-HFA-adequate female children (with respect to both the total female and the initially-HFA-adequate female children) in the baseline age groups of 0-11, 24-35 and 36-47 months; while these share of such female children was higher than that of such male children in the baseline age group of 12-23 months.

That is:

- the overall chance for having always-adequate HFA (healthy) status for a male child was 24.7%; and, this chance increased with the increase in the age of the male child from 12.2% for 0-11 months to 46.0% for 36-47 months of age;
- if the male child was ever-identified with adequate HFA, his chance of always remaining so was 71.3%; and, this chance increased with the increase in the age of such male child from 47.8% for 0-11 months to 85.3% for 36-47 months of age;
- the overall chance for having always-adequate HFA (healthy) status for a female child was 21.3%; and, this chance increased with the increase in the age of the female child from 7.6% for 0-11 months to 28.1% for 36-47 months of age;
- if the female child was ever-identified with adequate HFA, her chance of always remaining so was 70.3%; and, this chance increased with the increase in the age of such female child from 33.3% for 0-11 months to 75.0% for 36-47 months of age;
- this suggested similar gender differentials in the total group of HIV-exposed children for having a healthy (always-adequate HFA status), even though the male children had a better chance for remaining so in the life after 24 months of age, compared to the female children;
- this suggested a similar chance for the male and the female HIV-EU children for deterioration from an adequate HFA status; and,
- 75.3% of the male and 78.7% of the female children had ever-inadequate HFA, and they needed to have support to maintain their HFA status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all the male and female children, including those with adequate HFA, as 28.7% of such male and 29.7% of such female children tend to deteriorate.

(c) Always-inadequate HFA status: In the 12-24 months of follow-up, 57.2% of the total 0-47 month HIV-exposed children (from among the 67.5% of the initially-HFA-inadequate HIV-exposed children; or 84.7% of the initially-HFA-inadequate HIV-exposed children) were found to be having always-inadequate HFA status throughout the study period, while the remaining 10.3% (or 15.3% of the initially-HFA-inadequate HIV-exposed children) improved. The share of the always-HFA-inadequate HIV-exposed children among the total

HIV-exposed children decreased with the increase in the baseline age, after an initial spike at 12-23 months (0-11 months=61.5%, 12-23 months=68.3%, 24-35 months=55.6%, 36-47 months=44.1%). The share of the always-HFA-inadequate HIV-exposed children among the initially-HFA-inadequate HIV-exposed children increased in the 12-35 month baseline age and reverted to the year-1-level in the 36-47 month baseline age (0-11 months=81.4%, 12-23 months=91.0%, 24-35 months=87.0%, 36-47 months=81.2%).

That is:

- the chance for having always-inadequate HFA (unhealthy) status for an HIV-exposed child was 57.2%, and this chance decreased with the increase in the age of the child from 61.5% for 0-11 months to 44.1% for 36-47 months of age; and,
- if the HIV-exposed child was ever-identified with inadequate HFA, his/her chance of always remaining so was 84.7%, and this chance remained above 81.2% in all the age groups.

67.9% of the HIV-EI (from among the 78.6% of the initially-HFA-inadequate HIV-EI children; or 86.4% of the initially-HFA-inadequate HIV-EI children) and 56.5% of the HIV-EU (from among the 66.8% of the initially-HFA-inadequate HIV-EU children; or 84.6% of the initially-HFA-inadequate HIV-EU children) children had always-inadequate HFA, while the remaining 10.7% of the HIV-EI (or 13.6% of the initially-HFA-inadequate HIV-EI children) and 10.3% of the HIV-EU (or 15.4% of the initially-HFA-inadequate HIV-EU children) children improved. Thus, the share of the always-HFA-inadequate HIV-EI children (with respect to both the total HIV-EI and the initially-HFA-inadequate HIV-EI children) was higher than the share of the always-HFA-inadequate HIV-EU children (among both the total HIV-EU and the initially-HFA-inadequate HIV-EU children).

The share of the always-HFA-inadequate HIV-EI children among the total HIV-EI children were 71.4%, 83.3%, 100.0%, and 40.0%, and among the initially-HFA-inadequate HIV-EI children were 83.3%, 83.3%, 100.0% and 80.0%, in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-HFA-inadequate HIV-EU children among the total HIV-EU children decreased with the increase

in the baseline age, after an initial spike at 12-23 months (0-11 months=61.1%, 12-23 months=67.3%, 24-35 months=53.4%, 36-47 months=44.4%); and their share among the initially-HFA-inadequate HIV-EU children increased in the baseline age of 12-35 months and reverted to the year-1-level in the 36-47 months of baseline age (0-11 months=81.3%, 12-23 months=91.7%, 24-35 months=85.9%, 36-47 months=81.3%). Thus, even though a pattern could not be drawn clearly, the share of the always-HFA-inadequate HIV-EI children (with respect to both the total HIV-EI and the initially-HFA-inadequate HIV-EI children) tend to be higher than that of the always-HFA-inadequate HIV-EU children (with respect to both the total HIV-EU and the initially-HFA-inadequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-inadequate HFA (unhealthy) status for an HIV-EI child was 67.9%; and, this ranged between 40-100% in any age group;
- if the HIV-EI child was ever-identified with inadequate HFA, his/her chance of always remaining so was a maximum of 86.4%; and, this chance was more than 80.0% in any age group;
- the overall chance for having always-inadequate HFA (unhealthy) status for an HIV-EU child was 56.5%; and, this decreased with the increase in the age of the HIV-EU child from 61.1% for 0-11 months to 44.4% for 36-47 months of age;
- if the HIV-EU child was ever-identified with inadequate HFA, his/her chance of always remaining so was 84.6%; and, this chance remained above 81.2% in all the age groups; and,
- as such, once inadequate for age, the chance of both the HIV-EI and the HIV-EU children to improve their HFA was very less (~15%).

57.8% of the male (from among the 65.3% of the initially-HFA-inadequate male children; or 88.4% of the initially-HFA-inadequate male children) and 56.6% of the female (from among the 69.7% of the initially-HFA-inadequate female children; or 81.2% of the initially-HFA-inadequate female children) children had always-inadequate HFA, while the remaining 7.6% of the male (or 11.6% of the initially-HFA-inadequate male children) and

13.1% of the female (or 18.8% of the initially-HFA-inadequate female children) children improved. Thus, the share of the always-HFA-inadequate female children (with respect to both the total female and the initially-HFA-inadequate female children) was lower than the share of the always-HFA-inadequate male children (with respect to both the total male and the initially-HFA-inadequate male children).

The share of the always-HFA-inadequate male children among the total male children decreased with the increase in the baseline age, after an initial spike at the 12-23 months (0-11 months=66.7%, 12-23 months=75.0%, 24-35 months=48.0%, 36-47 months= 39.7%); and their share among the initially-HFA-inadequate male children decreased with the increase in the baseline age (0-11 months=89.6%, 12-23 months=87.8%, 24-35 months=88.9%, 36-47 months=86.2%). On the other hand, the share of the always-HFA-inadequate female children among the total female children decreased with increase in the baseline age, after an initial spike at the 12-35 months (0-11 months=54.5%, 12-23 months=62.5%, 24-35 months=62.1%, 36-47 months=48.4%); and their share among the initially-HFA-inadequate female children increased in the baseline age of 12-23 months and reverted to the near-year-1-level in the 36-47 months of baseline age (0-11 months=70.6%, 12-23 months=94.6%, 24-35 months=85.7%, 36-47 months=77.5%). Thus, the share of the always-HFA-inadequate male children (among the total male children) was higher than that of such female children (among the total female children) in the baseline age of <24 months, while this share of such female children was higher than that of such male children in the baseline age of >24 months. The share of the always-HFA-inadequate male children (among the initially-HFA-inadequate male children) was higher than that of such female children (among the initially-HFA-inadequate female children) in the baseline age 0-11, 24-35 and 36-47 months, while this share of such female children was higher than that of such male children in the baseline age 12-23 months.

That is:

- the overall chance for having always-inadequate HFA (unhealthy) status for a male child was 57.8%; and, this chance decreased with the increase in the age of the male child from 66.7% for 0-11 months of age to 39.7% for 36-47 months of age;

- if the male child was ever-identified with inadequate HFA, his chance of always remaining so was 88.4%; and, this chance decreased with the increase in the age of such male child from 89.6% for 0-11 months to 86.2% for 36-47 months of age;
- the overall chance for having always-inadequate HFA (unhealthy) status for a female child was 56.6%; and, this remained above 48.4% in all the age groups;
- if the female child was ever-identified with inadequate HFA, her chance of always remaining so was 81.2%; and, this remained above 70.6% in all the age groups;
- this suggested the near-equal chance for the male and female child to be remaining unhealthy (always-inadequate HFA); and the slightly higher chance for the female children to regain the adequate HFA status once she experienced an inadequate HFA, compared to the male children.

(d) Changes in the HFA status: The switch in the HFA status was due to the children either improving or dropping from their baseline HFA status. In the 12-24 months of follow-up, 10.3% of the total HIV-exposed children (or 15.3% of the initially-HFA-inadequate HIV-exposed children) improved their initial inadequate HFA status, while 9.5% (or 29.2% of the initially-HFA-adequate HIV-exposed children) deteriorated from their initial adequate HFA status. As such, 19.8% of the HIV-exposed children had a chance to change their initial HFA status in the subsequent 12-24 months of life; and, there was nearly two-times higher chance for the initially-HFA-adequate HIV-exposed children to deteriorate compared to the initially-HFA-inadequate HIV-exposed children's chance for improvement, despite the shares of the HIV-exposed children improving and deteriorating being near-similar among the total HIV-exposed children.

Among the total HIV-exposed children, the shares of the improving children were equal to, lesser than and higher than those deteriorating in the 0-11, 12-23 and 24+ months of the age at baseline (0-11 months=14.1% and 14.1%, 12-23 months=6.7% and 7.7%, 24-35 months=8.3% and 5.6%, 36-47 months=10.2% and 8.7%; improving and deteriorating, respectively). That is, the chance for the improvement and deterioration was maximum for the HIV-exposed children in the baseline age of 0-11 months (in the follow-up year 2). The share of the total HIV-exposed children experiencing changes in the HFA status was

highest in the baseline age of <12 months (28.2%), followed by 36-47 months (18.9%), 12-23 months (14.4%) and 24-35 months (13.9%) in the decreasing order.

However, by considering the shares of the HIV-exposed children improving and deteriorating with respect to their initial HFA status (inadequate and adequate, respectively), that of those improving was lesser than that of those deteriorating in the <36 months of the baseline age, while it was near-similar for the 36-47 months (0-11 months= 18.6% and 57.9%, 12-23 months=9.0% and 30.8%, 24-35 months=13.0% and 15.4%, 36-47 months=18.8% and 19.0%; improving and deteriorating, respectively). In short, the HIV-exposed children of the baseline age of 0-11 months tend to have the maximum chance for changes in their HFA status in the follow-up year 2, with the near-equal chance for both improvement and deterioration from their initial HFA status. Similarly, the follow-up year 3 was having more chance for deterioration from their adequate HFA status of baseline age of 12-23 months; the follow-up year 4 witnessed the revival of the chance of improvement from their inadequate HFA status of baseline age of 24-35 months; and the HFA status stabilized again with the improvement overriding the deterioration in the follow-up year 5. This drew a pattern with two spikes for the improvement in the HFA status: the first in the year 2 and the second in the year 5; with the deterioration following the improvement in the spike and drop.

During the 12-24 months' follow-up, 10.7% of the total HIV-EI children (or 13.6% of the initially-HFA-inadequate HIV-EI children) improved their initial inadequate HFA status, while 10.7% (or 50.0% of the initially-HFA-adequate HIV-EI children) deteriorated from their initial adequate HFA status. As such, 21.4% of the total HIV-EI children had a chance to change their initial HFA status in the subsequent 12-24 months of life.

Among the total HIV-EI children, the shares of the improving and the deteriorating HIV-EI children were 14.3% and 14.3%, 16.7% and 0.0%, 0.0%, and 0.0%, and 10.0% and 20.0% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months, respectively. The shares of the HIV-EI children experiencing changes in the HFA status were (respectively) 28.6%, 16.7%, 0.0% and 30.0% in the baseline age groups of <12, 12-23, 24-35 and 36-47 months.

However, by considering the shares of the HIV-EI children improving and deteriorating with respect to their initial HFA status (inadequate and adequate, respectively), that of those improving and deteriorating were 16.7% and 100.0%, 16.7% and 0.0%, 0.0%, and 0.0%, and 20.0% and 40.0%, in the baseline age groups of <12, 12-23, 24-35 and 36-47 months (respectively). Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children and in all the age groups.

In the 12-24 months of follow-up, 10.3% of the HIV-EU children (or 15.4% of the initially-HFA-inadequate HIV-EU children) improved their initial inadequate HFA status, while 9.4% (or 28.4% of the initially-HFA-adequate HIV-EU children) deteriorated from their initial adequate HFA status. As such, 19.7% of the total HIV-EU children had a chance to change their initial HFA status in the subsequent 12-24 months of life (which was slightly lesser than that of the HIV-EI children); and, there was nearly two-times higher chance for the initially-HFA-adequate HIV-EU children to deteriorate compared to the initially-HFA-inadequate HIV-EU children's chance for improvement (the trend was similar among the HIV-EI children, except for the magnitude of the deterioration and the sharper spike), despite the shares of the HIV-EU children improving and deteriorating being near-similar among the total HIV-EU children.

Among the total HIV-EU children, the shares of the improving HIV-EU children were equal to, lesser than and higher than that of those deteriorating in the 0-11, 12-23 and 24+ months of the age at baseline (0-11 months=14.1% and 14.1%, 12-23 months=6.1% and 8.2%, 24-35 months=8.7% and 5.8%, 36-47 months=10.3% and 7.7%; improving and deteriorating, respectively). That is, the chance for the improvement and deterioration was maximum in the follow-up year 2. The share of the HIV-EU children experiencing changes in the HFA status was highest among the baseline age of <12 months (28.2%), followed by 36-47 months (18.0%), 24-35 months (14.5%) and 12-23 months (14.3%) in the decreasing order.

However, by considering the shares of the HIV-EU children improving and deteriorating with respect to their initial HFA status (inadequate and adequate, respectively), the share of those improving was lesser than that of those deteriorating in the <36 months of the baseline age, while it was marginally higher for the 36-47 months (0-11 months=18.8% and 56.8%, 12-23 months=8.3% and 30.8%, 24-35 months=14.1% and 15.4%, 36-47 months=18.8% and 17.0%; improving and deteriorating, respectively). In short, the follow-up year 2 of the HIV-EU children tend to be having maximum chance for changes in the HFA status of the baseline age of 0-11 months, with near-equal chance for both improvement and deterioration from their initial HFA status; the follow-up year 3 was having more chance for deterioration from their HFA status of the baseline age 12-23 months; the follow-up years 4 and 5 witnessed the revival of the chance for improvement from their inadequate HFA status of the baseline age of 24-47 months; and, the HFA status tend to stabilize by the end of follow-up year 5, with the near-equal improvement and deterioration at a lower magnitude compared to the year 1. This drew a pattern with two-spikes for the improvement in the HFA status: the first in year 2 and the second in year 5; with the deterioration following the improvement in the spike and drop.

In the 12-24 months of follow-up, 7.6% of the male children (or 11.6% of the initially-HFA-inadequate male children) improved their initial inadequate HFA status, while 10.0% (or 28.7% of the initially-HFA-adequate male children) deteriorated from their initial adequate HFA status. As such, 17.6% of the total male children had a chance to change their initial HFA status in the subsequent 12-24 months of life, with the improvement lesser than the deterioration; and, there was nearly 2.5-times higher chance for the initially-HFA-adequate male children to deteriorate compared to the initially-HFA-inadequate male children's chance for improvement.

Among the total male children, the share of those improving was lesser than that of those deteriorating in the 0-11 and 24+ months of the baseline age, and higher in the 12-23 months (0-11 months=7.8% and 13.3%, 12-23 months=10.4% and 8.3%, 24-35 months= 6.0% and 8.0%, 36-47 months=6.3% and 7.9%; improving and deteriorating respectively). That is, the chance for the improvement was maximum in the follow-up year 3, and that

for deterioration was maximum in the follow-up year 2. The share of the male children experiencing changes in the HFA status decreased with the increase in the baseline age till 36 months and flattened off subsequently (0-11 months=21.1%, 12-23 months=18.7%, 24-35 months=14.0%, 36-47 months=14.2%).

However, the share of those improving male children (from initial inadequate HFA status) was lesser than that of those deteriorating (from initial adequate HFA status) in the baseline age <36 months, while it was nearly equal in the 36-47 months (0-11 months=10.4% and 52.2%, 12-23 months=12.2% and 57.1%, 24-35 months=11.1% and 17.4%, 36-47 months=13.8% and 14.7%; improving and deteriorating, respectively). In short, the follow-up year 2 of the male children tend to have maximum chance for changes in the HFA status of baseline age of 0-11 months, with the deterioration having near-double chance than the improvement from their initial HFA status; from the follow-up year 3 onwards, the deterioration seems to be more or less constant; however, the share of improvement was transiently (perhaps due to the sharp drop in the deterioration share) increased above the deterioration in the follow-up year 3, and then dropped to marginally-below-deterioration-level in the follow-up years 4 and 5.

In the 12-24 months of follow-up, 13.1% of the female children (or 18.8% of the initially-HFA-inadequate female children; which was higher than that of the male children) improved their initial inadequate HFA status, while 9.0% (or 29.7% of the initially-HFA-adequate female children; which was near-equal to that of the male children) deteriorated from their initial adequate HFA status. As such, 22.1% of the total female children had a chance to change their initial HFA status in the subsequent 12-24 months of life (which was higher than that of the male children), with the improvement more than the deterioration (unlike the male children); and, there was nearly 1.5-times higher chance for the initially-HFA-adequate female children to deteriorate compared to the initially-HFA-inadequate female children's chance for improvement (the trend was similar among the male children, except for the magnitude of the deterioration which was higher for the male children; hence the chance of the female children to deteriorate from an adequate HFA status was lesser than that for the male children).

Among the total female children, the share of those improving was higher than that of those deteriorating in the baseline age of 0-11 and 24+ months, and lower in the 12-23 months (0-11 months=22.7% and 15.2%, 12-23 months=3.6% and 7.1%, 24-35 months= 10.3% and 3.4%, 36-47 months=14.1% and 9.4%; improving and deteriorating, respectively; unlike that for the male children, which was in a reverse pattern). That is, the chance for the improvement (unlike the male children, which was in the follow-up year 3 and nearly less than one-half of that of the female children) and deterioration (like the male children, but slightly higher) was maximum in the follow-up year 2. The share of the female children experiencing changes in the HFA status was highest among the baseline age of <12 months (37.9%), followed by 36-47 months (23.5%), 24-35 months (13.7%) and 12-23 months (10.7%) in the decreasing order (unlike the trend among the male children, which flattened off from the baseline age of 24+ months and was smaller for 0-11 months of age).

However, the share of the improving female children (from an initial inadequate HFA status) was lesser than that of those deteriorating (from an initial adequate HFA status) in the baseline age of <24 months (unlike <36 months for the male children), while it was marginally higher for the 24+ months (unlike 36-47 months for the male children; 0-11 months=29.4% and 66.7%, 12-23 months=5.4% and 21.1%, 24-35 months=14.3% and 12.5%, 36-47 months=22.5% and 25.0%; improving and deteriorating, respectively). In short, the follow-up year 2 of the female children tend to be having maximum chance for changes in the HFA status of baseline age 0-11 months, with the deterioration having near-1.5-times higher chance than the improvement from their initial HFA status; the improvement dropped to its minimum in the follow-up year 3 and then increased ahead of the deterioration in the follow-up years 4 and 5; the deterioration dropped to its minimum in the follow-up year 4 and then increased subsequent to the improvement in the follow-up year 5. This drew a pattern with two-spikes for the improvement in the HFA status: in year 2 and 5; with the deterioration following the improvement in the spike and drop. Thus, the pattern for the female children largely showed improvement in the HFA status, but that of the male children a delayed improvement.

4.1.3.2. Weight for age.

The trajectory of WFA status of the unique children (0-47 months of age) through the 12-24 months of subsequent life (classified in the graver group of inadequate WFA) is given in table 31 and figure 68.

(a) Baseline scenario: At the baseline, 45.1% of the total HIV-exposed children had adequate WFA status, while the remaining 54.9% did not. The share of the total children with adequate WFA was 38.1%, 50.0%, 45.0% and 50.0% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was a fluctuating-but-increasing trend in the share of the total children having adequate WFA with the increase in the age at the baseline.

In the total group of HIV-exposed children, 39.3% of the HIV-EI children and 45.5% of the HIV-EU children had adequate WFA, while the remaining did not. Thus, the share of the HIV-EI children with adequate WFA was lower than the share of the HIV-EU children. The share of the HIV-EI children with adequate WFA status was 28.6%, 33.3%, 60.0% and 40.0% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. On the other hand, the share of the HIV-EU children with adequate WFA was 38.6%, 51.0%, 44.2% and 50.8% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-increasing trend in the share of the HIV-EU children having adequate WFA with the increase in the age at the baseline. The share of the HIV-EI children with adequate WFA was lesser than that of the HIV-EU children in the baseline age groups of 0-11, 12-23 and 36-47 months, while it was higher among the HIV-EI group in the baseline age group of 24-35 months (possibly due to the smaller number of the HIV-EI children included in the study). Thus, in all the baseline age groups, the share of the HIV-EI children tend to be lower than the share of the HIV-EU children. Or in other words, this could indicate the likely chance of the HIV-EI children to be having inadequate WFA than the HIV-EU children in all the age groups, in a cross-sectional approach; and that, a higher share of the HIV-EU children, whose majority were

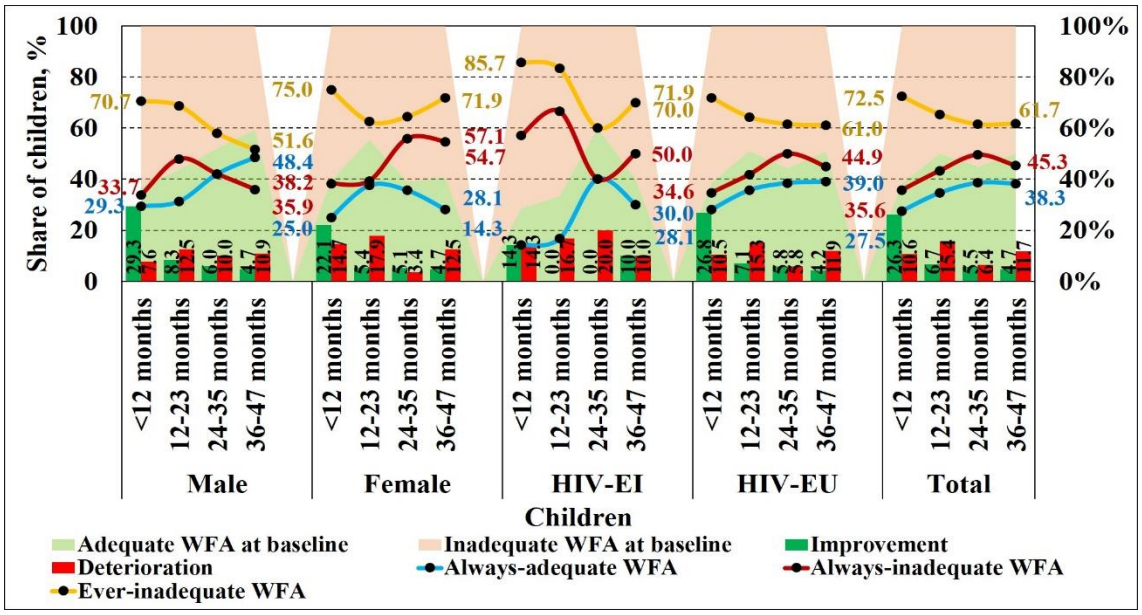
Table 31. The pattern of WFA by the trajectory of WAZ scores of unique children.

Characteristics			No. of children		At baseline		WFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>=-2SD	<-2SD	Always >=-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
<12 months	Male	HIV-EI	6	5	40.0	60.0	20.0	60.0	20.0	0.0	80.0
		HIV-EU	116	85	36.8	63.2	29.9	32.2	6.9	31.0	70.1
		Total	122	90	37.0	63.0	29.3	33.7	7.6	29.3	70.7
	Female	HIV-EI	4	2	0.0	100.0	0.0	50.0	0.0	50.0	100.0
		HIV-EU	88	64	40.9	59.1	25.8	37.9	15.2	21.2	74.2
		Total	92	66	39.7	60.3	25.0	38.2	14.7	22.1	75.0
	Total	HIV-EI	10	7	28.6	71.4	14.3	57.1	14.3	14.3	85.7
		HIV-EU	204	149	38.6	61.4	28.1	34.6	10.5	26.8	71.9
		Total	214	156	38.1	61.9	27.5	35.6	10.6	26.3	72.5
12-23 months	Male	HIV-EI	4	4	25.0	75.0	0.0	75.0	25.0	0.0	100.0
		HIV-EU	45	44	45.5	54.5	34.1	45.5	11.4	9.1	65.9
		Total	49	48	43.8	56.3	31.3	47.9	12.5	8.3	68.8
	Female	HIV-EI	2	2	50.0	50.0	50.0	50.0	0.0	0.0	50.0
		HIV-EU	56	54	55.6	44.4	37.0	38.9	18.5	5.6	63.0
		Total	58	56	55.4	44.6	37.5	39.3	17.9	5.4	62.5
	Total	HIV-EI	6	6	33.3	66.7	16.7	66.7	16.7	0.0	83.3
		HIV-EU	101	98	51.0	49.0	35.7	41.8	15.3	7.1	64.3
		Total	107	104	50.0	50.0	34.6	43.3	15.4	6.7	65.4
24-35 months	Male	HIV-EI	3	3	66.7	33.3	33.3	33.3	33.3	0.0	66.7
		HIV-EU	53	47	51.1	48.9	42.6	42.6	8.5	6.4	57.4
		Total	56	50	52.0	48.0	42.0	42.0	10.0	6.0	58.0
	Female	HIV-EI	2	2	50.0	50.0	50.0	50.0	0.0	0.0	50.0
		HIV-EU	58	56	38.6	61.4	35.1	56.1	3.5	5.3	64.9

Characteristics			No. of children		At baseline		WFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>-2SD	<-2SD	Always >-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
		Total	60	58	39.0	61.0	35.6	55.9	3.4	5.1	64.4
	Total	HIV-EI	5	5	60.0	40.0	40.0	40.0	20.0	0.0	60.0
		HIV-EU	111	103	44.2	55.8	38.5	50.0	5.8	5.8	61.5
		Total	116	108	45.0	55.0	38.5	49.5	6.4	5.5	61.5
36-47 months	Male	HIV-EI	7	6	50.0	50.0	33.3	50.0	16.7	0.0	66.7
		HIV-EU	62	57	60.3	39.7	50.0	34.5	10.3	5.2	50.0
		Total	69	63	59.4	40.6	48.4	35.9	10.9	4.7	51.6
	Female	HIV-EI	4	4	25.0	75.0	25.0	50.0	0.0	25.0	75.0
		HIV-EU	67	60	41.7	58.3	28.3	55.0	13.3	3.3	71.7
		Total	71	64	40.6	59.4	28.1	54.7	12.5	4.7	71.9
	Total	HIV-EI	11	10	40.0	60.0	30.0	50.0	10.0	10.0	70.0
		HIV-EU	129	117	50.8	49.2	39.0	44.9	11.9	4.2	61.0
		Total	140	127	50.0	50.0	38.3	45.3	11.7	4.7	61.7
0-4 years	Male	HIV-EI	20	18	44.4	55.6	22.2	55.6	22.2	0.0	77.8
		HIV-EU	276	233	47.0	53.0	38.1	37.3	8.9	15.7	61.9
		Total	296	251	46.9	53.1	37.0	38.6	9.8	14.6	63.0
	Female	HIV-EI	12	10	30.0	70.0	30.0	50.0	0.0	20.0	70.0
		HIV-EU	269	234	43.9	56.1	31.2	46.8	12.7	9.3	68.8
		Total	281	244	43.3	56.7	31.2	47.0	12.1	9.7	68.8
	Total	HIV-EI	32	28	39.3	60.7	25.0	53.6	14.3	7.1	75.0
		HIV-EU	545	467	45.5	54.5	34.7	42.1	10.8	12.5	65.3
		Total	577	495	45.1	54.9	34.1	42.7	11.0	12.2	65.9

≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are in percentage upon the number of children measured twice, except for the number of children.

Fig. 68. Share of unique children by trajectory of WAZ and age.



N of children: Male: N1=<12 months=90, N2=12-23 months=48, N3=24-35 months=50, N4=36-47 months=63; Female: N1=66, N2=56, N3=58, N4=64; HIV-EI: N1=7, N2=6, N3=5, N4=10; HIV-EU: N1=149, N2=98, N3=103, N4=117; Total: N1=156, N2=104, N3=108, N4=127.

also having inadequate WFA like the HIV-EI children, tend to achieve the adequate WFA status in the higher age groups more quickly than the HIV-EI children.

In the total group of HIV-exposed children, 46.9% of the male and 43.3% of the female children had adequate WFA, while the remaining did not; thus, the gender differentials appeared to be slightly better for the male children. The share of the male children having adequate WFA increased with the increase in the baseline age (0-11 months=37.0%, 12-23 months=43.8%, 24-35 months=52.0%, 36-47 months=59.4%). On the other hand, the share of the female children having adequate WFA remained near-similar, except for a spike in year 2 (0-11 months=39.7%, 12-23 months=55.4%, 24-35 months=39.0%, 36-47 months= 40.6%). The share of the female children having adequate WFA were higher than that of the male children in the baseline age groups of 0-11 and 12-23 months, while the share of such male children was higher than that of the female children in the baseline age group of 24-35 and 36-47 months. Or in other words, this could indicate that a higher share of the

male children, whose majority were also having anthropometric growth indices inadequate for age as the female children, initially tend to lag behind the female children in having the adequate WFA status, but subsequently surpass them in regaining the adequate WFA status beyond 24 months of age, thereby drawing an increasing pattern of advantage; while, a higher share of the female children, despite having a relative advantage over the male children in the initial 2 years, lagged in achieving the adequate WFA status in the 3+ year age group, thereby drawing a near-constant non-increasing pattern of advantage over time. The differentials and trends observed in the HIV-EU children by gender were similar to that in the total group. The trajectory of the WFA status of the children is described against this background.

(b) Always-adequate and ever-inadequate WFA status: In the 12-24 months of follow-up, 34.1% of the total 0-59 months HIV-exposed children (from among the 45.1% of the initially-WFA-adequate HIV-exposed children; or 75.7% of the initially-WFA-adequate HIV-exposed children) were found to be having always-adequate WFA status throughout the study period, while the remaining 11.0% (or 24.3% of the initially-WFA-adequate HIV-exposed children) deteriorated. The share of the always-WFA-adequate HIV-exposed children among the total HIV-exposed children increased with the increase in the baseline age of 0-35 months (0-11 months=27.5%, 12-23 months=34.6%, 24-35 months=38.5%) and then remained nearly constant in 36-47 months (36-47 months=38.3%). The proportion of the always-WFA-adequate HIV-exposed children among the initially-WFA-adequate HIV-exposed children were 72.1%, 69.2%, 85.7% and 76.6% in the baseline age of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was a fluctuating-but-increasing trend in the proportion of the always-WFA-adequate HIV-exposed children among the initially-WFA-adequate HIV-exposed children, with the increase in the baseline age.

That is:

- the chance for having always-adequate WFA (healthy) status for an HIV-exposed child was 34.1%, and this chance increased with the increase in the age of the child from 27.5% for 0-11 months of age to 38.3% for 36-47 months of age;

- if the HIV-exposed child was ever-identified with adequate WFA, his/her chance of always remaining so was 75.7%, and this chance also increased with the increase in the age from 72.1% for 0-11 months to 76.6% for 36-47 months of age; and,
- 65.9% of the HIV-exposed children were having ever-inadequate WFA, and they needed to have support to maintain their WFA status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all the HIV-exposed children, including those with adequate WFA, as 24.3% of such children tend to deteriorate.

25.0% of the HIV-EI (from among the 39.3% of the initially-WFA-adequate HIV-EI children; or 63.6% of the initially-WFA-adequate HIV-EI children) and 34.7% of the HIV-EU (from among the 45.5% of the initially-WFA-adequate HIV-EU children; or 76.3% of the initially-WFA-adequate HIV-EU children) children had always-adequate WFA, while the remaining 14.3% of the HIV-EI (or 36.4% of the initially-WFA-adequate HIV-EI children) and 10.8% of the HIV-EU (or 23.7% of the initially-WFA-adequate HIV-EU children) children deteriorated. Thus, the share of the always-WFA-adequate HIV-EI (among the total HIV-EI and initially-WFA-adequate HIV-EI children) was lower than the share of the always-WFA-adequate HIV-EU children (among the total HIV-EU and initially-WFA-adequate HIV-EU children).

The share of the always-WFA-adequate HIV-EI children among the total HIV-EI children were 14.3%, 16.7%, 40.0% and 30.0% in the baseline age of 0-11, 12-23, 24-35, and 36-47 months, respectively. The corresponding share of the always-WFA-adequate HIV-EI children among the initially-WFA-adequate HIV-EI children were 50.0%, 50.0%, 66.7% and 75.0% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-WFA-adequate HIV-EU children among the total HIV-EU children increased with the increase in the age at the baseline (0-11 months= 28.1%; 12-23 months=35.7%; 24-35 months=38.5%; 36-47 months=39.0%). The corresponding share of the always-WFA-adequate HIV-EU children among the initially-WFA-adequate HIV-EU children was 72.9%, 70.0%, 87.0% and 76.7% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-

increasing trend in the proportion of the always-WFA-adequate HIV-EU children among the initially-WFA-adequate HIV-EU children with an increase in the baseline age. Thus, the share of the always-WFA-adequate HIV-EI children (with respect to both the total HIV-EI and the initially-WFA-adequate HIV-EI children) was lesser than the share of the always-WFA-adequate HIV-EU children (with respect to both the total HIV-EU and the initially-WFA-adequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-adequate WFA (healthy) status for an HIV-EI child was 25.0%; and, this chance increased with the increase in the age of the HIV-EI child from 14.3% for 0-11 months to 30.0% for 36-47 months of age;
- if the HIV-EI child was ever-identified with adequate WFA, his/her chance of always remaining so was a maximum of 63.6%; and, this chance increased with the increase in the age of such HIV-EI child from 50.0% for 0-11 months of age to 75.0% for 36-47 months of age;
- the overall chance for having always-adequate WFA (healthy) status for an HIV-EU child was 34.7%; and, this chance increased with the increase in the age of the HIV-EU child from 28.1% for 0-11 months to 39.0% for 36-47 months of age;
- if the HIV-EU child was ever-identified with adequate WFA, the chance of always remaining so was 76.3%; and, this increased with the increase in the age of such HIV-EU child from 72.9% for 0-11 months to 76.7% for 36-47 months of age; and,
- 75.0% of the HIV-EI and 65.3% of the HIV-EU children were having ever-inadequate WFA, and they needed to have support to maintain their WFA status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all the HIV-EI and HIV-EU children, including those having adequate WFA, as 36.4% of such HIV-EI and 23.7% of such HIV-EU children tend to deteriorate.

37.0% of the male (from among the 46.9% of the initially-WFA-adequate male children; or 79.0% of the initially-WFA-adequate male children) and 31.2% of the female (from among the 43.3% of the initially-WFA-adequate female children; or 72.0% of the initially-

WFA-adequate female children) children had always-adequate WFA, while the remaining 9.8% of the male (or 21.0% of the initially-WFA-adequate male children) and 12.1% of the female (or 28.0% of the initially-WFA-adequate female children) children deteriorated. Thus, the share of the always-WFA-adequate female children (among the total female and initially-WFA-adequate female children) was lower than the share of the always-WFA-adequate male children (among the total male and initially-WFA-adequate male children).

The share of the always-WFA-adequate male children among the total male children increased with the increase in the baseline age (0-11 months=29.3%, 12-23 months=31.3%, 24-35 months=42.0%, 36-47 months=48.4%). The corresponding share of the always-WFA-adequate male children among the initially-WFA-adequate male children were 79.4%, 71.4%, 80.8% and 81.6% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was increasing trend in the share of the always-WFA-adequate male children among both the total male children and the initially-WFA-adequate male children with the increase in the baseline age, despite a delay in the spike through the 0-23 months of age in the former and an initial drop in the 12-23 months in the latter. On the other hand, the share of the always-WFA-adequate female children among the total female children was 25.0%, 37.5%, 35.6% and 28.1% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. The corresponding share of the always-WFA-adequate female children among the initially-WFA-adequate female children were 63.0%, 67.7%, 91.3% and 69.2% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a spiked trend in these shares of always-WFA-adequate female children, where the maximum share was reached in the year 2 and 3, and then dropped to the near-year-1-values in the baseline age of 36-47 months. This meant that there was a higher chance for female children to be of adequate WFA during the age of 12-35 months. Thus, the share of the always-WFA-adequate male children (with respect to the total male and the initially-WFA-adequate male children) was higher than the share of the always-WFA-adequate female children (with respect to the total male and the initially-WFA-adequate male children) in the baseline age of 0-11, 24-35 and 36-47 months, while the share of such female children was higher than that of such male children in the baseline age of 12-23 months.

That is:

- the overall chance for having always-adequate WFA (healthy) status for a male child was 37.0%; and, this chance increased with the increase in the age of the male child from 29.3% for 0-11 months of age to 48.4% for 36-47 months of age;
- if the male child was ever-identified with adequate WFA, his chance of always remaining so was 79.0%; and, this chance increased with the increase in the age of such male child from 79.4% for 0-11 months to 81.6% for 36-47 months of age;
- the overall chance for having always-adequate WFA (healthy) status for a female child was 31.2%; and, this chance increased with the increase in the age of the female child from 25.0% for 0-11 months of age to 28.1% for 36-47 months of age;
- if the female child was ever-identified with adequate WFA, her chance of always remaining so was 72.0%; and, this chance increased with the increase in the age of such female child from 63.0% for 0-11 month to 69.2% for 36-47 months of age;
- compared to the female children, this suggested a higher chance for the male children post 24 months of life, and a slightly higher chance overall in the 0-59 month life, for remaining always-adequate for WFA; and a slightly lower chance for the male children to deteriorate in the 0-59 month life; and,
- 63.0% of the male and 68.8% of the female children were having ever-inadequate WFA, and they needed to have support to maintain their WFA status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all male and female children, including those with adequate WFA status, as 21.0% of such male and 28.0% of such female children tend to deteriorate.

(c) Always-inadequate WFA status: In the 12-24 months of follow-up, 42.7% of the total 0-47 month HIV-exposed children (from among the 54.9% of the initially-WFA-inadequate HIV-exposed children; or 77.8% of the initially-WFA-inadequate HIV-exposed children) were found to be having always-inadequate WFA status throughout the study period, while the remaining 12.2% (or 22.2% of the initially-WFA-inadequate HIV-exposed children) improved. The share of the always-WFA-inadequate HIV-exposed children among the total HIV-exposed children increased with the increase in the baseline age of 0-35 months and then decreased in the baseline age of 36-47 months (0-11

months=35.6%, 12-23 months= 43.3%, 24-35 months=49.5%, 36-47 months=45.3%). The proportion of the always-WFA-inadequate HIV-exposed children among the initially-WFA-inadequate HIV-exposed children increased with the increase in the baseline age (0-11 months=57.6%, 12-23 months=86.5%, 24-35 months=90.0%, 36-47 months=90.6%).

That is:

- the chance for having always-inadequate WFA (unhealthy) status for an HIV-exposed child was 42.7%, and this chance increased with the increase in the age of the child from 35.6% for 0-11 months to 45.3% for 36-47 months of age; and,
- if the HIV-exposed child was ever-identified with inadequate WFA, his/her chance of always remaining so was 77.8%, and this increased with the increase in the age of the child from 57.6% for 0-11 months to 90.6% for 36-47 months of age.

53.6% of the HIV-EI (from among the 60.7% of the initially-WFA-inadequate HIV-EI children; or 88.2% of the initially-WFA-inadequate HIV-EI children) and 42.1% of the HIV-EU (from among the 54.5% of the initially-WFA-inadequate HIV-EU children; or 77.1% of the initially-WFA-inadequate HIV-EU children) children had always-inadequate WFA, while the remaining 7.1% of the HIV-EI (or 11.8% of the initially-WFA-inadequate HIV-EI children) and 12.5% of the HIV-EU (or 22.9% of the initially-WFA-inadequate HIV-EU children) children improved. Thus, the share of the always-WFA-inadequate HIV-EI children (among the total HIV-EI and initially-WFA-inadequate HIV-EI children) was higher than the share of the HIV-EU children (among the total HIV-EU and initially-WFA-inadequate HIV-EU children).

The share of the always-WFA-inadequate HIV-EI children among the total HIV-EI children was 57.1%, 66.7%, 40.0%, and 50.0%, and among the initially-WFA-inadequate HIV-EI children were 80.0%, 100.0%, 100.0%, and 83.3%, in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-WFA-inadequate HIV-EU children among the total HIV-EU children increased with the increase in the baseline age of 0-35 months, and then decreased in the baseline age of 36-47 months (0-11 months=34.6%, 12-23 months=41.8%, 24-35 months=50.0%, 36-47 months=

44.9%), and their share among the initially-WFA-inadequate HIV-EU children increased with the increase in the baseline age (0-11 months=56.4%, 12-23 months=85.4%, 24-35 months=89.7%, 36-47 months=91.4%). Thus, the share of the always-WFA-inadequate HIV-EI children (among the total HIV-EI and initially-WFA-inadequate HIV-EI children) tend to be higher than the share of such HIV-EU children (among the total HIV-EU and initially-WFA-inadequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-inadequate WFA (unhealthy) status for an HIV-EI child was 53.6%; and, this ranged between 40.0-66.7% in any age group;
- if the HIV-EI child was ever-identified with inadequate WFA, his/her chance of always remaining so was a maximum of 88.2%; and, this chance was more than 80.0% in any age group;
- the overall chance for having always-inadequate WFA (unhealthy) status for an HIV-EU child was 42.1%; and, this increased with the increase in the age of the HIV-EU child from 34.6% for 0-11 months to 44.9% for 36-47 months of age;
- if the HIV-EU child was ever-identified with inadequate WFA, the chance of always remaining so was 77.1%; and, this increased with the increase in the age of the HIV-EU child from 56.4% (0-11 months) to 91.4% (36-47 months of age); and,
- as such, once inadequate for age, the chance of both the HIV-EI (11.8%) and the HIV-EU (22.9%) children to improve their HFA was less.

38.6% of the male (from among the 53.1% of the initially-WFA-inadequate male children; or 72.6% of the initially-WFA-inadequate male children) and 47.0% of the female (from among the 56.7% of the initially-WFA-inadequate female children; or 82.9% of the initially-WFA-inadequate female children) children had always-inadequate WFA, while the remaining 14.6% of the male (or 27.4% of the initially-WFA-inadequate male children) and 9.7% of the female (or 17.1% of the initially-WFA-inadequate female children) children improved. Thus, the share of the always-WFA-inadequate female children (among the total female and initially-WFA-inadequate female children) was higher than the share

of the always-WFA-inadequate male children (among the total male and initially-WFA-inadequate male children).

The share of the always-WFA-inadequate male children among the total male children increased in the baseline age of 12-35 months and reverted back to the near-year-1 level in 36-47 months of baseline age (0-11 months=33.7%, 12-23 months=47.9%, 24-35 months= 42.0%, 36-47 months=35.9%), and their share among the initially-WFA-inadequate male children increased with the increase in the baseline age (0-11 months=53.4%, 12-23 months=85.2%, 24-35 months=87.5%, 36-47 months=88.5%). On the other hand, the share of the always-WFA-inadequate female children among the total female children increased with the increase in the baseline age 0-35 months and then decreased in the baseline age of 36-47 months (0-11 months=38.2%, 12-23 months=39.3%, 24-35 months=55.9%, 36-47 months=54.7%), and their share among the initially-WFA-inadequate female children increased with the increase in the baseline age (0-11 months=63.4%, 12-23 months=88.0%, 24-35 months=91.7%, 36-47 months=92.1%). Thus, the share of the always-WFA-inadequate female children among the total female children were higher than that of the always-WFA-inadequate male children among the total male children in the baseline age of <12 months and >24 months, while the share of such male children was higher than that of such female children in the baseline age of 12-23 months; and, the share of the always-WFA-inadequate female children among the initially-WFA-inadequate female children was higher than that of the always-WFA-inadequate male children among the initially-WFA-inadequate male children, in all the baseline age groups.

That is:

- the overall chance for having always-inadequate WFA (unhealthy) status for a male child was 38.6%; and, this chance remained above 33.7% in all the age groups; and,
- if the male child was ever-identified with inadequate WFA, his chance of always remaining so was 72.6%; and, this increased with the increase in the age of such male child from 53.4% for 0-11 months to 88.5% for 36-47 months of age;

- the overall chance for having always-inadequate WFA (unhealthy) status for a female child was 47.0%; and, this increased with the increase in the age of such female child from 38.2% for 0-11 months to 54.7% for 36-47 months of age;
- if the female child was ever-identified with inadequate WFA, her chance of always remaining so was 82.9%; and, this increased with the increase in the age of such female child from 63.4% for 0-11 months to 92.1% for 36-47 months of age; and,
- this suggested the slightly higher chance of the female children to remain unhealthy (inadequate WFA) always, compared to the male children; and, the higher chance of regaining of adequate WFA status among the male children (27.4%), compared to female children (17.1%), once he experienced an inadequate WFA in his 0-59 month life.

(d) Changes in the WFA status: The switch in the WFA status was due to the children either improving or dropping from their baseline WFA status. In the 12-24 months of follow-up, 12.2% of the total HIV-exposed children (or 22.2% of the initially-WFA-inadequate HIV-exposed children) improved their initial inadequate WFA status, while 11.0% (or 24.3% of the initially-WFA-adequate HIV-exposed children) deteriorated from their initial adequate WFA status. As such, 23.2% of the total HIV-exposed children had a chance to change their initial WFA status in the subsequent 12-24 months of life; and, there was a slightly higher chance for the initially-WFA-adequate children to deteriorate compared to the initially-WFA-inadequate children's chance for improvement, despite the shares of the children improving and deteriorating being near-similar.

Among the total HIV-exposed children, the shares of the improving children were more than, lesser than, nearly equal to and lesser than that of those deteriorating in the 0-11, 12-23, 24-35 and 36-47 months of the baseline age (0-11 months=26.3% and 10.6%, 12-23 months=6.7% and 15.4%, 24-35 months=5.5% and 6.4%, 36-47 months=4.7% and 11.7%; improving and deteriorating, respectively). The chance for the improvement was maximum in the follow-up year 2 (for the children of the baseline age of 0-11 months), and the deterioration was maximum in the follow-up year 3 (for the children of the baseline age of 12-23 months). The share of the HIV-exposed children experiencing changes in the WFA

status was highest among the baseline age of <12 months (36.9%), followed by 12-23 months (22.1%), 36-47 months (16.4%), and 24-35 months (11.9%) in decreasing order.

However, by considering the shares of the HIV-exposed children improving and deteriorating with respect to their initial WFA status, the share of the those improving was more than that of those deteriorating in the <12 months of the baseline age, while it was lesser than that of those deteriorating for the 12+ months of baseline age (0-11 months= 42.4% and 27.9%, 12-23 months=13.5% and 30.8%, 24-35 months=10.0% and 14.3%, 36-47 months=9.4% and 23.4%; improving and deteriorating, respectively). In short, the HIV-exposed children of the baseline age of 0-11 months tend to have maximum chance for changes in their WFA status in the follow-up year 2, with the chance for improvement nearly 2.5-times that of the deterioration from the initial WFA status; the chance of improvement stayed nearly constant or decreasing very slowly from the follow-up year 3; the chance of deterioration had two spikes (over the chance of improvement), one in the follow-up year 3 and the other in the follow-up year 5; and the chance of both deterioration and improvement nearly equaled in the follow-up year 4. This drew a pattern with two spikes for the deterioration in the WFA status: the first in the year 2 and the second in the year 5; with the improvement falling from the year 2 to a constant rate in the years 3-5.

In the 12-24 months follow-up, 7.1% of the HIV-EI children (or 11.8% of the initially-WFA-inadequate HIV-EI children) improved their initial inadequate WFA status, while 14.3% (or 36.4% of the initially-WFA-adequate HIV-EI children) deteriorated from their initial adequate WFA status. As such, 21.4% of the total HIV-EI children had a chance to change their initial WFA status in the subsequent 12-24 months of life.

Among the total HIV-EI children, the shares of the improving and deteriorating were 14.3% and 14.3%, 0.0% and 16.7%, 0.0% and 20.0%, and 10.0% and 10.0% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months, respectively. The shares of the HIV-EI children experiencing changes in the WFA status were 28.6%, 16.7%, 20.0% and 20.0% in the baseline age of <12, 12-23, 24-35 and 36-47 months (respectively).

However, the shares of the improving and deteriorating HIV-EI children (with respect to their initial WFA status) were 20.0% and 50.0%, 0.0% and 50.0%, 0.0% and33.3%, and 16.7% and 25.0%, in the baseline age groups of <12, 12-23, 24-35 and 36-47 months (respectively). Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children and in all the age groups.

In the 12-24 months of follow-up, 12.5% of the HIV-EU children (or 22.9% of the initially-WFA-inadequate HIV-EU children) improved their initial inadequate WFA status, while 10.8% (or 23.7% of the initially-WFA-adequate HIV-EU children) deteriorated from their initial adequate WFA status. As such, 23.3% of the total HIV-EU children had a chance to change their initial WFA status in the subsequent 12-24 months of life (which was slightly more than that of the HIV-EI children), with the improvement more than the deterioration; and, there was nearly-equal chance for the initially-WFA-adequate HIV-EU children to deteriorate and the initially-WFA-inadequate HIV-EU children to improve (the trend was unlike that of the HIV-EI children, for whom the chance of deterioration was nearly three-time higher).

Among the total HIV-EU children, the shares of those improving were more than, lesser than, equal to and lesser than that of those deteriorating in the 0-11, 12-23 and 24-35 and 36-47 months of the age at baseline (0-11 months=26.8% and 10.5%, 12-23 months=7.1% and 15.3%, 24-35 months=5.8% and 5.8%, 36-47 months=4.2% and 11.9%; improving and deteriorating, respectively). The higher share of improvement observed for the total HIV-EU children was not observed in all baseline age groups; instead, the higher share was observed only in the follow-up year 2; and, in all the other baseline age groups, it was either equal to or less than the share of deterioration. The chance for the improvement was maximum in the follow-up year 2, and that for the deterioration was maximum in the follow-up year 3. As such, the share of the HIV-EU children experiencing changes in the WFA status was highest in the baseline age of <12 months (37.3%), followed by 12-23 months (22.4%), 36-47 months (16.1%) and 24-35 months (11.6%) in the decreasing order.

However, by considering the shares of the HIV-EU children improving and deteriorating with respect to their initial WFA status, the share of those improving was higher than that of those deteriorating in the <12 months of the baseline age, while it was lesser for the 12+ months (0-11 months=43.6% and 27.1%, 12-23 months=14.6% and 30.0%, 24-35 months= 10.3% and 13.0%, 36-47 months=8.6% and 23.3%, respectively). In short, the follow-up year 2 tend to be having the maximum chance for changes in the WFA status, with the chance for improvement being 2.5-times higher than that for deterioration; the chance for improvement was nearly constant or slowly decreased from the follow-up year 3 onwards; the chance for deterioration predominated in the 3+ follow-up years, with two spikes (over the improvement chance), the first in the follow-up year 3 and the second in the follow-up year 5. This drew a pattern with two spikes for deterioration in the WFA status: the first in year 2 and the second in year 5; with the improvement falling from the year 2 to a constant rate through the years 3-5.

In the follow-up of 12-24 months, 14.6% of the male children (or 27.4% of the initially-WFA-inadequate male children) improved their initial inadequate WFA status, while 9.8% (or 21.0% of the initially-WFA-adequate male children) deteriorated from their initial adequate WFA status. As such, 24.4% of the total male children had a chance to change their initial WFA status in the subsequent 12-24 months of life, with the improvement more than the deterioration; and, there was a lesser chance for the initially-WFA-adequate male children to deteriorate compared to the initially-WFA-inadequate male children's chance for improvement.

Among the total male children, the share of those improving was higher than that of those deteriorating in the 0-11 months of the baseline age, and lesser in the 12+ months (0-11 months=29.4% and 7.6%, 12-23 months=8.3% and 12.5%, 24-35 months=6.0% and 10.0%, 36-47 months=4.7% and 10.9%, respectively). That is, the higher share of improvement observed for the total male children was not observed in all age groups; instead, the higher share was observed only in the follow-up year 2, and in all other age groups, it was less than the share of deterioration. The chance for the improvement was maximum in the follow-up year 2, and that for deterioration was maximum in the follow-

up year 3. As such, the share of the male children experiencing changes in the WFA status decreased with the increase in the baseline age till 36 months and flattened subsequently (0-11 months=37.0%, 12-23 months=20.8%, 24-35 months=16.0%, 36-47 months= 15.6%).

However, by considering the shares of the male children improving and deteriorating with respect to their initial WFA status, the share of those improving was higher than that of those deteriorating in the baseline age of <12 months, while it was lesser for the 12+ months (0-11 months=46.6% and 20.6%, 12-23 months=14.8% and 28.6%, 24-35 months=12.5% and 19.2%, 36-47 months=11.5% and 18.4%; improving and deteriorating, respectively). In short, the year 2 tend to have maximum chance for changes in the WFA status, with the improvement having 4-time higher chance than the deterioration; from the year 3 onwards, the deterioration was more or less constant, but higher than the improvement; the improvement tends to fall continuously from year 2, but at a slower pace through the years 3 to 5.

In the 12-24 months of follow-up, 9.7% of the female children (or 17.1% of the initially-WFA-inadequate female children; which was lesser than that of male children) improved their initial inadequate WFA status, while 12.1% (or 28.0% of the initially-WFA-adequate female children; which was higher than that of male children) deteriorated from their initial adequate WFA status. As such, 21.8% of the total female children had a chance to change their initial WFA status in the subsequent 12-24 months of life (which was near-equal to that of the male children), with the deterioration more than the improvement (unlike the male children); and, there was nearly 1.5-time higher chance for the initially-WFA-adequate female children to deteriorate compared to the initially-WFA-inadequate female children's chance for improvement (unlike the trend among the male children, where the chance was more for the improvement).

Among the total female children, the share of those improving was higher than that of those deteriorating in the baseline age of 0-11 months, and lower in the 12+ months (0-11 months=22.1% and 14.7%, 12-23 months=5.4% and 17.9%, 24-35 months=5.1% and

3.4%, 36-47 months=4.7% and 12.5%; improving and deteriorating, respectively; like that for the male children, except for the second spike in the deterioration in the follow-up year 5 for the female children). That is, the higher share of deterioration observed for the total female children was not observed in all the age groups; instead, the higher share was observed only in the follow-up years 3 and 5, and in all other ages, it was less than the share of the improvement. Also, like the male children, the chance for the improvement was maximum in the follow-up year 2 and that for the deterioration was maximum in follow-up year 3, but the magnitude of the deterioration was higher for the female children. As such, the share of the female children experiencing changes in the WFA status was highest in the baseline age of <12 months (36.8%), followed by 12-23 months (23.3%), 36-47 months (17.2%), and 24-35 months (8.5%) in the decreasing order (unlike the trend among the male children, which flattened off from the 36+ months baseline age).

However, by considering the shares of the female children improving and deteriorating with respect to their initial WFA status, the share of those improving was nearly equal to that of those deteriorating in the baseline age of 0-11 (unlike the male children's, for whom it was higher) and 24-35 (unlike the male children's, for whom it was lower) months, while it was lesser than that of those deteriorating in the 12-23 and 36-47 months (like the male children's, but with a wider gap between the shares of deterioration and improvement among the female children; 0-11 months=36.6% and 37.0%, 12-23 months=12.0% and 32.3%, 24-35 months=8.3% and 8.7%, 36-47 months=7.9% and 30.8%; improving and deteriorating, respectively). In short, the year 2 tend to be having maximum chance for changes in the WFA status, with the improvement having near-1.5-time higher chance than the deterioration; the improvement dropped in year 3 and then remained so in the years 4 and 5; the deterioration increased above the improvement in two spikes, in the years 3 and 5; and, as the deterioration dropped in year 4, the improvement was transiently higher. The pattern for the female children was predominantly of deterioration in the WFA status, in contrast to that of the male children, which portrayed improvement.

4.1.3.3. Head circumference for age.

The head circumference was measured only for the children of 0-23 months of age. The trajectory of HCFA status of the unique 0-11 month children through the subsequent 12 months (classified in the graver group of inadequate HCFA) is given in table 32.

(a) Baseline scenario: At the baseline, around a half (52.3%) of the total children had adequate HCFA status, while the remaining 47.7% did not. In the total group of children, the share of the HIV-EI children with adequate HCFA (28.6%) was lower than the share of the HIV-EU children (53.4%); also, 51.7% of the male and 53.0% of the female children had adequate HCFA; while the remaining did not. Thus, the gender differentials of having and not having adequate HCFA appeared to be similar among all the children. The gender differentials observed in the HIV-EU children were similar to that in the total group. The trajectory of the HCFA status of the children is described against this background.

(b) Always-adequate and ever-inadequate HCFA status: In the 12-24 months of follow-up, 43.2% of the total 0-23 month HIV-exposed children (from among the 52.3% of the initially-HCFA-adequate HIV-exposed children; or 82.6% of the initially-HCFA-adequate HIV-exposed children) were found to be having always-adequate HCFA status throughout the study period, while the remaining 9.1% (or 17.4% of the initially-HCFA-adequate children) deteriorated. Thus, the chance for having always-adequate HCFA (healthy) status for an HIV-exposed child was 43.2%; and, if the HIV-exposed child was ever-identified with adequate HCFA, his/her chance of always remaining so was 82.6%. As such, 56.8% of the total HIV-exposed children were having ever-inadequate HCFA, and they needed to have support to maintain their HCFA status as adequate in their life below 2 years of age; and that the support needs to be continuous, and for all HIV-exposed children whoever had inadequate HCFA and who were likely to develop inadequate HCFA (identified based on the presence of associated factors), as 17.4% of such children tend to deteriorate.

14.3% of the HIV-EI (from among the 28.6% of the initially-HCFA-adequate HIV-EI children; or 50.0% of the initially-HCFA-adequate HIV-EI children) and 44.6% of the

Table 32. The pattern of HCFA by the trajectory of HCAZ scores of unique children (0-11 months).

Characteristics			No. of children		At baseline		HCFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	≥-2SD	<-2SD	Always ≥-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
<12 months	Male	HIV-EI	6	5	40.0	60.0	20.0	60.0	20.0	0.0	80.0
		HIV-EU	116	84	52.4	47.6	41.7	28.6	10.7	19.0	58.3
		Total	122	89	51.7	48.3	40.4	30.3	11.2	18.0	59.6
	Female	HIV-EI	4	2	0.0	100.0	0.0	50.0	0.0	50.0	100.0
		HIV-EU	88	64	54.7	45.3	48.4	23.4	6.3	21.9	51.6
		Total	92	66	53.0	47.0	47.0	24.2	6.1	22.7	53.0
	Total	HIV-EI	10	7	28.6	71.4	14.3	57.1	14.3	14.3	85.7
		HIV-EU	204	148	53.4	46.6	44.6	26.4	8.8	20.3	55.4
		Total	214	155	52.3	47.7	43.2	27.7	9.0	20.0	56.8

≥-2SD=Adequate. <-2SD=Less-than-adequate. All values mentioned are in percentage upon the number of children measured twice, except for the number of children.

HIV-EU (from among the 53.4% of the initially-HCFA-adequate HIV-EU children; or 83.5% of the initially-HCFA-adequate HIV-EU children) children had always-adequate HCFA, while the remaining 14.3% of the HIV-EI (or 50.0% of the initially-HCFA-adequate HIV-EI children) and 8.8% of the HIV-EU (or 16.5% of the initially-HCFA-adequate HIV-EU children) children deteriorated. Thus, the share of the always-HCFA-adequate HIV-EI children (among both the total HIV-EI and the initially-HCFA-adequate HIV-EI children) was lower than the share of the always-HCFA-adequate HIV-EU children (among both the total HIV-EU and the initially-HCFA-adequate HIV-EU children). Or in other words, the overall chance for having always-adequate HCFA (healthy) status for an HIV-EI and an HIV-EU child was 14.3% and 34.7% respectively; and, if the HIV-EI or the HIV-EU child was ever-identified with adequate HCFA, his/her chance of always remaining so were a maximum of 50.0% and 83.5% respectively. As

such, 85.7% of the HIV-EI and 55.4% of the HIV-EU children were having ever-inadequate HCFA, and they needed to have a support to maintain their HCFA status as adequate in their life below 2 years of age; and that the support needs to be continuous, and for all the HIV-EI children, those HIV-EU children with ever-inadequate HCFA, and those-HIV-EU children likely to deteriorate (identified with the help of associated factors), as 50.0% of such HIV-EI and 16.5% of such HIV-EU children tend to deteriorate.

40.4% of the male (from among the 51.7% of the initially-HCFA-adequate male children; or 78.1% of the initially-HCFA-adequate male children) and 47.0% of the female (from among the 53.0% of the initially-HCFA-adequate female children; or 88.7% of the initially-HCFA-adequate female children) children had always-adequate HCFA, while the remaining 11.3% of the male (or 21.9% of the initially-HCFA-adequate male children) and 6.0% of the female (or 11.3% of the initially-HCFA-adequate female children) children deteriorated. Thus, the share of the always-HCFA-adequate male children (among both the total male and the initially-HCFA-adequate male children) was lower than the share of the always-HCFA-adequate female children (among both the total female and the initially-HCFA-adequate female children). Or in other words, the overall chance for having always-adequate HCFA (healthy) status for a male and a female child was 40.4% and 47.0% respectively; and if the male or the female child was ever-identified with adequate HCFA, his/her chance of always remaining so were 78.1% and 88.7% respectively. This suggested the higher chance of retaining adequate HCFA status among the female children compared to the male children; and higher chance for the female child to remain healthy (adequate HCFA) once she acquired the adequate HCFA status in her 0-59 month life. As such, 59.6% of the male and 53.0% of the female children were having ever-inadequate HCFA, and they needed to have a support to maintain their HCFA status as adequate in their life below 2 years of age; and that the support need to be continuous, and for both male and female children with ever-inadequate HCFA or risk of deterioration (identified with the help of associated factors), as 21.9% of such male and 11.3% of such female children tend to deteriorate.

(c) Always-inadequate HCFA status: In the 12-24 months of follow-up, 27.7% of the total HIV-exposed children (from among the 47.7% of the initially-HCFA-inadequate HIV-exposed children; or 58.1% of the initially-HCFA-inadequate HIV-exposed children) were found to be having always-inadequate HCFA status throughout the study period, while the remaining 20.0% (or 41.9% of the initially-HCFA-inadequate HIV-exposed children) improved. Or in other words, the chance for having always-inadequate HCFA (unhealthy) status for an HIV-exposed child was 27.7% among the total HIV-exposed children, if the child was ever-identified with inadequate HCFA, his/her chance of always remaining so was 58.1%.

57.1% of the HIV-EI (from among the 71.4% of the initially-HCFA-inadequate HIV-EI children; or 80.0% of the initially-HCFA-inadequate HIV-EI children) and 26.4% of the HIV-EU (from among the 46.6% of the initially-HCFA-inadequate HIV-EU children; or 56.7% of the initially-HCFA-inadequate HIV-EU children) children had always-inadequate HCFA, while the remaining 14.3% of the HIV-EI (or 20.0% of the initially-HCFA-inadequate HIV-EI children) and 20.2% of the HIV-EU (or 43.3% of the initially-HCFA-inadequate HIV-EU children) children improved. Thus, the share of the always-HCFA-inadequate HIV-EI children (among both the total HIV-EI and the initially-HCFA-inadequate HIV-EI children) was higher than the share of the HIV-EU children (among both the total HIV-EU and the initially-HCFA-inadequate HIV-EU children). Or in other words, the overall chance for having always-inadequate HCFA (unhealthy) status for an HIV-EI and HIV-EU child was 57.1% and 26.4% respectively; and if the HIV-EI or the HIV-EU child was ever-identified with inadequate HCFA, his/her chance of always remaining so were 80.0% and 56.7% respectively.

30.3% of the male (from among the 48.3% of the initially-HCFA-inadequate male children; or 62.7% of the initially-HCFA-inadequate male children) and 24.2% of the female (from among the 47.0% of the initially-HCFA-inadequate female children; or 51.5% of the initially-HCFA-inadequate female children) children had always-inadequate HCFA, while the remaining 18.0% of the male (or 37.3% of the initially-HCFA-inadequate male children) and 22.8% of the female (or 48.5% of the initially-HCFA-inadequate female

children) children improved. Thus, the share of the always-HCFA-inadequate female children (among both the total female and the initially-HCFA-inadequate female children) was lower than the share of the always-HCFA-inadequate male children (among both the total male and the initially-HCFA-inadequate male children). Or in other words, the overall chance for having always-inadequate HCFA (unhealthy) status for a male and female child was 30.3% and 24.2% respectively; and if the male or female child was ever-identified with inadequate HCFA, his/her chance of always remaining so were 62.7% and 51.5% respectively. This suggested the higher chance of the male children to remain unhealthy (inadequate HCFA) always, compared to the female children; and, the higher chance of regaining the adequate HCFA status among the female children, compared to the male children, once she experienced an inadequate HCFA in her 0-59 month life.

(d) Changes in the HCFA status: The switch in the HCFA status was due to the children either improving or dropping from their baseline HCFA status. In the 12-24 months of follow-up of the HIV-exposed children, 20.0% (or 41.9% of the initially-HCFA-inadequate HIV-exposed children) improved their initial inadequate HCFA status, while 9.0% (or 17.2% of the initially-HCFA-adequate HIV-exposed children) deteriorated from their initial adequate HCFA status. As such, 29.0% of the total HIV-exposed children had a chance to change their initial HCFA status in the subsequent 12-24 months of life; and, there was more than two-time higher chance for the initially-HCFA-inadequate children to improve, compared to the initially-HCFA-adequate children's chance for deterioration.

In the follow-up of 12-24 months, 14.3% of the HIV-EI children (or 20.0% of the initially-HCFA-inadequate HIV-EI children) improved their initial inadequate HCFA status, while 14.3% (or 50.0% of the initially-HCFA-adequate HIV-EI children) deteriorated from their initial adequate HCFA status. As such, 28.6% of the HIV-EI children had a chance to change their initial HCFA status in the subsequent 12-24 months of life. Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children.

In the 12-24 months' follow-up, 20.3% of the HIV-EU children (or 43.6% of the initially-HCFA-inadequate HIV-EU children) improved their initial inadequate HCFA status, while 8.8% (or 16.5% of the initially-HCFA-adequate HIV-EU children) deteriorated from their initial adequate HCFA status. As such, 29.1% of the HIV-EU children had a chance to change their initial HCFA status in the subsequent 12-24 months of life (which was slightly higher than that of the HIV-EI children), with the improvement more than the deterioration; and, there was nearly five-time higher chance for the initially-HCFA-adequate HIV-EU children to improve compared to the initially-HCFA-inadequate HIV-EU children's chance for deterioration (unlike the trend among the HIV-EI children, where the deterioration was more likely).

During the 12-24 months' follow-up of the male children, 18.0% (or 37.3% of the initially-HCFA-inadequate male children) improved their initial inadequate HCFA status, while 11.2% (or 21.7% of the initially-HCFA-adequate male children) deteriorated from their initial adequate HCFA status. As such, 29.2% of the total male children had a chance to change their initial HCFA status in the subsequent 12-24 months of life, with the improvement more than the deterioration; and, there was more than 1.5-times higher chance for the initially-HCFA-inadequate male children to improve, compared to the initially-HCFA-adequate male children's chance for deterioration.

In the 12-24 months of follow-up of the female children, 22.7% (or 48.3% of the initially-HCFA-inadequate female children; which was higher than that of the male children) improved their initial inadequate HCFA status, while 6.1% (or 11.5% of the initially-HCFA-adequate female children; which was lower than that of the male children) deteriorated from their initial adequate HCFA status. As such, 28.2% of the total female children had a chance to change their initial HCFA status in the subsequent 12-24 months of life (which was near-equal to that of the male children), with the improvement more than the deterioration (like the male children, but with a higher magnitude of improvement among the female children); and, there was nearly four-time higher chance for the initially-HCFA-inadequate female children to improve, compared to the initially-HCFA-adequate female children's chance for deterioration (the trend was similar among the male children,

except for the magnitude of the improvement which was higher for the female children; hence the chance of the female children to improve from an inadequate HCFA status was higher than that for male children). The pattern for the female children was predominantly of a boosted improvement in the HCFA status, compared to that of the male children, which portrayed a slower improvement.

4.1.3.4. Mid upper arm circumference for age.

The trajectory of the MUACFA status of the unique children (0-47 months of age) through the 12-24 months of their subsequent life (classified in the graver group of inadequate MUACFA) is given in table 33 and figure 69.

(a) Baseline scenario: At the baseline, around four-fifths (80.4%) of the total children had adequate MUACFA status, while the remaining one-fifth did not. The share of the total children with adequate MUACFA was 78.4%, 80.8%, 80.7% and 82.0% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. Thus, there was a very small increasing pattern in the share of total children with adequate MUACFA with the increasing age at the baseline.

In the total group of HIV-exposed children, around two-thirds (64.3%) of the HIV-EI children and near four-fifths (81.3%) of the HIV-EU children had adequate MUACFA, while the remaining did not. Thus, the share of the HIV-EI children with adequate MUACFA was lower than the share of the HIV-EU children. The share of the HIV-EI children with adequate MUACFA status was 57.1%, 66.7%, 80.0% and 60.0% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. On the other hand, the share of the HIV-EU children with adequate MUACFA was 79.5%, 81.6%, 80.8% and 83.9% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-increasing trend in the share of the HIV-EU children having adequate MUACFA with the increase in the age at the baseline. Thus, in all the baseline age groups, the share of the HIV-EI children with adequate MUACFA status was lower than that of the HIV-EU children. Or in other words, this indicated the

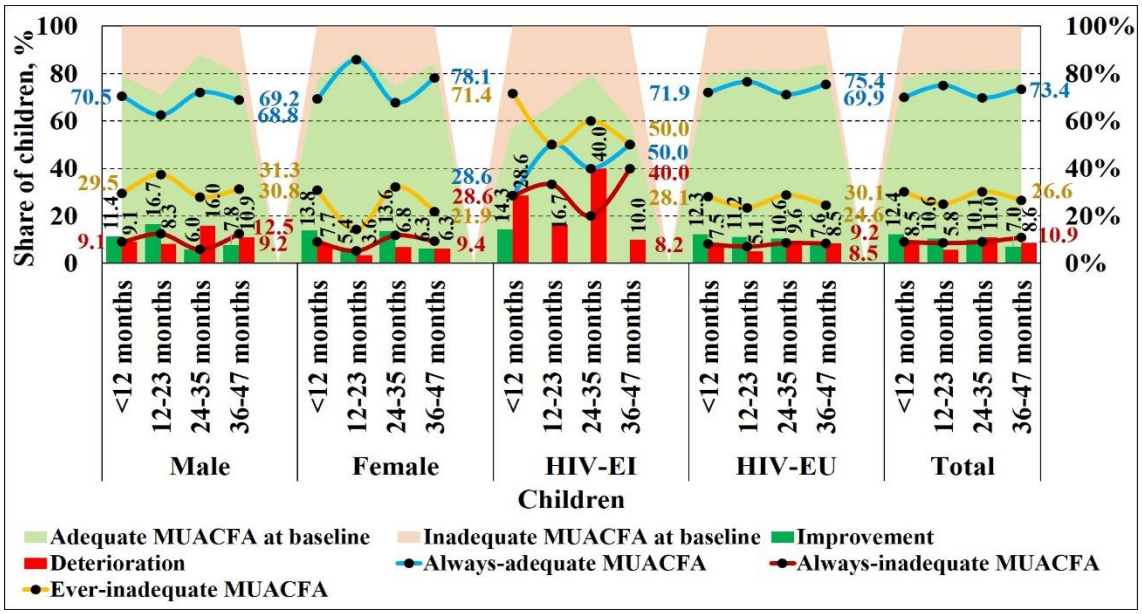
Table 33. The pattern of MUACFA by the trajectory of MCAZ scores of unique children.

Characteristics			No. of children		At baseline		MUACFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>=-2SD	<-2SD	Always >=-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
<12 months	Male	HIV-EI	6	5	60.0	40.0	40.0	40.0	20.0	0.0	60.0
		HIV-EU	116	83	80.7	19.3	72.3	7.2	8.4	12.0	27.7
		Total	122	88	79.5	20.5	70.5	9.1	9.1	11.4	29.5
	Female	HIV-EI	4	2	50.0	50.0	0.0	0.0	50.0	50.0	100.0
		HIV-EU	88	63	77.8	22.2	71.4	9.5	6.3	12.7	28.6
		Total	92	65	76.9	23.1	69.2	9.2	7.7	13.8	30.8
	Total	HIV-EI	10	7	57.1	42.9	28.6	28.6	28.6	14.3	71.4
		HIV-EU	204	146	79.5	20.5	71.9	8.2	7.5	12.3	28.1
		Total	214	153	78.4	21.6	69.9	9.2	8.5	12.4	30.1
12-23 months	Male	HIV-EI	4	4	75.0	25.0	50.0	25.0	25.0	0.0	50.0
		HIV-EU	45	44	70.5	29.5	63.6	11.4	6.8	18.2	36.4
		Total	49	48	70.8	29.2	62.5	12.5	8.3	16.7	37.5
	Female	HIV-EI	2	2	50.0	50.0	50.0	50.0	0.0	0.0	50.0
		HIV-EU	56	54	90.7	9.3	87.0	3.7	3.7	5.6	13.0
		Total	58	56	89.3	10.7	85.7	5.4	3.6	5.4	14.3
	Total	HIV-EI	6	6	66.7	33.3	50.0	33.3	16.7	0.0	50.0
		HIV-EU	101	98	81.6	18.4	76.5	7.1	5.1	11.2	23.5
		Total	107	104	80.8	19.2	75.0	8.7	5.8	10.6	25.0
24-35 months	Male	HIV-EI	3	3	66.7	33.3	33.3	33.3	33.3	0.0	66.7
		HIV-EU	53	47	89.4	10.6	74.5	4.3	14.9	6.4	25.5
		Total	56	50	88.0	12.0	72.0	6.0	16.0	6.0	28.0
	Female	HIV-EI	2	2	100.0	0.0	50.0	0.0	50.0	0.0	50.0
		HIV-EU	58	57	73.7	26.3	68.4	12.3	5.3	14.0	31.6

Characteristics			No. of children		At baseline		MUACFA status in the subsequent 12-24 months of age				
Age at baseline	Gender	HIV status	Total	Twice measured	>-2SD	<-2SD	Always >-2SD	Always <-2SD	Deterioration	Improvement	Ever <-2SD
		Total	60	59	74.6	25.4	67.8	11.9	6.8	13.6	32.2
	Total	HIV-EI	5	5	80.0	20.0	40.0	20.0	40.0	0.0	60.0
		HIV-EU	111	104	80.8	19.2	71.2	8.7	9.6	10.6	28.8
		Total	116	109	80.7	19.3	69.7	9.2	11.0	10.1	30.3
36-47 months	Male	HIV-EI	7	6	50.0	50.0	33.3	50.0	16.7	0.0	66.7
		HIV-EU	62	58	82.8	17.2	72.4	8.6	10.3	8.6	27.6
		Total	69	64	79.7	20.3	68.8	12.5	10.9	7.8	31.3
	Female	HIV-EI	4	4	75.0	25.0	75.0	25.0	0.0	0.0	25.0
		HIV-EU	67	60	85.0	15.0	78.3	8.3	6.7	6.7	21.7
		Total	71	64	84.4	15.6	78.1	9.4	6.3	6.3	21.9
	Total	HIV-EI	11	10	60.0	40.0	50.0	40.0	10.0	0.0	50.0
		HIV-EU	129	118	83.9	16.1	75.4	8.5	8.5	7.6	24.6
		Total	140	128	82.0	18.0	73.4	10.9	8.6	7.0	26.6
0-4 years	Male	HIV-EI	20	18	61.1	38.9	38.9	38.9	22.2	0.0	61.1
		HIV-EU	276	232	81.0	19.0	71.1	7.8	9.9	11.2	28.9
		Total	296	250	79.6	20.4	68.8	10.0	10.8	10.4	31.2
	Female	HIV-EI	12	10	70.0	30.0	50.0	20.0	20.0	10.0	50.0
		HIV-EU	269	234	81.6	18.4	76.1	8.5	5.6	9.8	23.9
		Total	281	244	81.1	18.9	75.0	9.0	6.1	9.8	25.0
	Total	HIV-EI	32	28	64.3	35.7	42.9	32.1	21.4	3.6	57.1
		HIV-EU	545	466	81.3	18.7	73.6	8.2	7.7	10.5	26.4
		Total	577	494	80.4	19.6	71.9	9.5	8.5	10.1	28.1

All values mentioned are in percentage upon the number of children measured twice.

Fig. 69. Share of unique children by trajectory of MCAZ and age.



N of children: Male: N1=<12 months=88, N2=12-23 months=48, N3=24-35 months=50, N4=36-47 months=64; Female: N1=65, N2=56, N3=59, N4=64; HIV-EI: N1=7, N2=6, N3=5, N4=10; HIV-EU: N1=146, N2=98, N3=104, N4=118; Total: N1=153, N2=104, N3=109, N4=128.

likely chance of the HIV-EI children to be having inadequate MUACFA more than the HIV-EU children in all the yearly age groups, in a cross-sectional approach; and that, a higher share of the HIV-EU children with an initial inadequate MUACFA status, tend to catch-up their age-adequate MUACFA status in the higher age groups, more quickly than the HIV-EI children did.

In the total group of HIV-exposed children, nearly four-fifths of the male (79.6%) and the female (81.1%) children had adequate MUACFA, while the remaining did not; thus, the gender differentials appeared to be near-similar. The share of the male children having adequate MUACFA was 79.5%, 70.8%, 88.0% and 79.7% in the baseline age groups of 0-11, 12-23, 24-35, and 36-47 months, respectively. On the other hand, the share of the female children having adequate MUACFA was 76.9%, 89.3%, 74.6% and 84.4% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-increasing trend in the share of both the male and the female children

having adequate MUACFA with the increase in the age at the baseline. The share of the male children having adequate MUACFA was higher than that of the female children in the baseline age groups of 0-11 and 24-35 months, while the share of such female children was higher than that of the male children in the baseline age groups of 12-23 and 36-47 months. Or in other words, both the male and the female children showed a slightly higher share of the adequate MUACFA status in the higher age groups, but, the magnitude of the (opposite) patterns among the male and female children were near-complementary to each other, so that the gender differentials were nullified in the total group. The differentials and trends observed in the HIV-EU children by gender were similar to that in the total group. The trajectory of the MUACFA status of the children is described against this background.

(b) Always-adequate and ever-inadequate MUACFA status: In the 12-24 months of follow-up, 71.9% of the total 0-47 month HIV-exposed children (from among the 80.4% of the initially-MUACFA-adequate HIV-exposed children; or 89.4% of the initially-MUACFA-adequate HIV-exposed children) were found to be having always-adequate MUACFA status throughout the study period, while the remaining 8.5% (or 10.6% of the initially-MUACFA-adequate HIV-exposed children) deteriorated. The share of the always-MUACFA-adequate HIV-exposed children among the total HIV-exposed children were 69.9%, 75.0%, 69.7% and 73.4% in the baseline age of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was a fluctuating-but-increasing trend in the proportion of the always-MUACFA-adequate HIV-exposed children, with the increase in the baseline age. The share of the always-MUACFA-adequate children among the initially-MUACFA-adequate HIV-exposed children were 89.2%, 92.9%, 86.4% and 89.5% in the baseline age of 0-11, 12-23, 24-35, and 36-47 months, respectively. That is, there was a fluctuating-but-near-constant trend in the share of the always-MUACFA-adequate children among the initially-MUACFA-adequate HIV-exposed children, with the increase in the baseline age.

That is:

- the chance for having always-adequate MUACFA (healthy) status for an HIV-exposed child was 71.4%, and this chance increased with the increase in the age of the child from 69.9% for 0-11 months to 73.4% for 36-47 months of age;

- if the HIV-exposed child was ever-identified with adequate MUACFA, his/her chance of always remaining so was 89.4%, and this chance remained nearly constant with the increasing age of the child from 89.2% for 0-11 months of age to 89.5% for 36-47 months of age; and,
- 28.6% of the HIV-exposed children were having ever-inadequate MUACFA, and they needed to have support to maintain their MUACFA status as adequate in their life below 5 years of age; and that the support needs to be continuous, and could be targeted for those in need (those who had ever-inadequate MUACFA or run a risk for the same, the latter identified using the associated factors, as 10.6% of such HIV-exposed children tend to deteriorate).

42.9% of the HIV-EI (from among the 64.3% of the initially-MUACFA-adequate HIV-EI children; or 66.7% of the initially-MUACFA-adequate HIV-EI children) and 73.6% of the HIV-EU (from among the 81.3% of the initially-MUACFA-adequate HIV-EU children; or 90.5% of the initially-MUACFA-adequate HIV-EU children) children had always-adequate MUACFA, while the remaining 21.4% of the HIV-EI (or 33.3% of the initially-MUACFA-adequate HIV-EI children) and 7.7% of the HIV-EU (or 9.5% of the initially-MUACFA-adequate HIV-EU children) children deteriorated. Thus, the share of the always-MUACFA-adequate HIV-EI children (among both the total HIV-EI and the initially-MUACFA-adequate HIV-EI children) was lower than the share of the always-MUACFA-adequate HIV-EU children (among both the total HIV-EI and the initially-MUACFA-adequate HIV-EI children).

The share of the always-MUACFA-adequate HIV-EI children among the total HIV-EI children were 28.6%, 50.0%, 40.0% and 50.0% in the baseline age of 0-11, 12-23, 24-35, and 36-47 months, respectively. The corresponding proportions of the always-MUACFA-adequate HIV-EI children among the initially-MUACFA-adequate HIV-EI children were 50.0%, 75.0%, 50.0% and 83.3% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-MUACFA-adequate HIV-EU children among the total HIV-EU children were 71.9%, 76.5%, 71.2% and 75.4% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, this

share was of the fluctuating-but-increasing trend with the increase in the baseline age. The corresponding proportions of the always-MUACFA-adequate HIV-EU children among the initially-MUACFA-adequate HIV-EU children were 90.5%, 93.8%, 88.1% and 89.9% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-near-constant trend in this share, with the increase in the baseline age. Thus, the share of the always-MUACFA-adequate HIV-EI children (among both the total HIV-EI and the initially-MUACFA-adequate HIV-EI children) was lesser than the share of the always-MUACFA-adequate HIV-EU children (among both the total HIV-EU and the initially-MUACFA-adequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-adequate MUACFA (healthy) status for an HIV-EI child was 42.9%; and, this chance increased with the increase in the age of the HIV-EI child from 28.6% for 0-11 months to 50.0% for 36-47 months of age;
- if the HIV-EI child was ever-identified with adequate MUACFA, his/her chance of always remaining so was a maximum of 66.7%; and, this chance increased with the increase in the age of such HIV-EI child from 50.0% for 0-11 months of age to 83.3% for 36-47 months of age;
- the overall chance for having always-adequate MUACFA (healthy) status for an HIV-EU child was 73.6%; and, this increased with the increase in the age of the HIV-EU child from 71.9% for 0-11 months to 75.4% for 36-47 months of age;
- if the HIV-EU child was ever-identified with adequate MUACFA, his/her chance of always remaining so was 90.5%; and, this chance remained nearly constant with the increasing age of such HIV-EU child from 90.5% for 0-11 months of age to 89.9% for 36-47 months of age; and,
- 57.1% of the HIV-EI and 26.4% of the HIV-EU children were having ever-inadequate MUACFA, and they needed support to maintain their MUACFA status as adequate in their <5 year life; and that the support need to be continuous, and for all the HIV-EI children, and those HIV-EU children who had inadequate MUACFA or run a risk for it (as identified using the presence of the associated factors), as 33.3% of such HIV-EI and 9.5% of such HIV-EU children tend to deteriorate.

68.8% of the male (from among the 79.6% of the initially-MUACFA-adequate male children; or 86.4% of the initially-MUACFA-adequate male children) and 75.0% of the female (from among the 81.1% of the initially-MUACFA-adequate female children; or 92.4% of the initially-MUACFA-adequate female children) children had always-adequate MUACFA, while the remaining 10.8% of the male (or 15.6% of the initially-MUACFA-adequate male children) and 6.1% of the female (or 7.6% of the initially-MUACFA-adequate female children) children deteriorated. Thus, the share of the always-MUACFA-adequate male children (among both the total male and the initially-MUACFA-adequate male children) was lower than the share of the always-MUACFA-adequate female children (among both the total female and the initially-MUACFA-adequate female children).

The share of the always-MUACFA-adequate male children among the total male children remained nearly constant with fluctuations with the increase in the baseline age (0-11 months= 70.5%, 12-23 months=62.5%, 24-35 months=72.0%, 36-47 months=68.8%). The corresponding proportions of the always-MUACFA-adequate male children among the initially-MUACFA-adequate male children were 88.6%, 88.2%, 81.8% and 86.3% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, this share also remained nearly constant with fluctuations with the increase in the baseline age. On the other hand, the share of the always-MUACFA-adequate female children among the total female children increased with fluctuations with the increase in the baseline age (0-11 months=69.2%, 12-23 months=85.7%, 24-35 months=67.8%, 36-47 months=78.1%). The corresponding proportions of the always-MUACFA-adequate female children among the initially-MUACFA-adequate female children remained nearly constant with fluctuations, with the increase in the baseline age (0-11 months=90.0%, 12-23 months= 96.0%, 24-35 months=90.9%, 36-47 months=92.6%). Thus, the share of the always-MUACFA-adequate male children among the total male children was higher than that of the always-MUACFA-adequate female children among the total female children, in the baseline age of 0-11 and 24-35 months, while the share of such female children was higher than that of such male children in the baseline age of 12-23 and 36-47 months; and, the share of the always-MUACFA-adequate female children among the initially-MUACFA-adequate female children was higher than that of the always-MUACFA-adequate male

children among the initially-MUACFA-adequate male children, in all the baseline age groups.

That is:

- the overall chance for having always-adequate MUACFA (healthy) status for a male child was 68.8%; and, this chance remained nearly constant with the increasing age of the male child from 70.5% for 0-11 months of age to 68.8% for 36-47 months of age;
- if the male child was ever-identified with adequate MUACFA, his chance of always remaining so was 86.4%; and, this chance remained nearly constant with the increasing age of such male child from 88.6% for 0-11 months of age to 86.3% for 36-47 months of age;
- the overall chance for having always-adequate MUACFA (healthy) status for a female child was 75.0%; and, this chance increased with the increase in the age of the female child from 69.2% for 0-11 months to 78.1% for 36-47 months of age;
- if the female child was ever-identified with adequate MUACFA, her chance of always remaining so was 92.4%; and, this chance remained nearly constant with the increasing age of such female child from 90.0% for 0-11 months of age to 92.6% for 36-47 months of age;
- this suggested the slightly higher chance of retaining the adequate MUAFA status among the female children compared to male children, and the slightly higher chance for the female child to remain healthy (adequate MUACFA) once she acquired the adequate MUACFA status in her 0-59 month life; and,
- 31.2% of the male and 25.0% of the female children were having ever-inadequate MUACFA, and they needed to have support to maintain their MUACFA status as adequate in their <5 year life ; and that the support needs to be continuous, and could be targeted for the HIV-EI and HIV-EU children in need (those having inadequate MUACFA, or those who run a risk for the same, as identified using the presence of the associated factors in them), as only 15.6% of the male and 7.6% of the female children to deteriorate from an adequate MUACFA status.

(c) Always-inadequate MUACFA status: In the 12-24 months of follow-up, 9.5% of the total 0-47 month HIV-exposed children (from among the 19.6% of the initially-MUACFA-inadequate HIV-exposed children; or 48.5% of the initially-MUACFA-inadequate HIV-exposed children) were found to be having always-inadequate MUACFA status throughout the study period, while the remaining 10.1% (or 51.5% of the initially-MUACFA-inadequate HIV-exposed children) improved. The share of the always-MUACFA-inadequate HIV-exposed children among the total HIV-exposed children slightly increased with increase in the baseline age, after an initial drop at the 12-23 months (0-11 months=9.2%, 12-23 months=8.7%, 24-35 months=9.2%, 36-47 months=10.9%). The proportion of the always-MUACFA-inadequate HIV-exposed children among the initially-MUACFA-inadequate HIV-exposed children increased with the increase in the baseline age (0-11 months=42.4%, 12-23 months=45.0%, 24-35 months=47.6%, 36-47 months= 60.9%).

That is:

- the chance for having always-inadequate MUACFA (unhealthy) status for an HIV-exposed child was 9.5%, and this slightly increased with the increase in the age of the child from 9.2% for 0-11 months to 10.9% for 36-47 months of age; and,
- if the HIV-exposed child was ever-identified with inadequate MUACFA, his/her chance of always remaining so was 48.5%, and this chance increased with the increase in the age of the child from 42.4% for 0-11 months of age to 60.9% for 36-47 months of age.

32.1% of the HIV-EI (from among the 35.7% of the initially-MUACFA-inadequate HIV-EI children; or 90.0% of the initially-MUACFA-inadequate HIV-EI children) and 8.2% of the HIV-EU (from among the 18.7% of the initially-MUACFA-inadequate HIV-EU children; or 43.7% of the initially-MUACFA-inadequate HIV-EU children) children had always-inadequate MUACFA, while the remaining 3.6% of the HIV-EI (or 10.0% of the initially-MUACFA-inadequate HIV-EI children) and 10.5% of the HIV-EU (or 56.3% of the initially-MUACFA-inadequate HIV-EU children) children improved. Thus, the share of the always-MUACFA-inadequate HIV-EI children (among the total HIV-EI and the

initially-MUACFA-inadequate HIV-EI children) was higher than the share of the always-MUACFA-inadequate HIV-EU children (among the total HIV-EU and the initially-MUACFA-inadequate HIV-EU children).

The share of the always-MUACFA-inadequate HIV-EI children among the total HIV-EI children were 28.6%, 33.3%, 20.0%, and 40.0%, and among the initially-MUACFA-inadequate HIV-EI children were 66.7%, 100.0%, 100.0%, and 100.0%, in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-MUACFA-inadequate HIV-EU children among the total HIV-EU children was 8.2%, 7.1%, 8.7%, and 8.5%, and among the initially-MUACFA-inadequate HIV-EU children were 40.0%, 38.9%, 45.0% and 52.6%, in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, these shares of the HIV-EU children increased with the increase in the baseline age, after an initial drop at 12-23 months. Thus, the share of the always-MUACFA-inadequate HIV-EI children (among both the total HIV-EI and the initially-MUACFA-inadequate HIV-EI children) tend to be higher than the share of the always-MUACFA-inadequate HIV-EU children (among both the total HIV-EU and the initially-MUACFA-inadequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-inadequate MUACFA (unhealthy) status for an HIV-EI child was 32.1%; and, this ranged between 20-40% in any age group;
- if the HIV-EI child was ever-identified with inadequate MUACFA, his/her chance of always remaining so was a maximum of 90.0%; and, this chance was more than 66.7% in any age group;
- the overall chance for having always-inadequate MUACFA (unhealthy) status for an HIV-EU child was 8.2%; and, this increased with the increase in the age of the HIV-EU child from 8.2% for 0-11 months to 8.5% for 36-47 months of age;
- if the HIV-EU child was ever-identified with inadequate MUACFA, his/her chance of always remaining so was 43.7%; and, this chance increased with the increase in the age of the HIV-EU child from 40.0% for 0-11 months of age to 52.6% for 36-47 months of age; and,

- the chance of the HIV-EI children to be, and be remaining as inadequate MUACFA was higher than the HIV-EU children.

10.0% of the male (from among the 20.4% of the initially-MUACFA-inadequate male children; or 49.0% of the initially-MUACFA-inadequate male children) and 9.0% of the female (from among the 18.9% of the initially-MUACFA-inadequate female children; or 47.8% of the initially-MUACFA-inadequate female children) children had always-inadequate MUACFA, while the remaining 10.4% of the male (or 51.0% of the initially-MUACFA-inadequate male children) and 9.8% of the female (or 52.2% of the initially-MUACFA-inadequate female children) children improved. Thus, the share of the always-MUACFA-inadequate female children (among both the total female and the initially-MUACFA-inadequate female children) was lower than the share of the always-MUACFA-inadequate male children (among both the total male and the initially-MUACFA-inadequate male children).

The share of the always-MUACFA-inadequate male children among the total male children increased in a zig-zag pattern with the increase in the baseline age (0-11 months=9.1%, 12-23 months=12.5%, 24-35 months=6.0%, 36-47 months=12.5%), while their share among the initially-MUACFA-inadequate male children increased with the increase in the baseline age, after an initial drop at 12-23 months (0-11 months=44.4%, 12-23 months= 42.9%, 24-35 months=50.0%, 36-47 months=61.5%). On the other hand, the share of the always-MUACFA-inadequate female children among the total female children remained near-constant after a full sigmoidal deflection (0-11 months=9.2%, 12-23 months=5.4%, 24-35 months=11.9%, 36-47 months=9.4%), and their share among the initially-MUACFA-inadequate female children increased with fluctuations with the increase in the baseline age (0-11 months=40.0%, 12-23 months=50.0%, 24-35 months=46.7%, 36-47 months=60.0%). Thus, the shares of the always-MUACFA-inadequate male and female children (among the respective gender totals) were nearly the same in the baseline age of <12 months; thereafter, this share was higher for the male children in the baseline age of 12-23 and 36-47 months, while it was higher for the female children in the baseline age 24-35 months. And the share of the always-MUACFA-inadequate male children among

the initially-MUACFA-inadequate male children was higher than that of the always-MUACFA-inadequate female children among the initially-MUACFA-inadequate female children in the baseline age of <12 months and >24 months, while this share of the female children was higher than that of the male children in the baseline age of 12-23 months.

That is:

- the overall chance for having always-inadequate MUACFA (unhealthy) status for a male child was 10.0%; and, this chance increased with the increase in the age of the male child from 9.1% for 0-11 months of age to 12.5% for 36-47 months of age;
- if the male child was ever-identified with inadequate MUACFA, his chance of always remaining so was 49.0%; and, this increased with the increase in the age of such male child from 44.4% for 0-11 months to 61.5% for 36-47 months of age;
- the overall chance for having always-inadequate MUACFA (unhealthy) status for a female child was 9.0%; and, this chance remained above 5.4% in all age groups;
- if the female child was ever-identified with inadequate MUACFA, her chance of always remaining so was 47.8%; and, this increased with the increase in the age of such male child from 40.0% for 0-11 months to 60.0% for 36-47 months of age;
- this suggested the near-equal chance for the male and the female child to remain to have inadequate MUACFA always, and for them to regain adequate MUACFA status, once they experienced an inadequate MUACFA in their 0-59 month life.

(d) Changes in the MUACFA status: The switch in the MUACFA status was due to the children either improving or dropping from their baseline MUACFA status. In the 12-24 months of follow-up, 10.1% of the HIV-exposed children (or 51.5% of the initially-MUACFA-inadequate HIV-exposed children) improved their initial inadequate MUACFA status, while 8.5% (or 10.6% of the initially-MUACFA-adequate HIV-exposed children) deteriorated from their initial adequate MUACFA status. As such, 18.6% of the HIV-exposed children had a chance to change their initial MUACFA status in the subsequent 12-24 months of life; and, there was nearly five-time higher chance for the initially-MUACFA-inadequate children to improve, compared to the initially-MUACFA-adequate children's chance for deterioration.

Among the total HIV-exposed children, the shares of those improving were more than and lesser than those deteriorating in the baseline age of <24 and 24+ months, respectively (0-11 months=12.4% and 8.5%, 12-23 months=10.6% and 5.8%, 24-35 months=10.1% and 11.0%, 36-47 months=7.0% and 8.6%; improving and deteriorating, respectively). Also, the chance for the improvement was maximum in the follow-up year 2, and the chance for the deterioration was maximum in the follow-up year 4. As such, the share of the HIV-exposed children experiencing changes in the MUACFA status was highest among the baseline age of 24-35 months (21.1%) and <12 months (20.9%), followed by 12-23 months (16.4%) and 36-47 months (15.6%) in the decreasing order. This implied two spikes of changes: the first in year 2 and the second in year 4.

However, by considering the shares of the HIV-exposed children improving and deteriorating with respect to their initial MUACFA status, the share of those improving were higher than that of those deteriorating in the all the baseline age groups (0-11 months=57.6% and 10.8%, 12-23 months=55.0% and 7.1%, 24-35 months=52.4% and 13.6%, 36-47 months=39.1% and 10.5%; improving and deteriorating, respectively). In short, the share of the improvement of the MUACFA status among the total HIV-exposed children decreased with the increase in the age at the baseline, and was maximum in the year 2; the share of deterioration completed a full sigmoidal curve between 0-11 and 36-47 months of age at the baseline, such that its magnitude was lower than that of the improvement in the first two years and more than that of the improvement in the last two years, and was maximum in the year 4; the baseline age of <12 and 24-35 months tend to have maximum and near-equal chance for changes in their MUACFA status in the years 2 and 4, with near-equal chance for both the improvement and deterioration.

During the follow-up of the HIV-EI children through 12-24 months, 3.6% (or 10.0% of the initially-MUACFA-inadequate HIV-EI children) improved their initial inadequate MUACFA status, while 21.4% (or 33.3% of the initially-MUACFA-adequate HIV-EI children) deteriorated from their initial adequate MUACFA status. As such, 25.0% of the total HIV-EI children had a chance to change their initial MUACFA status in the subsequent 12-24 months of life.

Among the total HIV-EI children, the shares of those improving and deteriorating were 14.3% and 28.6%, 0.0% and 16.7%, 0.0% and 40.0%, and 0.0% and 10.0% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months, respectively. As such, the share of the HIV-EI children experiencing changes in the MUACFA status were (respectively) 42.9%, 16.7%, 40.0% and 10.0% in the baseline age of <12, 12-23, 24-35 and 36-47 months.

However, by considering the shares of the HIV-EI children improving and deteriorating with respect to their initial MUACFA status, the shares of those improving and deteriorating were 33.3% and 50.0%, 0.0% and 25.0%, 0.0%, and 50.0%, and 0.0% and 16.7%, in the baseline age groups of <12, 12-23, 24-35 and 36-47 months (respectively). Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children and in all the age groups.

In the 12-24 months of follow-up, 10.5% of the HIV-EU children (or 56.3% of the initially-MUACFA-inadequate HIV-EU children) improved their initial inadequate MUACFA status, while 7.7% (or 9.5% of the initially-MUACFA-adequate HIV-EU children) deteriorated from their initial adequate MUACFA status. As such, 18.2% of the HIV-EU children had a chance to change their initial MUACFA status in the subsequent 12-24 months of life (which was lesser than that of the HIV-EI children), with the improvement more than the deterioration; and, there was nearly five-time higher chance for the initially-MUACFA-inadequate HIV-EU children to improve compared to the initially-MUACFA-adequate HIV-EU children's chance for deterioration (unlike the trend among the HIV-EI children, for whom it was predominantly deteriorating).

Among the total HIV-EU children, the shares of those improving were more than and nearly equal to that of those deteriorating in the baseline age of <24 and 24+ months respectively (0-11 months=12.3% and 7.5%, 12-23 months=11.2% and 5.1%, 24-35 months=10.6% and 9.6%, 36-47 months=7.6% and 8.5%; improving and deteriorating, respectively). The chance for the improvement was maximum in year , and that for the

deterioration was maximum in year 4. As such, the share of the HIV-EU children experiencing changes in the MUACFA status was highest among the baseline age of <12 months (20.8%) and 24-35 months (20.5%), followed by 12-23 months (16.3%) and 36-47 months (16.1%) in the decreasing order. This implied two spikes of changes: the first in year 2 and the second in year 4.

However, by considering the shares of the HIV-EU children improving and deteriorating with respect to their initial MUACFA status, the share of those improving was higher than that of those deteriorating in all the baseline age groups (0-11 months=60.0% and 9.5%, 12-23 months=61.1% and 6.3%, 24-35 months=55.0% and 11.9%, 36-47 months=47.4% and 10.1%; improving and deteriorating, respectively). In short, the share of the improvement of the MUACFA status among total HIV-EU children decreased with the increase in the baseline age, and was maximum in the year 2; the share of the deterioration completed a full sigmoidal curve between the baseline age of 0-11 and 36-47 months, such that its magnitude was lower than that of the improvement in the first two years and nearly equal to that of the improvement in the last two years; the baseline age of <12 and 24-35 months tend to have maximum chance for changes in their MUACFA status in the follow-up years 2 and 4, with a higher chance for the improvement than the deterioration.

In the follow-up of 12-24 months, 10.4% of the male children (or 51.0% of the initially-MUACFA-inadequate male children) improved their initial inadequate MUACFA status, while 10.8% (or 13.6% of the initially-MUACFA-adequate male children) deteriorated from their initial adequate MUACFA status. As such, 21.2% of the total male children had a chance to change their initial MUACFA status in the subsequent 12-24 months of life, with the improvement nearly equal to the deterioration; and, there was nearly four-time higher chance for the initially-MUACFA-inadequate male children to improve compared to the initially-MUACFA-adequate male children's chance for deterioration.

Among the total male children, the shares of those improving were more than and lesser than that of those deteriorating in the baseline age of <24 and 24+ months respectively (0-11 months=11.4% and 9.1%, 12-23 months=16.7% and 8.3%, 24-35 months=6.0% and

16.0%, 36-47 months=7.8% and 10.9%; improving and deteriorating, respectively). The chance for the improvement was maximum in year 3, and that for the deterioration was maximum in year 4. As such, the share of the male children experiencing changes in the MUACFA status increased with the increase in the baseline age till <24 months and then decreased subsequently (0-11 months=20.5%, 12-23 months=25.0%, 24-35 months= 22.0%, 36-47 months=18.7%).

However, by considering the shares of the male children improving and deteriorating with respect to their initial MUACFA status, the share of those improving was higher than those deteriorating in all the baseline age groups (0-11 months=55.6% and 11.4%, 12-23 months=57.1% and 11.8%, 24-35 months=50.0% and 18.2%, 36-47 months=38.5% and 13.7%; improving and deteriorating, respectively). In short, the share of the improvement of the MUACFA status among total HIV-EU children increased to a maximum in the year 3 (for the baseline age group of 12-23 months) and then decreased with the increase in the baseline age; the share of the deterioration completed a full sigmoidal curve between the baseline age of 0-11 and 36-47 months, such that its magnitude was lower than that of the improvement in the first two years and nearly equal to that of the improvement in the last two years, and was maximum in the year 4; the baseline age group of 12-23 months tend to have maximum chance for changes in their MUACFA status in year 3, with near-double higher chance for the improvement than the deterioration.

In the 12-24 months of follow-up, 9.8% of the female children (or 52.2% of the initially-MUACFA-inadequate female children; which was nearly equal to that of the male children) improved their initial inadequate MUACFA status, while 6.1% (or 7.6% of the initially-MUACFA-adequate female children; which was lesser than that of the male children) deteriorated from their initial adequate MUACFA status. As such, 15.9% of the total female children had a chance to change their initial MUACFA status in the subsequent 12-24 months of life (which was lesser than that of the male children), with the improvement more than the deterioration (unlike the male children, for whom it was nearly equal); and, there was nearly seven-time higher chance for the initially-MUACFA-inadequate female children to improve, compared to the initially-MUACFA-adequate

female children's chance for deterioration (the trend was similar among the male children, except for the magnitude of the improvement which was lesser for the male children; hence the chance of the female children to deteriorate from an adequate MUACFA status was lesser than that for male children).

Among the total female children, the shares of those improving were higher than and equal to that of those deteriorating in the baseline age of <36 and 36+ months respectively (0-11 months=13.8% and 7.7%, 12-23 months=5.4% and 3.6%, 24-35 months=13.6% and 6.8%, 36-47 months=6.3% and 6.3%; improving and deteriorating, respectively; unlike that for the male children, which was having increasing share of the improvement till 24 months of baseline age, and lower share subsequently). The chance for the improvement (unlike the nearly-equal but single-spike improvement among the male children in the year 3) had two spikes, the first in the year 2 and the second in the year 4; and that of deterioration was maximum in the year 2 (unlike the male children's in the year 4). As such, the share of the female children experiencing changes in the MUACFA status was highest among the baseline age of <12 months (21.5%), followed by 24-35 months (20.4%), 36-47 months (12.6%) and 12-23 months (9.0%) in the decreasing order; and presented with two spikes, the first in the year 2 and the second in the year 4 (unlike the trend among the male children, which increased till 24 months and decreased in the 24+ months baseline age).

However, by considering the shares of the female children improving and deteriorating with respect to their initial MUACFA status, the share of those improving was more than that of those deteriorating in all the baseline age groups, like the male children (0-11 months=60.0% and 10.0%, 12-23 months=50.0% and 4.0%, 24-35 months=53.3% and 9.1%, 36-47 months=40.0% and 7.4%; improving and deteriorating, respectively). In short, the years 2 and 4 tend to be having the maximum chance for changes in the MUACFA status, with the improvement having a near-double higher chance than the deterioration; the improvement had two spikes (in the years 2 and 4), and this converged with the near-constant deterioration in year 5. The pattern for the female children was predominantly of improvement in the MUACFA status, compared to that of the male children, which portrayed a compensated trade-off between the improvement and deterioration.

4.2. The patterns of psychomotor, social, and language development.

Table 34. Unique children (0-59 months) ever identified with altered psychomotor, social, and language development.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Delay/non-achievement of milestones of growth and physical/ social development	Present	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	4	0.6
	Absent	100.0	100.0	100.0	99.4	99.4	99.4	99.4	99.4	655	99.4
	Total	22	13	35	315	309	624	337	322	659	100.0
Delay/non-achievement of milestones of language development	Present	0.0	7.7	2.9	0.6	1.3	1.0	0.6	1.5	7	1.1
	Absent	100.0	92.3	97.1	99.4	98.7	99.0	99.4	98.5	653	98.9
	Total	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

There were assessments of the psychomotor, social, and language developments for all the children on every data collection schedule. The results of each assessment were classified as ‘ever delay/non-achievement of the milestones’ and analyzed, but the events of such delay/non-achievements were very few.

The characteristics of the unique children ever identified with delayed/non-achieved milestones are described in table 34. There were a total of 4 unique children (0.6%) with psychomotor and social developmental delay, and 7 (1.1%) unique children with language delay; however, 3 of these unique children had both developmental and language delay, which in turn was linked to a chronic disease condition (birth injury/cerebral palsy). Hence, a physiological reason was to be sought only for the one child with developmental delay,

and the 4 children with language delay, which was too small to be analyzed for. For the same reason, the delayed/non-achieved psychomotor, social and language development milestones were not considered as outcome variables (for the analysis of associated factors) but were retained as covariates for the other outcome variables considered.

4.3. The patterns of vitamin/mineral deficiencies.

The characteristics of the unique children ever identified as having vitamin/mineral deficiency are described in table 35. There were assessments of vitamin/mineral deficiencies for all the children (0-59 months) on every data collection schedule. The results of each assessment were categorized into the graver group of deficiency while analyzing the criteria 'maximum number of deficient vitamins/ minerals ever'. Since this criteria included the follow-up assessments in addition to the baseline and end-line assessments for the children, the sub-groups of baseline and end-line assessment of vitamin/mineral deficiency does not match with the 'ever' group, unlike the analysis of the mothers. As such, the 'combined' share of children 'ever deficient' for vitamins/minerals could be used as a better indicator.

55.3% of the children never had a vitamin/mineral deficiency during the study period. Or, in other words, less than half of the HIV-exposed children ever had vitamin/mineral deficiencies during the study period (1-6 deficiencies=23.6%, 7+ deficiencies=21.1%, total=44.7%; HIV-EI: male=72.7%, female=38.5%, total=60.0%; HIV-EU: male=41.0%, female=46.8%, total=43.8%; male=43.1%, female=46.4%). That is, a higher share of the HIV-EI children ever experienced vitamin/mineral deficiencies, especially the more severe (7+) deficiencies (HIV-EI=51.4%, HIV-EU=19.4%) forms, compared to the HIV-EU children; a slightly higher share of the female HIV-EU children ever experienced deficiencies than the male HIV-EU children; and among the HIV-EI children, the share of the more severe forms of deficiencies were higher than that of less-severe deficiencies (1-6 deficiencies=8.6%, 7+ deficiencies=51.4%). However, there was no marked gender differentials in the total group of HIV-exposed children.

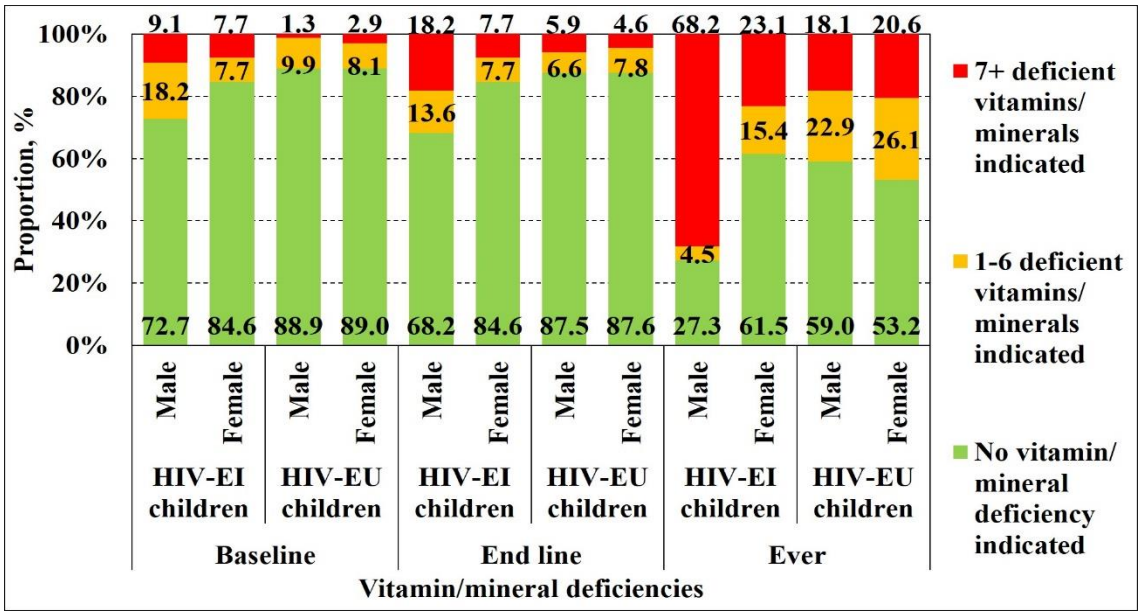
Table 35. Unique children (0-59 months) ever indicated as deficient in vitamins/minerals.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Maximum deficient vitamins/minerals indicated ever in the child	No deficiency	27.3	61.5	40.0	59.0	53.2	56.2	57.0	53.6	365	55.3
	1-6	4.5	15.4	8.6	22.9	26.1	24.5	21.7	25.7	156	23.6
	7+	68.2	23.1	51.4	18.1	20.6	19.4	21.4	20.7	139	21.1
	Total, N	22	13	35	315	310	625	337	323	660	100.0
	Average no. of vit./min. deficient among those indicated	10.1	7.6	9.2	6.2	6.6	6.4	6.5	6.6	6.6	
Persistence of vit./min. deficiency among ever deficient children	<50% of time	50.0	100.0	61.8	80.7	78.6	79.5	77.2	79.3	231	78.3
	≥50% of time	50.0	0.0	38.2	19.3	21.4	20.5	22.8	20.7	64	21.7
	Total, N	16	5	21	129	145	274	145	150	295	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

The share of the unique children by the presence and severity of vitamin/mineral deficiencies is shown in figure 70. 11.7% and 13.1% of the children were vitamin/mineral deficient at the baseline and end-line assessment (respectively). The share of vitamin/mineral deficient HIV-EI and HIV-EU children were similar and comparable between the baseline and end-line measurement: the largest share had no vitamin deficiency, a lesser share had less severe (1-6) deficiencies and the least share experienced more severe (7+) forms of deficiency.

Fig. 70. Share of unique children by the presence and severity of vitamin/mineral deficiencies.



N of children: Baseline, end line and ever: HIV-EI: male=22, female=13; HIV-EU: male=315, female=310.

The mean maximum number of ever-deficient vitamins/minerals for all the children was 6.6 (HIV-EI: male=10.1, female=7.6, total=9.2; HIV-EU: male=6.2, female=6.6, total= 6.4), but was higher for the HIV-EI children compared to the HIV-EU children. The gender differentials in the groups of HIV-EU and total HIV exposed children were near-nil.

The share of the unique children by the types of deficiency ever identified is given in table 36. All the children (N=660) were assessed for vitamin/mineral deficiencies at least once. Nearly a quarter or more of all the children were ever indicated as deficient for the vitamins B, C and E (vitamin: B1=22.3%, B2=27.9%, B3=26.1%, B6=32.3%, B7=30.9%, B9=26.2%, B12=25.0%, C=25.3%, E=23.6%). The presence of deficiency among the HIV-EU children was similar to the total group's (vitamin: B1=21.4%, B2=26.2%, B3=24.6%, B6=30.9%, B7=29.4%, B9=25.3%, B12=24.2%, C=23.5%, E=22.1%). However, among the HIV-EI children, additionally, the vitamins A (37.1%) and D (31.4%), and iron (25.7%) were ever indicated as deficient in a near-quarter or more. In absolute, more than 50% of the HIV-EI children had revealed the presence of deficiencies

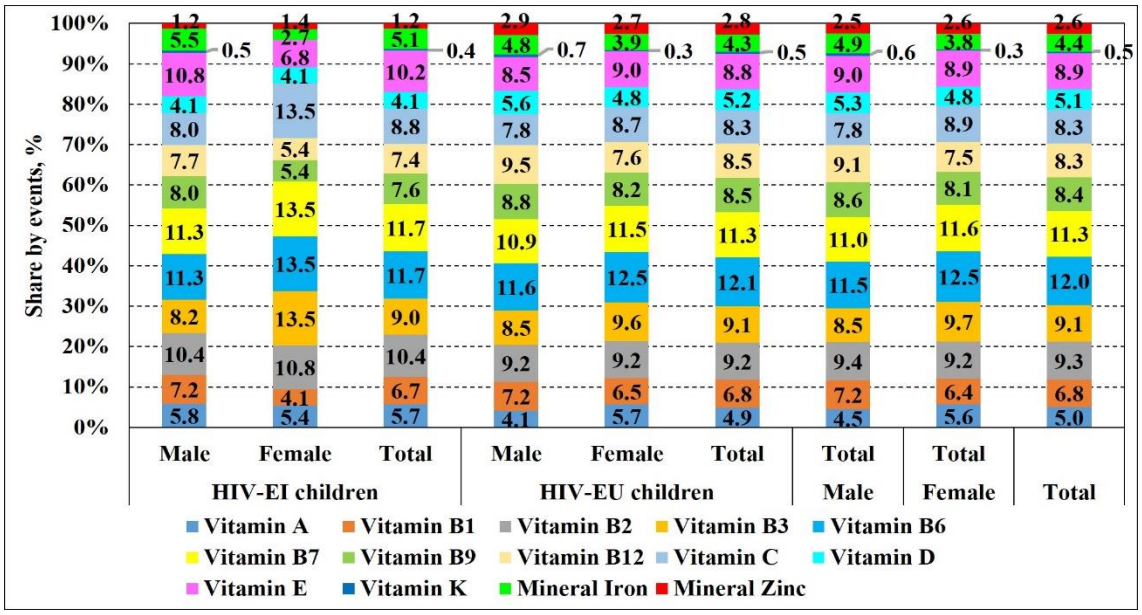
Table 36. Share of unique children by types of vitamin/mineral deficiencies.

Deficient vitamin/mineral	HIV-EI children			HIV-EU children			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Vitamin A	50.0	15.4	37.1	11.1	15.5	13.3	13.6	15.5	14.5
Vitamin B1	50.0	15.4	37.1	20.6	22.3	21.4	22.6	22.0	22.3
Vitamin B2	68.2	38.5	57.1	24.1	28.4	26.2	27.0	28.8	27.9
Vitamin B3	63.6	38.5	54.3	21.3	28.1	24.6	24.0	28.5	26.2
Vitamin B6	68.2	38.5	57.1	28.3	33.5	30.9	30.9	33.7	32.3
Vitamin B7	68.2	38.5	57.1	27.3	31.6	29.4	30.0	31.9	30.9
Vitamin B9	59.1	15.4	42.9	22.9	27.7	25.3	25.2	27.2	26.2
Vitamin B12	54.5	15.4	40.0	22.5	25.8	24.2	24.6	25.4	25.0
Vitamin C	68.2	38.5	57.1	21.0	26.1	23.5	24.0	26.6	25.3
Vitamin D	45.5	7.7	31.4	13.3	15.5	14.4	15.4	15.2	15.3
Vitamin E	72.7	15.4	51.4	20.3	23.9	22.1	23.7	23.5	23.6
Vitamin K	9.1	0.0	5.7	1.3	1.6	1.4	1.8	1.5	1.7
Iron	36.4	7.7	25.7	11.1	12.9	12.0	12.8	12.7	12.7
Zinc	22.7	7.7	17.1	8.6	9.4	9.0	9.5	9.3	9.4
N (children)	22	13	35	315	310	625	337	323	660
N (assessments)	166	95	261	2279	2239	4518	2445	2334	4779
Assessments where a deficiency was identified	34.3	10.5	25.7	12.7	14.1	13.4	14.2	14.0	14.1

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total of children.

of the vitamins B2 (57.1%), B3 (54.3%), B6 (57.1%), B7 (57.1%), C (57.1%) and E (51.4%). In the HIV-EU sub-group, the B3 (male=21.3%, female=28.1%), B6 (male= 28.3%, female=33.5%) and C (male= 21.0%, female=26.1%) vitamin deficiencies were slightly higher among the female children, than the male children. The gender differentials in the vitamin/mineral deficiencies were near-nil among all the HIV-exposed children.

Fig. 71. Share of types of vitamin/mineral deficiencies among children by events.



N of events of deficiencies: HIV-EI male=415, HIV-EI female=74, HIV-EI total=489, HIV-EU male=1535, HIV-EU female=1733, HIV-EU total=3268; male total=1950, female total=1807; total=3757.

Of the 4804 successful schedules of data collection for 660 children, total assessments which yielded information on vitamin/mineral deficiency were 4779 (99.5%; HIV-EI: male=166, female=95, total=261; HIV-EU: male=2279, female=2239, total=4518; total: male=2445, female=2334). On the whole, 14.1% of these measurements among the HIV-exposed children identified a vitamin/mineral deficiency (HIV-EI: male=34.3%, female= 10.5%, total=25.7%; HIV-EU: male=12.7%, female=14.1%, total=13.4%; total: male=14.2%, female=14.0%). That is, there was a one-in-three chance to identify a vitamin/mineral deficient male HIV-EI child by using symptom/sign-based screening criteria once in a cross-sectional survey, while it was 10-15% for the rest of the children.

The share of the types of deficient vitamins/minerals with respect to the total events of deficiency identified is given in figure 71. Of the total 3757 vitamin/mineral deficiencies indicated, the commonly encountered deficient vitamins were B6 (12.0%; HIV-EI: male=11.3%, female=13.5%, total=11.7%; HIV-EU: male=11.6%, female=12.5%, total=12.1%; total: male=11.5%, female=12.5%), B7 (11.3%; HIV-EI: male=11.3%,

female=13.5%, total=11.7%; HIV-EU: male=10.9%, female=11.5%, total=11.3%; total: male=11.0%, female=11.6%), B2 (9.3%; HIV-EI: male=10.4%, female=10.8%, total=10.4%; HIV-EU: male, female and total=9.2%; total: male=9.4%, female=9.2%) and B3 (9.1%; HIV-EI: male=8.2%, female=13.5%, total=9.0%; HIV-EU: male=8.5%, female=9.6%, total=9.1%; total: male=8.5%, female=9.7%). The share of the deficient vitamins (individually and in total) were near-equal among all the groups of children.

Around one-fifth of the vitamin/mineral deficient children had their deficiencies persisting for over more than half of the study period (21.7%; HIV-EI: male=50.0%, female=0.0%, total=38.2%; HIV-EU: male=19.3%, female=21.4%, total=20.5%). A higher share of the HIV-EI children had vitamin/mineral deficiencies persisting longer, compared to the HIV-EU children.

Due to the multitude of the screening criteria (signs and symptoms), and the abstract method (annexure 7) adopted for attributing the positive screening criteria (identified sign/ symptom) to (their corresponding single/multiple) individual vitamin/mineral deficiencies, the information (patterns and proportion) on the vitamin/mineral deficiencies were deemed less specific. As such, the information on the vitamin/mineral deficiencies was retained for corroborative and descriptive value (like a lid-opener) and hence was not considered as an exclusive outcome variable. Instead, the more specific laboratory-determined Hb level (anaemia and anaemic children) was considered as a single and better indicator for the nutritional outcome (for the analysis of associated factors), as this could also represent the larger iceberg of the vitamin/ mineral deficiencies beneath. However, the presence, severity, and persistence of the vitamin/mineral deficiencies were retained as covariates for the other outcome variables considered.

4.4. The patterns of anaemia (by haemoglobin levels).

The patterns of the nutritional outcome of anaemia were ascertained, grossly, and by age-groups and trajectory of changes.

4.4.1. The gross patterns of anaemia.

Table 37. Unique children (0-59 months) ever identified as anaemic.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Anaemia status ever	No anaemia	9.1	7.7	8.6	22.9	29.0	25.9	22.0	28.2	165	25.0
	Mild anaemia	18.2	23.1	20.0	25.4	21.0	23.2	24.9	21.1	152	23.0
	Moderate anaemia	63.6	69.2	65.7	47.0	44.5	45.8	48.1	45.5	309	46.8
	Severe anaemia	9.1	0.0	5.7	4.8	5.5	5.1	5.0	5.3	34	5.2
	Total	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

There were two scheduled assessments of Hb for all the children (0-59 months), at the baseline and end line. The children were categorized as 'non-anaemic', or with 'mild anaemia', 'moderate anaemia', and 'severe anaemia', in the graver (disadvantaged) group, while analyzing the category of anaemia as 'ever having anaemia'. The characteristics of the unique children by their ever identified anaemia status is described in table 37.

The Hb level was $\geq$11.0 g/dl (non-anaemic children) for 25.0% of all the children in the study; while the remaining were anaemic (75.0%; HIV-EI: male=90.9%, female=92.3%, total=91.4%; HIV-EU: male=77.1%, female=71.0%, total=74.1%; total: male=78.0%, female=71.8%). As such, there was a higher share of the HIV-EI children who were anaemic, compared to the HIV-EU children; and a slightly higher share of the male children who were anemic compared to the female children, in both the HIV-EU sub-group and the total group of children. The share of the children with mild, moderate and severe anaemia was 23.0%, 46.8% and 5.2% among all the HIV-exposed children, and 30.7%, 62.4% and 6.9% among the anaemic children. A higher share of the HIV-EI children had moderate

anaemia compared to the HIV-EU children, while the other two categories of anaemia were near-equally present among the children, irrespective of HIV status or gender.

4.4.2. The patterns of anaemia in various age cross-sections.

The Hb results were classified into (mild, moderate and severe) anaemia and non-anaemia. Every child reaching a particular age cross-section ever during the study, for whom (an) assessment(s) was/were available, was included in the analysis of total measurements made for that age cross-section. As such, a child might be counted in different age cross-sections and for multiple times of measurements.

The status of anaemia among the total measurements in the various age cross-sections is given in table 38 and figure 72. The mean Hb value of all the measurements is given in figure 73. Grossly, more than two-thirds (68.2%) of all the Hb measurements (N=1344) done for the children of 0-59 months of age (N=1109) had identified an anaemia status with a mean Hb value of 9.3 g/dl, while the remaining (31.8%) measurements revealed a non-anaemic status with a mean Hb value of 11.9 g/dl. The share of the measurements which revealed an anaemia status was highest in the 12-23 months (79.0%) of the life of the HIV-exposed children, followed by 0-11 (72.0%), 24-35 (72.0%), 36-47 (63.5%) and 48+ months (56.1%) in the decreasing order. As such, the anaemia status increased in the 12-23 months compared to the 0-11 months and then decreased with the increase in the age. The mean Hb value of the overall and anaemic measurements decreased in the 12-23 months compared to the 0-11 months, and then increased with the increase in the age; but, that of the non-anaemic measurements decreased in the 12-23 months compared to the 0-11 months, and then remained more-or-less constant in the 24+ months (0-11 months=9.2, 12.4, 10.1; 12-23 months=9.1, 11.8, 9.7; 24-35 months=9.3, 11.8, 10.0; 36-47 months=9.5, 11.9, 10.4; 48+ months= -9.7, 11.9, 10.6; all values in g/dl).

The shares of the mild, moderate and severe anaemia were 26.3%, 38.8% and 3.1% among all the measurements for all the HIV-exposed children; these were 38.5%, 57.0% and 4.5% among all the anaemic measurements; the mean Hb value for each category of anaemia

Table 38. Haemoglobin measurements in various age cross-sections of children, by gender, HIV, and anaemia status.

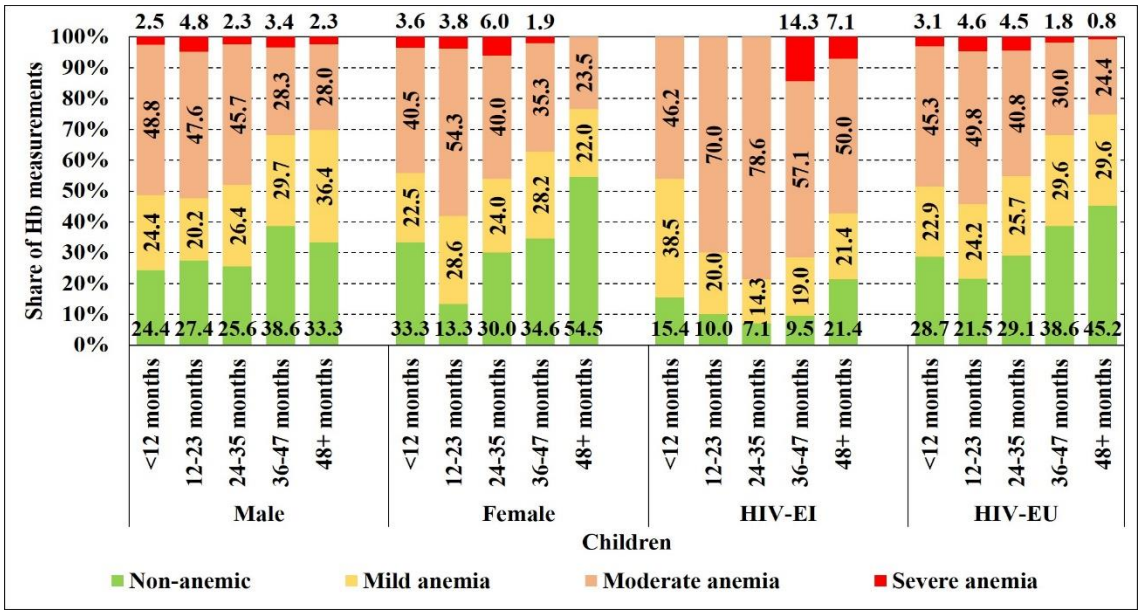
Age group	Gender	HIV status	No. of children	No. of measurements done	Non-anaemic		Mild anaemia		Moderate anaemia		Severe anaemia		Anaemic		Total
					%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	Mean Hb value
<12 months	Male	HIV-EI	5	8	0.0		37.5	10.3	62.5	8.4	0.0		100.0	9.1	9.1
		HIV-EU	111	152	25.7	12.6	23.7	10.4	48.0	8.9	2.6	5.8	74.3	9.3	10.1
		Total	116	160	24.4	12.6	24.4	10.4	48.8	8.9	2.5	5.8	75.6	9.3	10.1
	Female	HIV-EI	3	5	40.0	11.6	40.0	10.9	20.0	7.4	0.0		60.0	9.7	10.5
		HIV-EU	84	106	33.0	12.3	21.7	10.5	41.5	8.7	3.8	5.7	67.0	9.1	10.2
		Total	87	111	33.3	12.2	22.5	10.6	40.5	8.7	3.6	5.7	66.7	9.2	10.2
	Total	HIV-EI	8	13	15.4	11.6	38.5	10.5	46.2	8.2	0.0		84.6	9.3	9.6
		HIV-EU	195	258	28.7	12.4	22.9	10.5	45.3	8.8	3.1	5.7	71.3	9.2	10.1
		Total	203	271	28.0	12.4	23.6	10.5	45.4	8.8	3.0	5.7	72.0	9.2	10.1
12-23 months	Male	HIV-EI	8	8	12.5	11.9	25.0	10.2	62.5	8.3	0.0		87.5	8.9	9.2
		HIV-EU	101	116	28.4	11.7	19.8	10.5	46.6	8.7	5.2	5.9	71.6	9.0	9.8
		Total	109	124	27.4	11.7	20.2	10.5	47.6	8.7	4.8	5.9	72.6	9.0	9.7
	Female	HIV-EI	2	2	0.0		0.0		100.0	9.4	0.0		100.0	9.4	9.4
		HIV-EU	95	103	13.6	12.0	29.1	10.4	53.4	8.9	3.9	5.9	86.4	9.2	9.6
		Total	97	105	13.3	12.0	28.6	10.4	54.3	8.9	3.8	5.9	86.7	9.3	9.6
	Total	HIV-EI	10	10	10.0	11.9	20.0	10.2	70.0	8.6	0.0		90.0	9.0	9.3
		HIV-EU	196	219	21.5	11.8	24.2	10.5	49.8	8.8	4.6	5.9	78.5	9.1	9.7
		Total	206	229	21.0	11.8	24.0	10.4	50.7	8.8	4.4	5.9	79.0	9.1	9.7

Age group	Gender	HIV status	No. of children	No. of measurements done	Non-anaemic		Mild anaemia		Moderate anaemia		Severe anaemia		Anaemic		Total
					%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	Mean Hb value
24-35 months	Male	HIV-EI	7	9	0.0		22.2	10.7	77.8	8.4	0.0		100.0	8.9	8.9
		HIV-EU	107	120	27.5	11.6	26.7	10.4	43.3	8.7	2.5	6.3	72.5	9.3	9.9
		Total	114	129	25.6	11.6	26.4	10.5	45.7	8.7	2.3	6.3	74.4	9.2	9.8
	Female	HIV-EI	4	5	20.0	11.2	0.0		80.0	9.0	0.0		80.0	9.0	9.5
		HIV-EU	115	145	30.3	12.0	24.8	10.4	38.6	9.0	6.2	6.5	69.7	9.3	10.1
		Total	119	150	30.0	12.0	24.0	10.4	40.0	9.0	6.0	6.5	70.0	9.3	10.1
	Total	HIV-EI	11	14	7.1	11.2	14.3	10.7	78.6	8.6	0.0		92.9	8.9	9.1
		HIV-EU	222	265	29.1	11.8	25.7	10.4	40.8	8.9	4.5	6.4	70.9	9.3	10.0
		Total	233	279	28.0	11.8	25.1	10.4	42.7	8.9	4.3	6.4	72.0	9.3	10.0
36-47 months	Male	HIV-EI	12	16	12.5	11.8	18.8	10.4	50.0	9.3	18.8	6.5	87.5	8.9	9.3
		HIV-EU	110	129	41.9	11.9	31.0	10.5	25.6	8.8	1.6	6.4	58.1	9.6	10.6
		Total	122	145	38.6	11.9	29.7	10.5	28.3	8.9	3.4	6.4	61.4	9.5	10.4
	Female	HIV-EI	5	5	0.0		20.0	10.7	80.0	8.1	0.0		100.0	8.6	8.6
		HIV-EU	129	151	35.8	11.9	28.5	10.4	33.8	9.0	2.0	6.3	64.2	9.5	10.4
		Total	134	156	34.6	11.9	28.2	10.5	35.3	8.9	1.9	6.3	65.4	9.5	10.3
	Total	HIV-EI	17	21	9.5	11.8	19.0	10.5	57.1	8.9	14.3	6.5	90.5	8.8	9.1
		HIV-EU	239	280	38.6	11.9	29.6	10.5	30.0	8.9	1.8	6.3	61.4	9.6	10.5
		Total	256	301	36.5	11.9	28.9	10.5	31.9	8.9	2.7	6.4	63.5	9.5	10.4

Age group	Gender	HIV status	No. of children	No. of measurements done	Non-anaemic		Mild anaemia		Moderate anaemia		Severe anaemia		Anaemic		Total
					%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	%	Mean Hb value	Mean Hb value
48+ months	Male	HIV-EI	8	10	20.0	12.3	10.0	10.2	60.0	9.4	10.0	6.8	80.0	9.1	9.8
		HIV-EU	95	122	34.4	11.9	38.5	10.4	25.4	8.8	1.6	6.3	65.6	9.7	10.5
		Total	103	132	33.3	11.9	36.4	10.4	28.0	8.9	2.3	6.4	66.7	9.7	10.4
	Female	HIV-EI	4	4	25.0	11.3	50.0	10.2	25.0	8.7	0.0		75.0	9.7	10.1
		HIV-EU	104	128	55.5	11.8	21.1	10.4	23.4	9.1	0.0		44.5	9.8	10.9
		Total	108	132	54.5	11.8	22.0	10.4	23.5	9.1	0.0		45.5	9.7	10.9
	Total	HIV-EI	12	14	21.4	12.0	21.4	10.2	50.0	9.3	7.1	6.8	78.6	9.3	9.9
		HIV-EU	199	250	45.2	11.9	29.6	10.4	24.4	9.0	0.8	6.3	54.8	9.7	10.7
		Total	211	264	43.9	11.9	29.2	10.4	25.8	9.0	1.1	6.4	56.1	9.7	10.6
0-5 years	Male	HIV-EI	40	51	9.8	12.0	21.6	10.4	60.8	8.8	7.8	6.6	90.2	9.0	9.3
		HIV-EU	524	639	31.5	11.9	27.9	10.4	38.0	8.8	2.7	6.0	68.5	9.4	10.2
		Total	564	690	29.9	11.9	27.4	10.4	39.7	8.8	3.0	6.1	70.1	9.3	10.1
	Female	HIV-EI	18	21	19.0	11.4	23.8	10.6	57.1	8.6	0.0		81.0	9.2	9.6
		HIV-EU	527	633	34.4	11.9	25.1	10.4	37.3	8.9	3.2	6.2	65.6	9.4	10.3
		Total	545	654	33.9	11.9	25.1	10.4	37.9	8.9	3.1	6.2	66.1	9.4	10.2
	Total	HIV-EI	58	72	12.5	11.7	22.2	10.4	59.7	8.7	5.6	6.6	87.5	9.0	9.4
		HIV-EU	1051	1272	32.9	11.9	26.5	10.4	37.7	8.9	2.9	6.1	67.1	9.4	10.2
		Total	1109	1344	31.8	11.9	26.3	10.4	38.8	8.9	3.1	6.2	68.2	9.3	10.2

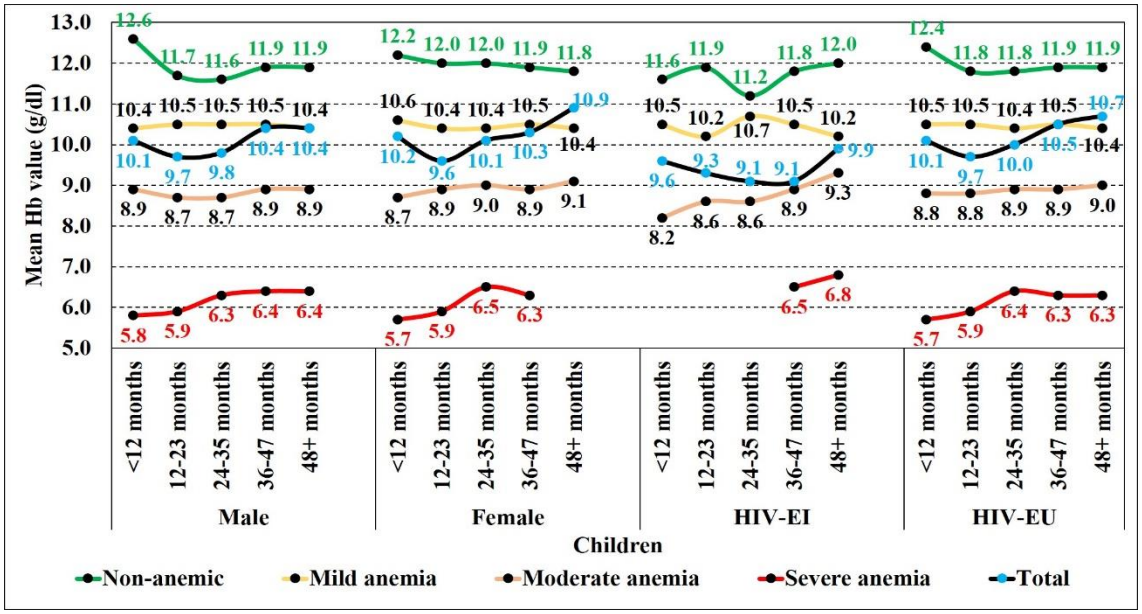
All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 72. Share of haemoglobin measurements by anaemia status.



N of measurements: Male: N1=<12 months=160, N2=12-23 months=124, N3=24-35 months=129, N4=36-47 months=145, N5=48+ months=132; Female: N1=111, N2=105, N3=150, N4=156, N5=132; HIV-EI: N1=13, N2=10, N3=14, N4=21, N5=14; HIV-EU: N1=258, N2=219, N3=265, N4=280, N5=250.

Fig. 73. Mean haemoglobin values from all the measurements among children.



N of measurements: Same as in Fig. 72.

were 10.4, 8.9, and 6.2 g/dl (respectively). The share of the measurements which identified mild anaemia increased with the increase in the age; that of moderate anaemia increased in the 12-23 months of age, compared to the 0-11 months, and then decreased with the increasing age; and that of severe anaemia increased in the 12-35 months of age, compared to the 0-11 months, and then decreased with the increasing age (0-11 months=23.6%, 45.4%, 3.0%; 12-23 months=24.0%, 50.7%, 4.4%; 24-35 months=25.1%, 42.7%, 4.3%; 36-47 months=28.9%, 31.9%, 2.7%; 48+ months=29.2%, 25.8%, 1.1%). As such, the combined shares of the moderate and severe anaemia were almost two-time that of the mild anaemia in the 0-35 months of age, and this became nearly equal in the 36+ months of age. The mean Hb value of the measurements which identified mild anaemia was nearly constant (10.4-10.5 g/dl) across all the age groups; that of moderate anaemia was also nearly constant (8.8-9.0 g/dl); and that of severe anaemia was of the range 5.7 to 6.4 g/dl, bettering towards higher ages. All these suggested that the age of 12-35 months were mostly affected with anaemia in the life of the HIV-exposed children, and the children became increasingly non-anaemic in the higher ages.

Of the total, 72 (5.4%) measurements were made for the 58 HIV-EI children (0-59 months); 87.5% of these measurements exposed an anaemic status with a mean Hb value of 9.0 g/dl, and 12.5% measurements were declared non-anaemic with a mean Hb value of 11.7 g/dl. The share of the measurements which revealed an anaemia status was highest in the 24-35 months (92.9%) of the life of the HIV-EI children, followed by 36-47 (90.5%), 12-23 (90.0%), 0-11 (84.6%) and 48+ (78.6%) months of age in the decreasing order. As such, the anaemia status increased in the 0-35 months and then decreased in the 36+ months. The mean Hb value of the anaemic measurements dropped in the 0-47 months, and then bettered (to year 1 level) in the 48+ months; that of the non-anaemic measurements improved in the 0-23 months, and dropped in the 24-35 months to improve subsequently in the 36+ months; and that of the overall Hb measurements dropped in the 0-47 months, and then bettered (than year 1 level) in the 48+ months (0-11 months=9.3, 11.6, 9.6; 12-23 months=9.0, 11.9, 9.3; 24-35 months=8.9, 11.2, 9.1; 36-47 months=8.8, 11.8, 9.1; 48+ months=9.3, 12.0, 9.9; all values in g/dl).

The shares of the mild, moderate and severe anaemia were 22.2%, 59.7% and 5.6% among all the measurements for all the HIV-EI children; these were 25.4%, 68.3% and 6.3% among all the anaemic measurements; the mean Hb value for each category of anaemia were 10.4, 8.7 and 6.6 g/dl (respectively). The share of the measurements which identified mild anaemia decreased with the increase in the age in the 0-35 months and then increased in the 36+ months; that of moderate anaemia increased with the increase in the age in the 0-35 months and then decreased in the 36+ months; and that of severe anaemia appeared in 36-47 months and decreased in the 48+ months (0-11 months=38.5%, 46.2%, 0.0%; 12-23 months=20.0%, 70.0%, 0.0%; 24-35 months=14.3%, 78.6%, 0.0%; 36-47 months= 19.0%, 57.1%, 14.3%; 48+ months=21.4%, 50.0%, 7.1%). As such, the combined shares of the moderate and severe anaemia were almost three-to-five times of that of the mild anaemia in the 12-59 months of age. The mean Hb value of the measurements which identified mild anaemia fluctuated between 10.2 and 10.7 g/dl between 0-59 months; that of moderate anaemia improved from 8.2 to 9.3 in the 0-59 months, and that of severe anaemia tend to better in the 36-59 months (6.5 to 6.8 g/dl). All these suggested that the age of 0-47 months were mostly affected with anaemia of increasing severity in the life of the HIV-EI children, and the anaemia status remained mostly unchanged between 0-47 months but showed the signs of reversal in the 48+ months.

Of the total, 1272 (94.6%) measurements were made for the 1051 HIV-EU children (0-59 months); 67.1% of these measurements exposed an anaemic status with a mean Hb value of 9.4 g/dl, and 32.9% measurements were declared non-anaemic with a mean Hb value of 11.9 g/dl. The share of the measurements which revealed an anaemia status was highest in the 12-23 months (78.5%) of the age of the HIV-EU children, followed by 0-11 (71.3%), 24-35 (70.9%), 36-47 (61.4%) and 48+ (54.8%) months in the decreasing order. As such, the anaemia status increased in the 0-23 months and then decreased in the 24+ months. The mean Hb value of the overall and anaemic measurements dropped in the 0-23 months, and then bettered (than year 1 level) in the 24+ months; but, that of the non-anaemic measurements dropped in the 0-23 months, and then remained nearly constant in the 24+ months (0-11 months=9.2, 12.4, 10.1; 12-23 months=9.1, 11.8, 9.7; 24-35 months= 9.3, 11.8, 10.0; 36-47 months=9.6, 11.9, 10.5; 48+ months=9.7, 11.9, 10.7; all values in g/dl).

The shares of the mild, moderate and severe anaemia were 26.5%, 37.7% and 2.9% among all the measurements for all the HIV-EU children; these were 39.5%, 56.2% and 4.3% among all the anaemic measurements; the mean Hb value for each category of anaemia were 10.4, 8.9 and 6.1 g/dl (respectively). The share of the measurements which identified mild anaemia increased with the increase in the age in the 0-59 months; but that of moderate and severe anaemia increased in the 0-23 months and then decreased in the 24+ months (0-11 months=22.9%, 45.3%, 3.1%; 12-23 months=24.2%, 49.8%, 4.6%; 24-35 months= 25.7%, 40.8%, 4.5%; 36-47 months=29.6%, 30.0%, 1.8%; 48+ months=29.6%, 24.4%, 0.8%). As such, the combined shares of the moderate and severe anaemia were almost two-time that of the mild anaemia in the 0-35 months of age, and this became nearly equal in the 36+ months of age. The mean Hb value of the measurements which identified mild anaemia remained nearly constant at 10.4-10.5 g/dl between 0-59 months; that of moderate anaemia also remained constant at 8.8-9.0 g/dl, but showed improving trend with the increase in the age; and that of severe anaemia improved from 5.7 to 6.3 g/dl through 0-59 months. All these suggested that the age of 12-35 months were mostly affected with anaemia in the life of the HIV-EU children, and the children became increasingly non-anaemic in the higher ages.

As such, compared to the HIV-EU counterpart:

- the chance of being anaemic was higher for the HIV-EI children in all the age groups;
- the chance of being moderately or severely anaemic was higher for the HIV-EI children in the 12+ months of age, while it was higher in the HIV-EU group in the 0-11 months of age;
- the severe anaemia was present in prominently higher share when it appeared in the 36-47 month HIV-EI children, while it was on the decline in the HIV-EU group;
- the mean Hb value of the anaemic measurements was unfavorable for the HIV-EI children in the 24+ months age;
- the mean Hb value of the non-anaemic measurements was unfavorable for the HIV-EI children in the 0-11 and 25-47 months of age, and unfavorable for the HIV-EU children in the 12-23 and 48+ months of age; and,

- the mean Hb value of overall Hb measurements was unfavorable for the HIV-EI children in all the age groups.

690 (51.3%) of the total measurements were made on 564 male children (0-59 months), to reveal anaemia status among 70.1% of the measurements with a mean Hb value of 9.3 g/dl and non-anaemia status among 29.9% of the measurements with a mean Hb value of 11.9 g/dl. The share of the measurements which revealed an anaemia status was highest in the 0-11 months (75.6%) of the life of the male children, followed by 24-35 (74.4%), 12-23 (72.6%), 36-47 (61.4%) and 48+ (66.7%) months of age in the decreasing order. As such, the anaemia status fluctuated across each of the cross-sectional years but showed a declining trend over time in general. The mean Hb value of anaemic measurements dropped in the 12-23 months, and then bettered (than year 1 level) in the 24+ months; that of non-anaemic measurements dropped in the 12-35 months, and then increased to stabilize in the 36+ months (at a value lower than that of the 0-11 months); and that of overall Hb measurements dropped in the 12-23 months, and then bettered (than year 1 level) in the 24+ months (0-11 months=9.3, 12.6, 10.1; 12-23 months=9.0, 11.7, 9.7; 24-35 months=9.2, 11.6, 9.8; 36-47 months=9.5, 11.9, 10.4; 48+ months=9.7, 11.9, 10.4; all values in g/dl).

The shares of the mild, moderate and severe anaemia were 27.4%, 39.7% and 3.0% among all the measurements for all the male children; these were 39.1%, 56.6% and 4.3% among all the anaemic measurements; the mean Hb value for each category of anaemia were 10.4, 8.8 and 6.1 g/dl (respectively). The share of the measurements which identified mild anaemia decreased in the 12-23 months of age and then increased with the increase in the age; that of moderate anaemia decreased slowly in the 0-35 months, drastically in the 36-47 months and remained near-constant later; and that of severe anaemia increased (nearly doubled) in the 12-23 months, and then decreased to near year-1 levels in the 24+ months of age (0-11 months=24.4%, 48.8%, 2.5%; 12-23 months=20.2%, 47.6%, 4.8%; 24-35 months=26.4%, 45.7%, 2.3%; 36-47 months=29.7%, 28.3%, 3.4%; 48+ months=36.4%, 28.0%, 2.3%). As such, the combined shares of the moderate and severe anaemia were almost 2-to-2.5 times of that of the mild anaemia in the 0-35 months of age, but nearly equal in the 36+ months of age. The mean Hb value of the measurements which identified

mild anaemia remained nearly constant (10.4-10.5 g/dl) between 0-59 months; that of moderate anaemia remained nearly constant (8.7-8.9 g/dl) between 0-59 months; and that of severe anaemia improved slightly with the increase in the age (5.8 to 6.4 g/dl). All these suggested that the age of 0-35 months were mostly affected with anaemia of increasing severity in the life of the male children, and the anaemia status improved with the increase in the age of the male children.

For the 545 female children (0-59 months), 654 (48.7%) measurements were made, to identify anaemia status among 66.1% of the measurements with a mean Hb value of 9.4 g/dl, and non-anaemic status among 33.9% of the measurements with a mean Hb value of 11.9 g/dl. The share of the measurements which revealed an anaemia status was highest in the 12-23 months (86.7%) of the life of the female children, followed by 24-35 (70.0%), 0-11 (66.7%), 36-47 (65.4%) and 48+ (45.5%) months of age in the decreasing order. As such, compared to the 0-11 months, the anaemia status increased in the 12-23 months and then decreased in the 24+ months. The mean Hb value of the anaemic measurements improved with the increase in the age of the child; that of the non-anaemic measurements declined with the increase in the age, and that of the overall Hb measurements dropped in the 12-23 months, and then bettered (than year 1 level) in the 24+ months (0-11 months=9.2, 12.2, 10.2; 12-23 months=9.3, 12.0, 9.6; 24-35 months=9.3, 12.0, 10.1; 36-47 months=9.5, 11.9, 10.3; 48+ months=9.7, 11.8, 10.9; all values in g/dl).

The shares of the mild, moderate and severe anaemia were 25.1%, 37.9% and 3.1% among all the measurements for all the female children; these were 38.0%, 57.4% and 4.6% among all the anaemic measurements; the mean Hb value for each category of anaemia were 10.4, 8.9 and 6.2 g/dl (respectively). The share of the measurements which identified mild anaemia fluctuated around a quarter of Hb measurements in age in the 0-59 months; that of moderate anaemia increased in the 12-23 months and then decreased in the 24+ months; and that of severe anaemia increased with the increase in the age in the 0-35 months and then decreased in the 36-47 months, to wane off subsequently in the 48+ months of age (0-11 months=22.5%, 40.5%, 3.6%; 12-23 months=28.6%, 54.3%, 3.8%; 24-35 months= 24.0%, 40.0%, 6.0%; 36-47 months=28.2%, 35.3%, 1.9%; 48+ months=22.0%, 23.5%,

0.0%). As such, the combined shares of the moderate and severe anaemia were almost two-time of that of the mild anaemia in the 0-35 months of age, and this became nearly equal in the 48+ months of age. The mean Hb value of the measurements which identified mild anaemia remained nearly constant at 10-4-10.6 g/dl between 0-59 months, but showed a declining trend with the increase in the age; that of moderate anaemia also remained constant at 8.7-9.1 g/dl, but showed an improving trend with the increase in the age; and that of severe anaemia improved from 5.7 to 6.3 g/dl through 0-59 months. All these suggested that the age of 0-35 months were mostly affected with anaemia in the life of the female children, and the children became increasingly non-anaemic in the higher ages.

As such, compared to the female counterpart:

- the chance of being of anaemic, moderately anaemic or severely anaemic was higher for the male children in the 0-11, 24-35 and 48+ months, while this was higher for the female children in the intervening months;
- the chance of being of mildly anaemic was higher for the male children in the 0-11 and 24+ months of age, while it was higher in the female group in the 12-23 months;
- the severe anaemia was persisting among the male children in the 48+ months of age, while it was absent among female children;
- the mean Hb value of the anaemic measurements was unfavorable for the 12-35 month male children and 0-11 month female children;
- the mean Hb value of the non-anaemic measurements was unfavorable for the 12-35 month male children, and 0-11 and 48+ month female children; and,
- the mean Hb value of overall Hb measurements was unfavorable for the male children in the 0-11, 24-35, and 48+ months of age, while it was unfavorable for the female children in the intervening months.

4.4.3. The patterns of anaemia by the trajectory of haemoglobin levels.

The trajectory of the anaemia status of the unique children (0-47 months of age) through the 12-24 months of their subsequent life (categorized in the graver group of anaemia) is given in table 39 and figure 74. The trajectory of the unique children by category of

Table 39. The pattern of anaemia by the trajectory of haemoglobin values of unique children.

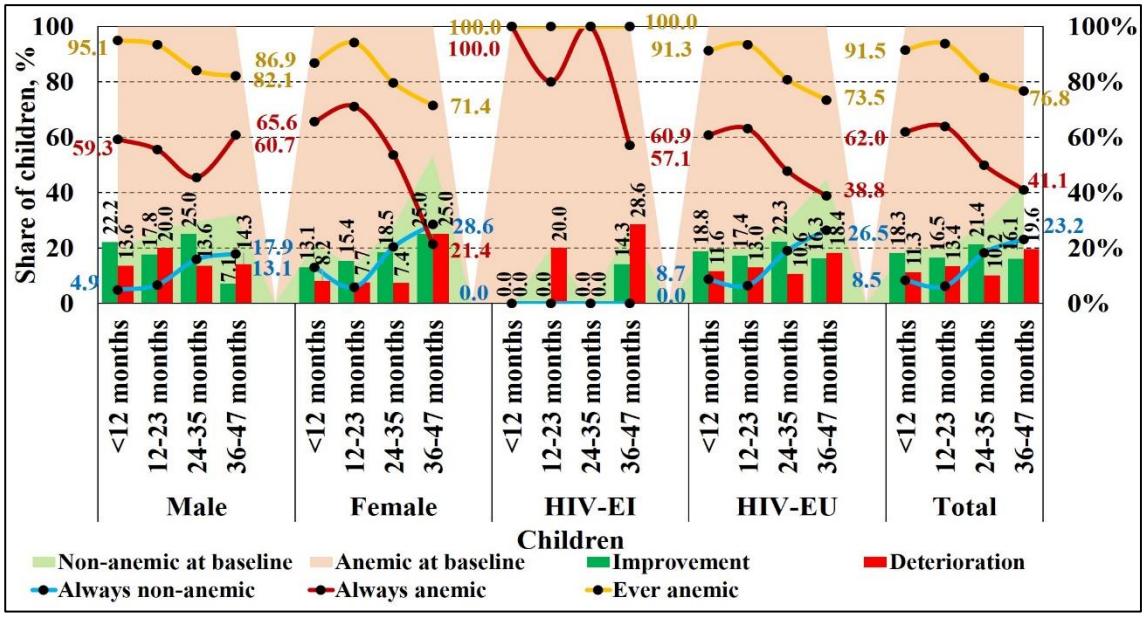
Characteristics			Number of children		At baseline		Anaemia status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice measured	Non-anaemic	Anaemic	Always non-anaemic	Always anaemic	Deterioration	Improvement	Ever anaemic
<12 months	Male	HIV-EI	6	3	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	116	78	19.2	80.8	5.1	57.7	14.1	23.1	94.9
		Total	122	81	18.5	81.5	4.9	59.3	13.6	22.2	95.1
	Female	HIV-EI	4	1	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	88	60	21.7	78.3	13.3	65.0	8.3	13.3	86.7
		Total	92	61	21.3	78.7	13.1	65.6	8.2	13.1	86.9
	Total	HIV-EI	10	4	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	204	138	20.3	79.7	8.7	60.9	11.6	18.8	91.3
		Total	214	142	19.7	80.3	8.5	62.0	11.3	18.3	91.5
12-23 months	Male	HIV-EI	4	4	25.0	75.0	0.0	75.0	25.0	0.0	100.0
		HIV-EU	45	41	26.8	73.2	7.3	53.7	19.5	19.5	92.7
		Total	49	45	26.7	73.3	6.7	55.6	20.0	17.8	93.3
	Female	HIV-EI	2	1	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	56	51	13.7	86.3	5.9	70.6	7.8	15.7	94.1
		Total	58	52	13.5	86.5	5.8	71.2	7.7	15.4	94.2
	Total	HIV-EI	6	5	20.0	80.0	0.0	80.0	20.0	0.0	100.0
		HIV-EU	101	92	19.6	80.4	6.5	63.0	13.0	17.4	93.5
		Total	107	97	19.6	80.4	6.2	63.9	13.4	16.5	93.8
24-35 months	Male	HIV-EI	3	3	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	53	41	31.7	68.3	17.1	41.5	14.6	26.8	82.9
		Total	56	44	29.5	70.5	15.9	45.5	13.6	25.0	84.1

Characteristics			Number of children		At baseline		Anaemia status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice measured	Non-anaemic	Anaemic	Always non-anaemic	Always anaemic	Deterioration	Improvement	Ever anaemic
	Female	HIV-EI	2	1	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	58	53	28.3	71.7	20.8	52.8	7.5	18.9	79.2
		Total	60	54	27.8	72.2	20.4	53.7	7.4	18.5	79.6
	Total	HIV-EI	5	4	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	111	94	29.8	70.2	19.1	47.9	10.6	22.3	80.9
		Total	116	98	28.6	71.4	18.4	50.0	10.2	21.4	81.6
36-47 months	Male	HIV-EI	7	5	40.0	60.0	0.0	60.0	40.0	0.0	100.0
		HIV-EU	62	23	30.4	69.6	21.7	60.9	8.7	8.7	78.3
		Total	69	28	32.1	67.9	17.9	60.7	14.3	7.1	82.1
	Female	HIV-EI	4	2	0.0	100.0	0.0	50.0	0.0	50.0	100.0
		HIV-EU	67	26	57.7	42.3	30.8	19.2	26.9	23.1	69.2
		Total	71	28	53.6	46.4	28.6	21.4	25.0	25.0	71.4
	Total	HIV-EI	11	7	28.6	71.4	0.0	57.1	28.6	14.3	100.0
		HIV-EU	129	49	44.9	55.1	26.5	38.8	18.4	16.3	73.5
		Total	140	56	42.9	57.1	23.2	41.1	19.6	16.1	76.8
0-4 years	Male	HIV-EI	20	15	20.0	80.0	0.0	80.0	20.0	0.0	100.0
		HIV-EU	276	183	25.1	74.9	10.4	53.6	14.8	21.3	89.6
		Total	296	198	24.7	75.3	9.6	55.6	15.2	19.7	90.4
	Female	HIV-EI	12	5	0.0	100.0	0.0	80.0	0.0	20.0	100.0
		HIV-EU	269	190	26.3	73.7	15.8	56.8	10.5	16.8	84.2
		Total	281	195	25.6	74.4	15.4	57.4	10.3	16.9	84.6
	Total	HIV-EI	32	20	15.0	85.0	0.0	80.0	15.0	5.0	100.0
		HIV-EU	545	373	25.7	74.3	13.1	55.2	12.6	19.0	86.9

Characteristics			Number of children		At baseline		Anaemia status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice measured	Non-anaemic	Anaemic	Always non-anaemic	Always anaemic	Deterioration	Improvement	Ever anaemic
		Total	577	393	25.2	74.8	12.5	56.5	12.7	18.3	87.5

All values mentioned are in percentage upon the number of children measured twice, except for the number of children.

Fig. 74. Share of unique children by trajectory of haemoglobin values and age.



N of children: Male: N1=<12 months=81, N2=12-23 months=45, N3=24-35 months=44, N4=36-47 months=28; Female: N1=61, N2=52, N3=54, N4=28; HIV-EI: N1=4, N2=5, N3=4, N4=7; HIV-EU: N1=138, N2=92, N3=94, N4=49; Total: N1=142, N2=97, N3=98, N4=56.

anaemia status (mild, moderate, or severe) was not attempted due to the small numbers figuring in each category. However, the detailed matrix of the number of children by anaemia status, age, gender, and HIV status is given in annexure 10.

(a) Baseline scenario: At the baseline, around one-quarter (25.2%) of the total children had adequate Hb status (non-anaemic), while the remaining two-thirds did not (anaemic). At the baseline, the share of the total children with adequate Hb was near similar in the baseline age groups of 0-11 and 12-23 months (0-11 months=19.7%, 12-23 months= 19.6%), and this share increased in the higher baseline age groups (24-35 months=28.6%, 36-47 months=42.9%). Thus, the share of total children with adequate Hb increased with the increase in the age beyond the 12 months of age.

In the total group of HIV-exposed children, 15.0% of the HIV-EI children and 25.7% of the HIV-EU children had adequate Hb, while the remaining did not. Thus, the share of the HIV-EI children with adequate Hb was lower than the share of the HIV-EU children. Among the HIV-EI children, none (except one child) in the baseline age 0-35 months and 28.6% in the baseline age group of 36-47 months were having adequate Hb at the baseline. On the other hand, the share of the HIV-EU children with adequate Hb remained nearly constant in the baseline age of 0-23 months and then increased with the increase in the baseline age in the 24+ months (0-11 months=20.3%; 12-23 months=19.6%; 24-35 months=29.8%; 36-47 months=44.9%). The share of the HIV-EI children with adequate Hb was lesser than the share of the HIV-EU children in the baseline age groups of 0-11 and 24-47 months, while it was higher among the HIV-EI group in the baseline age group of 12-23 months (possibly due to the smaller number of the HIV-EI children in the study). Thus, in all the baseline age groups, the share of the HIV-EI children tend to be lower than the share of the HIV-EU children. Or in other words, this could indicate the likely chance of the HIV-EI children to be more anaemic than the HIV-EU children in all the age groups, in a cross-sectional approach; and that, a higher share of the HIV-EU children, whose majority was also as anaemic like the HIV-EI children, tend to achieve the adequate Hb status in the higher age groups more quickly than the HIV-EI children.

In the total group of HIV-exposed children, nearly a quarter of the male (24.7%) and the female (25.6%) children had adequate Hb, while the remaining did not, thereby retaining similar gender differentials. The share of the male children having adequate Hb increased with the increase in the baseline age of the child (0-11 months=18.5%, 12-23 months=

26.7%, 24-35 months=29.5%, 36-47 months=32.1%). On the other hand, the share of the female children having adequate Hb was 21.3% in the baseline age group of 0-11 months, which dropped to 13.5% in the baseline age group of 12-23 months, and then increased in the subsequent higher baseline age groups of 24-35 (27.8%) and 36-47 (53.6%) months. That is, there was an increasing trend in the share of the female children having adequate Hb with the increase in the age at the baseline, after an initial drop among at the age of 12-23 months. The share of the male children having adequate Hb was higher than that of the female children in the baseline age group of 12-35 months, while the share of such female children was higher than that of the male children in the baseline age groups of 0-11 and 36-47 months. Or in other words, this could indicate that a higher share of the female children, whose majority was also as anaemic as the male children, initially tend to deteriorate in their Hb status in the year 2, but subsequently regained their adequate Hb status more quickly in the higher age groups beyond 24 months; while, compared to the female children, a higher share of the male children, lacked adequate Hb status in all the age groups (except in year 2 and 3, comparatively, due to the deterioration and subsequent catch-up of the female children), and had a slower-but-increasing trend in achieving the adequate Hb status with the increase in the age. The differentials and trends observed in the HIV-EU children by gender were similar to that in the total group. The trajectory of the Hb status of the children is described against this background.

(b) Always-adequate and ever-inadequate Hb status: In the 12-24 months of follow-up, one-eighth (12.5%) of the total 0-47 month HIV-exposed children (from among the 25.2% of the initially-Hb-adequate HIV-exposed children; or 49.5% of the initially-Hb-adequate HIV-exposed children) were found to be having always-adequate Hb status throughout the study period, while the remaining 12.7% (or 50.5% of the initially-Hb-adequate HIV-exposed children) deteriorated. The share of the always-Hb-adequate HIV-exposed children among the total HIV-exposed children was 8.5% in the baseline age of 0-11 months, which dropped to 6.2% in the baseline age of 12-23 months, and then increased in the subsequent higher baseline age of 24-35 (18.4%) and 36-47 (23.2%) months. That is, there was an increasing trend in the share of the always-Hb-adequate HIV-exposed children with the increase in the baseline age, after an initial drop at 12-23 months. The proportion

of the always-Hb-adequate HIV-exposed children among the initially-Hb-adequate HIV-exposed children fluctuated-but-increased with the increase in the baseline age (0-11 months=42.9%, 12-23 months=31.6%, 24-35 months=64.3%, 36-47 months=54.2%).

That is:

- the chance for having always-adequate Hb (healthy) status for an HIV-exposed child was 12.5%, and this chance increased with the increase in the age of the child from 8.5% for 0-11 months of age to 23.2% for 36-47 months of age;
- if the HIV-exposed child was ever-identified with adequate Hb, his/her chance of always remaining so was 49.5%, and this also increased with the increase in the age of the child from 42.9% for 0-11 months to 54.2% for 36-47 months of age; and,
- 87.5% of the HIV-exposed children had ever-inadequate Hb, and they needed support to maintain their Hb status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all the HIV-exposed children, as 50.5% of such HIV-exposed children tend to deteriorate.

None of the HIV-EI (from among the 15.0% of the initially-Hb-adequate HIV-EI children) and 13.1% of the HIV-EU (from among the 25.7% of the initially-Hb-adequate HIV-EU children; or 51.0% of the initially-Hb-adequate HIV-EU children) children had always-adequate Hb, while the remaining 15.0% of the HIV-EI (or all of the initially-Hb-adequate HIV-EI children) and 12.6% of the HIV-EU (or 49.0% of the initially-Hb-adequate HIV-EU children) children deteriorated. Thus, the share of the always-Hb-adequate HIV-EI children (among both the total HIV-EI and the initially-Hb-adequate HIV-EI children) was lower than the share of the always-Hb-adequate HIV-EU children (among both the total HIV-EU and the initially-Hb-adequate HIV-EU children).

The share of the always-Hb-adequate HIV-EI children among the total HIV-EI children was nil for all the baseline age groups. On the other hand, the share of the always-Hb-adequate HIV-EU children among the total HIV-EU children was 8.7% in the baseline age of 0-11 months, which dropped to 6.5% at 12-23 months, and then increased in the subsequent higher baseline age of 24-35 (19.1%) and 36-47 (26.5%) months. That is, there

was an increasing trend in this share of the HIV-EU children with the increase in the baseline age, after an initial drop at the age of 12-23 months. The corresponding proportions of the always-Hb-adequate HIV-EU children among the initially-Hb-adequate HIV-EU children were 42.9%, 33.3%, 64.3% and 59.1% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively; this also fluctuated-but-increased with the increase in the baseline age. Thus, the share of the always-Hb-adequate HIV-EI children (among both the total HIV-EI and the initially-Hb-adequate HIV-EI children) was lesser than the share of the always-Hb-adequate HIV-EU children (among both the total HIV-EU and the initially-Hb-adequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-adequate Hb (healthy) status for an HIV-EI child was nil; and, this chance remained constant with the increasing age of the HIV-EI child;
- if the HIV-EI child was ever-identified with adequate Hb, his/her chance of always remaining so was 0.0%; and, this chance remained constant with the increasing age of such HIV-EI child;
- the overall chance for having always-adequate Hb (healthy) status for an HIV-EU child was 13.1%; and, this chance increased with the increase in the age of the HIV-EU child from 8.7% for 0-11 months of age to 26.5% for 36-47 months of age;
- if the HIV-EU child was ever-identified with adequate Hb, his/her chance of always remaining so was 51.0%; and, this increased with the increase in the age of such HIV-EU child from 42.9% for 0-11 months to 59.1% for 36-47 months of age; and,
- all of the HIV-EI and 86.9% of the HIV-EU children were having ever-inadequate Hb, and they needed to have support to maintain their Hb status as adequate in their life below 5 years of age; and that the support needs to be continuous and for both the HIV-EI and HIV-EU children, as 100.0% of such HIV-EI and 49.0% of such HIV-EU children tend to deteriorate.

9.6% of the male (from among the 24.7% of the initially-Hb-adequate male children; or 38.8% of the initially-Hb-adequate male children) and 15.4% of the female (from among

the 25.6% of the initially-Hb-adequate female children; or 60.0% of the initially-Hb-adequate female children) children had always-adequate Hb, while the remaining 15.1% of the male (or 61.2% of the initially-Hb-adequate male children) and 10.2% of the female (or 40.0% of the initially-Hb-adequate female children) children deteriorated. Thus, the share of the always-Hb-adequate male children (among both the total male and the initially-Hb-adequate male children) was lower than the share of the always-Hb-adequate female children (among both the total female and the initially-Hb-adequate female children).

The share of the always-Hb-adequate male children among the total male children increased with the increase in the baseline age of the child (0-11 months=4.9%, 12-23 months=6.7%, 24-35 months=15.9%, 36-47 months=17.9%). The corresponding share of the always-Hb-adequate male children among the initially-Hb-adequate male children were 26.7%, 25.0%, 53.8% and 55.6% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was an increasing trend in this share with the increase in the baseline age, despite a small initial drop at 12-23 months. On the other hand, the share of the always-Hb-adequate female children among the total female children was 13.1% in the baseline age of 0-11 months, which dropped to 5.8% at 12-23 months, and then increased in the subsequent higher baseline age of 24-35 (20.4%) and 36-47 (28.6%) months. That is, there was an increasing trend in this share with the increase in the baseline age, after an initial drop at 12-23 months. The corresponding share of the always-Hb-adequate female children among the initially-Hb-adequate female children were 61.5%, 42.9%, 73.3% and 53.3% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. That is, there was a fluctuating-but-decreasing trend in this share with the increase in the baseline age. The low levels of always-adequate Hb status among the male children at the 0-11 months and the females at the 12-23 months could be due to some same reason, like the end of breastfeeding or start of other feeds. Thus, the share of the always-Hb-adequate female children (among both the total female and the initially-Hb-adequate female children) was higher than that of the always-Hb-adequate male children (among both the total male and the initially-Hb-adequate male children) in the baseline age of 0-11, 24-35 and 36-47 months, while these shares of such male children were higher than that of such female children in the baseline age of 12-23 months.

That is:

- the overall chance for having always-adequate Hb (healthy) status for a male child was 9.6%; and, this chance increased with the increase in the age of the male child from 4.9% for 0-11 months of age to 17.9% for 36-47 months of age;
- if the male child was ever-identified with adequate Hb, his chance of always remaining so was 38.8%; and, this chance increased with the increase in the age of such male child from 26.7% for 0-11 months to 55.6% for 36-47 months of age;
- the overall chance for having always-adequate Hb (healthy) status for a female child was 15.4%; and, this chance increased with the increase in the age of the female child from 13.1% for 0-11 months of age to 28.6% for 36-47 months of age;
- if the female child was ever-identified with adequate Hb, her chance of always remaining so was above 60.0%; and, this chance was above 42.9% for all the baseline age groups;
- this suggested the higher chance of retaining the adequate Hb status among the female children compared to male children post 24 months of life; and,
- 90.4% of the male and 84.6% of the female children had ever-inadequate Hb, and they needed to have support to maintain their Hb status as adequate in their life below 5 years of age; and that the support needs to be continuous and for all male and female children, as 61.2% of such male and 40.0% of such female children tend to deteriorate.

(c) Always-inadequate Hb status: In the 12-24 months of follow-up, 56.5% of the total 0-47 month HIV-exposed children (from among the 74.8% of the initially-Hb-inadequate HIV-exposed children; or 75.5% of the initially-Hb-inadequate HIV-exposed children) were found to be having always-inadequate Hb status throughout the study period, while the remaining 18.3% (or 24.5% of the initially-Hb-inadequate HIV-exposed children) improved. The share of the always-Hb-inadequate HIV-exposed children among the total HIV-exposed children was 62.0% in the baseline age of 0-11 months, which increased to 63.9% at the 12-23 months, and then decreased in the subsequent higher baseline age of 24-35 (50.0%) and 36-47 (41.1%) months. That is, there was a decreasing trend in this share with the increase in the baseline age, after an initial increase at the 12-23 months.

The share of the always-Hb-inadequate HIV-exposed among the initially-Hb-inadequate HIV-exposed children decreased with the increase in the baseline age, but with fluctuations (0-11 months=77.2%, 12-23 months=79.5%, 24-35 months=70.0%, 36-47 months=71.9%).

That is:

- the chance for having always-inadequate Hb (unhealthy) status for an HIV-exposed child was 56.5%, and this chance decreased with the increase in the age of the child from 62.0% for 0-11 months of age to 41.1% for 36-47 months of age; and,
- if the HIV-exposed child was ever-identified with inadequate Hb, his/her chance of always remaining so was 75.5%, and this chance remained above 70.0% in all the age groups.

80.0% of the HIV-EI (from among the 85.0% of the initially-Hb-inadequate HIV-EI children; or 94.1% of the initially-Hb-inadequate HIV-EI children) and 55.2% of the HIV-EU (from among the 74.3% of the initially-Hb-inadequate HIV-EU children; or 74.4% of the initially-Hb-inadequate HIV-EU children) children had always-inadequate Hb, while the remaining 5.0% of the HIV-EI (or 5.9% of the initially-Hb-inadequate HIV-EI children) and 19.1% of the HIV-EU (or 25.6% of the initially-Hb-inadequate HIV-EU children) children improved. Thus, the share of the always-Hb-inadequate HIV-EI children (among both the total HIV-EI and the initially-Hb-inadequate HIV-EI children) was higher than the share of the always-Hb-inadequate HIV-EU children (among both the total HIV-EU and the initially-Hb-inadequate HIV-EU children).

The share of the always-Hb-inadequate HIV-EI children among the total HIV-EI children were 100.0%, 80.0%, 100.0%, and 57.1%, and among the initially-Hb-inadequate HIV-EI children were 100.0%, 100.0%, 100.0%, and 80.0%, in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-Hb-inadequate HIV-EU children among the total HIV-EU children decreased with the increase in the baseline age, after an initial spike at the 12-23 months (0-11 months=60.9%, 12-23 months=63.0%, 24-35 months=47.9%, 36-47 months=38.8%); and their share among the

initially-Hb-inadequate HIV-EU children increased in the baseline age of 12-23 months and then reverted to the below-year-1-level in the 36-47 months of baseline age (0-11 months=76.4%, 12-23 months=78.4%, 24-35 months=68.2%, 36-47 months=70.4%). Thus, even though a pattern could not be drawn clearly, the share of the always-Hb-inadequate HIV-EI children (among both the total HIV-EI and the initially-Hb-inadequate HIV-EI children) tend to be higher than the share of the always-Hb-inadequate HIV-EU children (among both the total HIV-EU and the initially-Hb-inadequate HIV-EU children) in all the baseline age groups.

That is:

- the overall chance for having always-inadequate Hb (unhealthy) status for an HIV-EI child was 80.0%; and, this was more than 57.1% in any age group;
- if the HIV-EI child was ever-identified with inadequate Hb, his/her chance of always remaining so was 94.1%; and, this was more than 80.0% in any age group;
- the overall chance for having always-inadequate Hb (unhealthy) status for an HIV-EU child was 55.2%; and, this chance decreased with the increase in the age of the HIV-EU child from 60.9% for 0-11 months to 38.8% for 36-47 months of age;
- if the HIV-EU child was ever-identified with inadequate Hb, his/her chance of always remaining so was 74.4%; and, this chance remained above 68.2% in all the age groups; and,
- those who were anemic tend to continue as anemic, higher among the HIV-EI children than the HIV-EU children.

55.6% of the male (from among the 75.3% of the initially-Hb-inadequate male children; or 73.8% of the initially-Hb-inadequate male children) and 57.4% of the female (from among the 74.4% of the initially-Hb-inadequate female children; or 77.2% of the initially-Hb-inadequate female children) children had always-inadequate Hb, while the remaining 19.7% of the male (or 26.2% of the initially-Hb-inadequate male children) and 17.0% of the female (or 25.6% of the initially-Hb-inadequate female children) children improved. Thus, the shares of the always-Hb-inadequate male and female children (among the respective total, and total initially-Hb-inadequate children, by gender) were near similar.

However, the share of the always-Hb-inadequate male children among the total male children decreased with the increase in the baseline age 0-35 months, but reverted back to near-year-1-level at the 36-47 months (0-11 months=59.3%, 12-23 months=55.6%, 24-35 months=45.5%, 36-47 months=60.7%); and their share among the initially-Hb-inadequate male children showed a fluctuating-but-increasing trend with the increase in the baseline age (0-11 months=72.7%, 12-23 months=75.8%, 24-35 months=64.5%, 36-47 months= 89.5%). On the other hand, the share of the always-Hb-inadequate female children among the total female children decreased with the increase in the baseline age, after an initial spike at the 12-23 months (0-11 months=65.6%, 12-23 months=71.2%, 24-35 months= 53.7%, 36-47 months=21.4%); and their share among the initially-Hb-inadequate female children decreased with the increase in the baseline age (0-11 months=83.3%, 12-23 months=82.2%, 24-35 months=74.4%, 36-47 months=46.2%). Thus, the share of the always-Hb-inadequate female children (among both the total female and the initially-Hb-inadequate female children) was higher than that of such male children (among both the total male and the initially-Hb-inadequate male children) in the baseline age of <36 months, while these shares of such male children were higher than those of such female children in the baseline age of >36 months.

That is:

- the overall chance for having always-inadequate Hb (unhealthy) status for a male child was 55.6%; and, this chance was more than 45.5% in any age group; and,
- if the male child was ever-identified with inadequate Hb, his chance of always remaining so was 73.8%; and, this was more than 64.5% in any age group; and,
- the overall chance for having always-inadequate Hb (unhealthy) status for a female child was 57.4%; and, this chance decreased with the increase in the age at the baseline from 65.6% for 0-11 months to 21.4% for 36-47 months of age; and,
- if the female child was ever-identified with inadequate Hb, her chance of always remaining so was 77.2%; and, this chance decreased with the increase in the age at the baseline from 83.3% for 0-11 months to 46.2% for 36-47 months of age; and,

- this suggested the near-equal chance for the male and the female child to remain unhealthy (inadequate Hb) always, and for them to regain the adequate Hb status, once they experienced an inadequate Hb in their 0-59 month life.

(d) Changes in the Hb status: The switch in the Hb status was due to the children either improving or dropping from their baseline Hb status. In the 12-24 months of follow-up, 18.3% of the HIV-exposed children (or 24.5% of the initially-Hb-inadequate HIV-exposed children) improved their initial inadequate Hb status, while 12.7% (or 50.5% of the initially-Hb-adequate HIV-exposed children) deteriorated from their initial adequate Hb status. As such, 31.0% of the HIV-exposed children had a chance to change their initial Hb status in the subsequent 12-24 months of life; and, there was nearly two-time higher chance for the initially-Hb-adequate children to deteriorate, compared to the initially-Hb-inadequate children's chance for improvement; but, the share of those improving was 1.5-times higher than that of those deteriorating in the total group of HIV-exposed children, because a majority of them had inadequate Hb status at the baseline.

Among the total HIV-exposed children, the share of those improving children was higher than that of those deteriorating in the <36 months of baseline age, while the share of those deteriorating was higher in the 36-47 months (0-11 months=18.3% and 11.3%, 12-23 months=16.5% and 13.4%, 24-35 months=21.4% and 10.2%, 36-47 months=16.1% and 19.6%; improving and deteriorating, respectively). The chance for the improvement was maximum in year 4, and that for the deterioration was maximum in year 5. As such, the share of the HIV-exposed children experiencing changes in the Hb status was highest among the baseline age of 36-47 months (35.7%), followed by 24-35 months (31.6%), 12-23 months (29.9%) and 0-11 months (29.6%) in the decreasing order.

However, by considering the share of the HIV-exposed children improving and deteriorating with respect to their initial Hb status, the share of those improving was lesser than that of those deteriorating in all the baseline age groups (0-11 months=22.8% and 57.1%, 12-23 months=20.5% and 68.4%, 24-35 months=30.0% and 35.7%, 36-47 months=28.1% and 45.8%; improving and deteriorating, respectively). In short, the HIV-

exposed children of the baseline age <36 months (years 1-4) had the share of the improving children more than that of those deteriorating; the share of the deteriorating children was more than that of those improving in the baseline age of 36-47 months (year 5); the maximum changes happened for the Hb status of baseline age 36-47 months in year 5, with near-equal chance for both the improvement and deterioration.

In the follow-up of 12-24 months, 5.0% of the HIV-EI children (or 5.9% of the initially-Hb-inadequate HIV-EI children) improved their initial inadequate Hb status, while 15.0% (or 100.0% of the initially-Hb-adequate HIV-EI children) deteriorated from their initial adequate Hb status. As such, 20.0% of the total HIV-EI children had a chance to change their initial Hb status in the subsequent 12-24 months of life.

Among the total HIV-EI children, the shares of those improving and deteriorating were 0.0% and 0.0%, 0.0% and 20.0%, 0.0% and 0.0%, 14.3% and 28.6% in the baseline age groups of 0-11, 12-23, 24-35 and 36-47 months, respectively. As such, the share of the HIV-EI children experiencing changes in the Hb status was 0.0%, 20.0%, 0.0% and 42.9% in the baseline age of <12, 12-23, 24-35 and 36-47 months (respectively).

However, the shares of the HI-EI children improving and deteriorating with respect to their initial Hb status were 0.0% and 0.0%, 0.0% and 100.0%, 0.0% and 0.0%, 20.0% and 100.0% in the baseline age groups of <12, 12-23, 24-35 and 36-47 months (respectively). Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children and in all the age groups.

In the 12-24 months of follow-up, 19.0% of the HIV-EU children (or 25.6% of the initially-Hb-inadequate HIV-EU children) improved their initial inadequate Hb status, while 12.6% (or 49.0% of the initially-Hb-adequate HIV-EU children) deteriorated from their initial adequate Hb status. As such, 31.6% of the HIV-EU children had a chance to change their initial Hb status in the subsequent 12-24 months of life, with the improvement more than

the deterioration; and, there was nearly two-time higher chance for the initially-Hb-adequate HIV-EU children to deteriorate, compared to the initially-Hb-inadequate HIV-EU children's chance for improvement (the trend was similar among the HIV-EI children, except for the ratio between the improvement and deterioration).

Among the total HIV-EU children, the share of those improving was higher than that of those deteriorating in the baseline age of <36 months, and lower than that of those deteriorating in the 36-47 months (0-11 months=18.8% and 11.6%, 12-23 months=17.4% and 13.0%, 24-35 months=22.3% and 10.6%, 36-47 months=16.3% and 18.4%; improving and deteriorating, respectively). The highest chance for the improvement and deterioration were in year 4 and respectively. The share of the HIV-EU children experiencing changes in the Hb status was highest among the baseline age of 36-47 months (34.7%), followed by 24-35 months (33.0%), and 0-23 months (30.4%) in the decreasing order.

However, by considering the shares of the HIV-EU children improving and deteriorating with respect to their initial Hb status, the share of those improving was lesser than that of those deteriorating in all the baseline age groups (0-11 months=23.6% and 57.1%, 12-23 months=21.6% and 66.7%, 24-35 months=31.8% and 35.7%, 36-47 months=29.6% and 40.9%; improving and deteriorating, respectively). In short, the HIV-EU children of the baseline age of <36 months (years 1-4) of age had the share of improving children more than that of those deteriorating; the share of the deteriorating children was more than that of those improving in the baseline age of 36-47 months (year 5); the maximum changes happened for the Hb status in year 5, with near-equal chance for both the improvement and deterioration.

In the follow-up of 12-24 months, 19.7% of the male children (or 26.2% of the initially-Hb-inadequate male children) improved their initial inadequate Hb status, while 15.2% (or 61.2% of the initially-Hb-adequate male children) deteriorated from their initial adequate Hb status. As such, 34.8% of the total male children had a chance to change their initial Hb status in the subsequent 12-24 months of life, with the improvement higher than the deterioration; and, there was nearly two-time higher chance for the initially-Hb-adequate

male children to deteriorate, compared to the initially-Hb-inadequate male children's chance for improvement.

Among the total male children, the share of those improving was higher than that of those deteriorating in the baseline age of 0-11 and 24-35 months (years 2 and 4), and lower in the 12-23 and 36-47 months (years 3 and 5; 0-11 months=22.2% and 13.6%, 12-23 months=17.8% and 20.0%, 24-35 months=25.0% and 13.6%, 36-47 months=7.1% and 14.3%; improving and deteriorating, respectively). The chance for the improvement was highest in year 4, and that for the deterioration was maximum in year 5. As such, the share of the male children experiencing changes in the Hb status was nearly-equally high in the baseline age of <36 months (0-11 months=35.8%, 12-23 months=37.8%, 24-35 months=38.6%) and low in the 36-47 months (21.4%).

However, by considering the shares of the male children improving and deteriorating with respect to their initial Hb status, the share of those improving was lesser than that of those deteriorating in all the baseline age groups (0-11 months=27.3% and 73.3%, 12-23 months=24.2% and 75.0%, 24-35 months=35.5% and 46.2%, 36-47 months=10.5% and 44.4%; improving and deteriorating, respectively). In short, the male children had two spikes of chance of improvement, one in the year 3 and the other in the year 5, while the chance for deterioration exceeded the chance of improvement in the remaining period; the maximum turbulence happened for the Hb status at baseline age of <36 months (years 1 to 4), which reduced to near-half in the year 5.

In the 12-24 months of follow, 16.9% of the female children (or 22.9% of the initially-Hb-inadequate female children; which was lower than that of the male children) improved their initial inadequate Hb status, while 10.3% (or 40.0% of the initially-Hb-adequate female children; which was lower than that of the male children) deteriorated from their initial adequate Hb status. As such, 27.4% of the total female children had a chance to change their initial Hb status in the subsequent 12-24 months of life (which was lower than that of the male children), with the improvement more than the deterioration (like the male children); and, there was nearly 1.5-time higher chance for the initially-Hb-adequate

female children to deteriorate, compared to the initially-Hb-inadequate female children's chance for improvement (the trend was similar among the male children, except for the magnitude of the deterioration which was higher for the male children; hence the chance of the female children to deteriorate from an adequate Hb status was lesser than that for the male children).

Among the total female children, the share of the improving female children was higher (1.5-2 times) than that of those deteriorating in the baseline age of <36 months, and equal to that of those deteriorating in the 36-47 months (0-11 months=13.1% and 8.2%, 12-23 months=15.4% and 7.7%, 24-35 months=18.5% and 7.4%, 36-47 months=25.0% and 25.0%; improving and deteriorating, respectively; unlike the male children's). The chance for the improvement and deterioration were the highest in year 5 (unlike the male children). The share of the female children experiencing changes in the Hb status was the highest in the year 5 and was near-equally low in the years 0-4 (0-11 months=21.3%, 12-23 months=23.1%, 24-35 months=25.9, 36-47 months=50.0%; unlike the male children).

However, by considering the shares of the female children improving and deteriorating with respect to their initial Hb status, the shares of those improving female children were lesser than, nearly-equal to and higher than that of those deteriorating in the baseline age of <24, 24-35 and 36-47 months (0-11 months=16.7% and 38.5%, 12-23 months=17.8% and 57.1%, 24-35 months=25.6% and 26.7%, 36-47 months=53.8% and 46.7%; improving and deteriorating, respectively; unlike the male children). In short, the female children had gradually increased (with age) and higher chance for the improvement of their Hb status in all age groups, which reached its maximum in the year 5; the maximum turbulence happened for the Hb status in the baseline age of 36-47 months (year 5), which was nearly double that in the years 0-4 (unlike that for the male children).

4.5. The patterns of acute morbidity.

The acute morbidity outcomes in terms of its presence, burden, and types were ascertained among the HIV-exposed children, grossly, and by age groups and trajectory of changes.

The picture of morbidities detailed for the HIV-EI children in the sections below also represented the status, burden, and types of opportunistic infections among them.

4.5.1. The gross patterns of acute morbidity.

There were assessments of acute morbidities for all the children (0-59 months) on every data collection schedule. The total number of morbidities were divided by the duration of follow-up of each child (duration from recruitment to the last successful data collection visit), to generate a variable 'number of acute morbidities per month of follow-up', to denote both the magnitude and persistence of acute morbidity among them. The children were categorized into 'nil morbidity', '<0.5 morbidity/month' and '≥0.5 morbidity/month' (equivalent to 0, <1 and >1 morbidity in two months' time period), in the graver (disadvantaged) group of morbidity, while analyzing the 'ever morbid children'. The characteristics of the unique children ever identified as morbid are described in table 40.

There were no acute morbidities reported ever for one-fifth (20.8%) of all the HIV-exposed children; while the remaining had experienced at least one morbidity during the study period (79.2%; HIV-EI: male=81.8%, female=84.6%, total=82.9%; HIV-EU: male= 78.7%, female=79.4%, total=79.0%; total: male=78.9%, female=79.6%). As such, there was a near-equal share of ever morbid children among the sub-groups by HIV status and gender. 62.9% of all the children (or 79.3% of the morbid children) experienced acute morbidities amounting to <0.5 morbidity/month (HIV-EI: male=40.9%, female= 46.2%, total=42.9%; HIV-EU: male=62.9%, female=65.2%, total=64.0%; total: male= 61.4%, female=64.4%); while 16.4% of all the children (20.7% of the morbid children) had ≥0.5 morbidity/month (20.7% of morbid children; HIV-EI: male=40.9%, female=38.5%, total= 40.0%; HIV-EU: male=15.9%, female=14.2%, total=15.0%; total: male=17.5%, female= 15.2%). Compared to each other, a higher share of the HIV-EI children had ≥0.5 morbidity/ month, and a higher share of the HIV-EU children had <0.5 morbidity/month, despite harbouring a near-equal share of morbid children among them. That is, the chance of the child to be morbid was the same in the HIV-EI and the HIV-EU groups, but the burden of

Table 40. Unique children (0-59 months) ever identified with acute morbidity.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Acute disease events report-ed per month of follow-up	No morbidity	18.2	15.4	17.1	21.3	20.6	21.0	21.1	20.4	137	20.8
	<0.5 per month	40.9	46.2	42.9	62.9	65.2	64.0	61.4	64.4	415	62.9
	≥0.5 per month	40.9	38.5	40.0	15.9	14.2	15.0	17.5	15.2	108	16.4
	Total	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

Table 41. Mean acute morbidity events per month of follow-up by age, gender, and HIV status of children.

Characteristics	Male			Female			Total		
	HIV-EI	HIV-EU	Total	HIV-EI	HIV-EU	Total	HIV-EI	HIV-EU	Total
<12 months	0.39	0.32	0.32	0.57	0.29	0.30	0.47	0.31	0.31
12-23 months	0.26	0.21	0.22	0.11	0.26	0.26	0.21	0.24	0.24
24-35 months	0.12	0.19	0.18	0.21	0.22	0.22	0.16	0.21	0.20
36-47 months	0.39	0.27	0.29	0.19	0.23	0.23	0.32	0.25	0.26
48+ months	0.42	0.25	0.26	0.53	0.22	0.22	0.46	0.23	0.24
Total	0.33	0.26	0.27	0.32	0.25	0.25	0.33	0.26	0.26

morbidity events were higher among the HIV-EI children. There was no much difference in the burden of acute morbidities by gender.

The mean number of acute morbidities among the HIV-exposed children per month was 0.26 (HIV-EI: male=0.33, female=0.32, total=0.33; HIV-EU: male=0.26, female=0.25, total=0.26; total: male=0.27, female=0.25); this was higher for the HIV-EI children

compared to the HIV-EU children (Table 41). The mean number of acute morbidities decreased for all the categories of children by gender and HIV status in the 0-35 months of age (except for the female HIV-EI children, for whom the mean value decreased in 0-23 months of age and increased in 24-35 months of age, possibly due to the smaller numbers of them included in the study) and then increased in 36-47 months of age. In the 48+ months of age, the mean value increased again for the HIV-EI children (male and female), while it decreased for the HIV-EU children (male and female). This meant that the morbidity events had two larger peaks for the HIV-EI children, in 0-11 and 48+ months; and one larger and one smaller peak for the HIV-EU children, in 0-11 and 36-47 months (respectively). The HIV-EI children and the male children tend to have more morbidity events in years 1, 4 and 5 of the life, while the HIV-EU children and the female children tend to have it more in the years 2 and 3.

4.5.2. The patterns of acute morbidity in various age cross-sections.

The results of the morbidity assessments were classified into children with nil, single, and multiple acute morbidities. Every child reaching a particular age cross-section ever during the study, for whom (an) assessment(s) was/were available, was included in the analysis of total assessments made for that age cross-section. As such, a child might be counted in different age cross-sections and for multiple times of assessments.

The status of morbidity among the total assessments in the various age cross-sections is given in table 42 and figure 75. Grossly, around one-third (32.9%) of all the morbidity assessments (N=4671) done for the HIV-exposed children of 0-59 months of age (N=1390) had identified a morbidity status. The share of the assessments which revealed a morbidity status was nearly equal in all the age groups, except in the 12-23 months of age when it was slightly higher (0-11 months=30.4%, 12-23 months=37.4%, 24-35 months=32.0%, 36-47 months=33.3%, 48+ months=32.0%), which meant near-equal chance for the child to be morbid in all age groups.

Table 42. Morbidity assessments in various age cross-sections of children, by gender, HIV, and morbidity status.

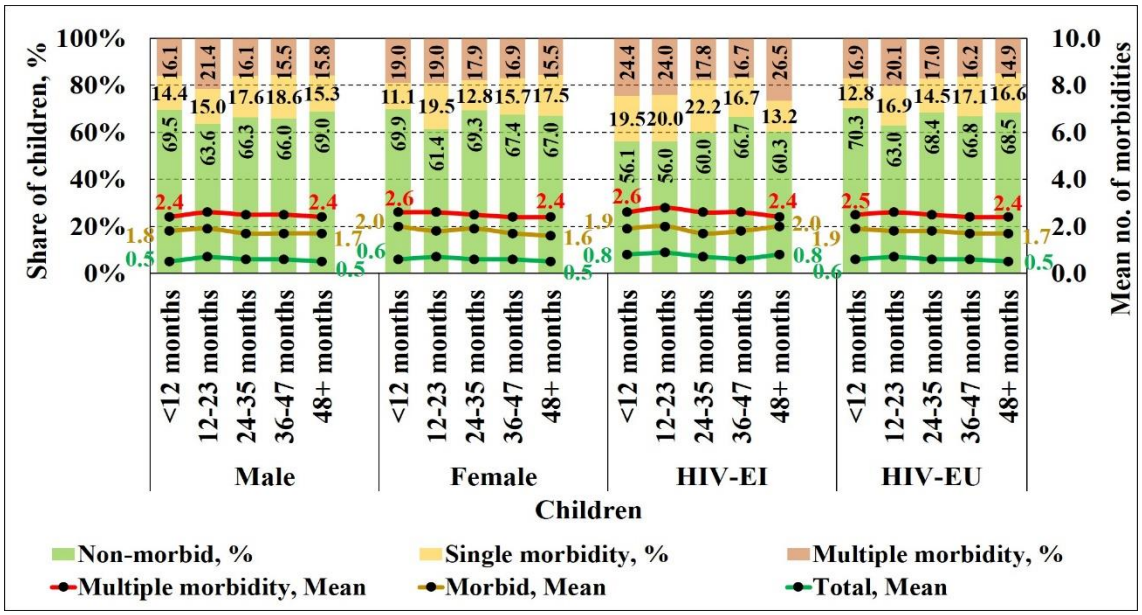
Age group	Gender	HIV status	No. of children	No. of assessments done	Non-morbid	Morbidity			Morbid		Total
						Single	Multiple				
					%	%	%	Mean	%	Mean	Mean
<12 months	Male	HIV-EI	6	21	66.7	19.0	14.3	2.0	33.3	1.4	0.5
		HIV-EU	116	526	69.6	14.3	16.2	2.4	30.4	1.8	0.5
		Total	122	547	69.5	14.4	16.1	2.4	30.5	1.8	0.5
	Female	HIV-EI	4	20	45.0	20.0	35.0	2.9	55.0	2.2	1.2
		HIV-EU	88	332	71.4	10.5	18.1	2.6	28.6	2.0	0.6
		Total	92	352	69.9	11.1	19.0	2.6	30.1	2.0	0.6
	Total	HIV-EI	10	41	56.1	19.5	24.4	2.6	43.9	1.9	0.8
		HIV-EU	204	858	70.3	12.8	16.9	2.5	29.7	1.9	0.6
		Total	214	899	69.6	13.1	17.2	2.5	30.4	1.9	0.6
12-23 months	Male	HIV-EI	9	36	50.0	22.2	27.8	2.5	50.0	1.8	0.9
		HIV-EU	133	431	64.7	14.4	20.9	2.6	35.3	1.9	0.7
		Total	142	467	63.6	15.0	21.4	2.6	36.4	1.9	0.7
	Female	HIV-EI	4	14	71.4	14.3	14.3	4.0	28.6	2.5	0.7
		HIV-EU	122	401	61.1	19.7	19.2	2.5	38.9	1.8	0.7
		Total	126	415	61.4	19.5	19.0	2.6	38.6	1.8	0.7
	Total	HIV-EI	13	50	56.0	20.0	24.0	2.8	44.0	2.0	0.9
		HIV-EU	255	832	63.0	16.9	20.1	2.6	37.0	1.8	0.7
		Total	268	882	62.6	17.1	20.3	2.6	37.4	1.8	0.7
24-35 months	Male	HIV-EI	10	27	44.4	37.0	18.5	2.8	55.6	1.6	0.9
		HIV-EU	133	365	67.9	16.2	15.9	2.5	32.1	1.7	0.6
		Total	143	392	66.3	17.6	16.1	2.5	33.7	1.7	0.6
	Female	HIV-EI	5	18	83.3	0.0	16.7	2.3	16.7	2.3	0.4
		HIV-EU	150	468	68.8	13.2	17.9	2.5	31.2	1.9	0.6
		Total	155	486	69.3	12.8	17.9	2.5	30.7	1.9	0.6

Age group	Gender	HIV status	No. of children	No. of assessments done	Non-morbid	Morbidity			Morbid		Total
						Single	Multiple				
					%	%	%	Mean	%	Mean	Mean
	Total	HIV-EI	15	45	60.0	22.2	17.8	2.6	40.0	1.7	0.7
		HIV-EU	283	833	68.4	14.5	17.0	2.5	31.6	1.8	0.6
		Total	298	878	68.0	14.9	17.1	2.5	32.0	1.8	0.6
36-47 months	Male	HIV-EI	13	33	69.7	12.1	18.2	2.8	30.3	2.1	0.6
		HIV-EU	139	355	65.6	19.2	15.2	2.5	34.4	1.6	0.6
		Total	152	388	66.0	18.6	15.5	2.5	34.0	1.7	0.6
	Female	HIV-EI	6	15	60.0	26.7	13.3	2.0	40.0	1.3	0.5
		HIV-EU	157	430	67.7	15.3	17.0	2.4	32.3	1.7	0.6
		Total	163	445	67.4	15.7	16.9	2.4	32.6	1.7	0.6
	Total	HIV-EI	19	48	66.7	16.7	16.7	2.6	33.3	1.8	0.6
		HIV-EU	296	785	66.8	17.1	16.2	2.4	33.2	1.7	0.6
		Total	315	833	66.7	17.0	16.2	2.5	33.3	1.7	0.6
48+ months	Male	HIV-EI	10	43	60.5	16.3	23.3	2.7	39.5	2.0	0.8
		HIV-EU	134	560	69.6	15.2	15.2	2.4	30.4	1.7	0.5
		Total	144	603	69.0	15.3	15.8	2.4	31.0	1.7	0.5
	Female	HIV-EI	7	25	60.0	8.0	32.0	2.1	40.0	1.9	0.8
		HIV-EU	144	551	67.3	18.0	14.7	2.4	32.7	1.6	0.5
		Total	151	576	67.0	17.5	15.5	2.4	33.0	1.6	0.5
	Total	HIV-EI	17	68	60.3	13.2	26.5	2.4	39.7	2.0	0.8
		HIV-EU	278	1111	68.5	16.6	14.9	2.4	31.5	1.7	0.5
		Total	295	1179	68.0	16.4	15.6	2.4	32.0	1.7	0.5
0-5 years	Male	HIV-EI	48	160	58.1	20.6	21.3	2.6	41.9	1.8	0.7
		HIV-EU	655	2237	67.8	15.6	16.6	2.5	32.2	1.8	0.6
		Total	703	2397	67.1	15.9	16.9	2.5	32.9	1.8	0.6
	Femal	HIV-EI	26	92	63.0	13.0	23.9	2.5	37.0	2.0	0.7
		HIV-EU	661	2182	67.2	15.6	17.2	2.5	32.8	1.8	0.6

Age group	Gender	HIV status	No. of children	No. of assessments done	Non-morbid	Morbidity			Morbid		Total
						Single	Multiple				
					%	%	%	Mean	%	Mean	Mean
		Total	687	2274	67.0	15.5	17.5	2.5	33.0	1.8	0.6
	Total	HIV-EI	74	252	59.9	17.9	22.2	2.6	40.1	1.9	0.7
		HIV-EU	1316	4419	67.5	15.6	16.9	2.5	32.5	1.8	0.6
		Total	1390	4671	67.1	15.7	17.2	2.5	32.9	1.8	0.6

Mean=Mean morbidities reported per assessment. All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

Fig. 75. Share of morbidity assessments by morbidity status and mean number of morbidities.



Mean=Mean morbidities reported per assessment. N of assessments: Male: N1=<12 months=547, N2=12-23 months=467, N3=24-35 months=392, N4=36-47 months=388, N5=48+ months=603; Female: N1=352, N2=415, N3=486, N4=445, N5=576; HIV-EI: N1=41, N2=50, N3=45, N4=48, N5=68; HIV-EU: N1=858, N2=832, N3=833, N4=785, N5=1111.

The shares of the children with single and multiple morbidities were 15.7% and 17.2% among all the assessments for all the HIV-exposed children. The share of the assessments which identified single and multiple morbidities remained nearly constant across all age groups; both increased slightly in the 12-23 months; the former increased again in the 36-47 months after dropping in the 24-35 months, while the latter decreased in the 24+ months of age (0-11 months=13.1% and 17.2%, 12-23 months=17.1% and 20.3%, 24-35 months=14.9% and 17.1%, 36-47 months=17.0% and 16.2%, 48+ months=16.4% and 15.6%; respectively). As such, comparatively, the share of the assessments which identified multiple morbidities were higher during 0-35 months (meant more children with multiple morbidities and fewer children with single morbidity in the younger age), while the share of the assessments which identified single morbidity was higher during 36+ months (meant decreasing multi-morbid children and increasing children with single morbidity, in the higher ages).

In the 0-5 year children, the mean number of morbidity events among the children with multiple morbidities per assessment was 2.5. This remained slow nearly constant but tended to decrease very slowly, across the yearly cross-sectional ages, except for a slight increase in the 12-23 months of age, which coincided with the increased share of morbid children in this age (0-11 months=2.5; 12-23 months=2.6; 24-35 months=2.5; 36-47 months=2.5; 48+ months=2.4). As such, there was the slightly lesser burden of morbidity events among the children with multiple morbidities in the higher (24+ months) age. The mean number of morbidity events among all and morbid children were 0.6 and 1.8 per assessment, in the 0-59 months of age.

Of the total, 252 (5.4%) assessments were made for the 74 HIV-EI children (0-59 months); 40.1% of these assessments exposed a morbid status. The share of the assessments which revealed a morbidity status remained nearly equal in the 0-23 months of age, and then decreased in the 24-47 months of age, and increased further in the 48+ months of age (0-11 months=43.9%, 12-23 months=44.0%, 24-35 months=40.0%, 36-47 months=33.3%, 48+ months=39.7%). However, it showed a declining trend with increasing age of the

child, which meant a lesser chance for the HIV-EI children to be morbid in the higher age groups, despite the second spike of this chance in the 48+ months of age.

The shares of the children with single and multiple morbidities were 17.9% and 22.2% among all the assessments for the HIV-EI children. The share of the assessments which identified single morbidity increased in the 0-35 months and then decreased in the 36+ months of age; while, the share of the assessments which identified multiple morbidities decreased in the 0-47 months, and then increased in the 48+ months of age to become nearly two-time higher than the share of assessments which identified single morbidity; in between, during the 36-47 months, both were equal (0-11 months=19.5% and 24.4%, 12-23 months=20.0% and 24.0%, 24-35 months=22.2% and 17.8%, 36-47 months=16.7% and 16.7%, 48+ months=13.2% and 26.5%; respectively). As such, comparatively, the share of the assessments which identified multiple morbidities were higher during the 0-23 and 48+ months (meant more children were affected with multiple morbidities in these age groups), while the share of the assessments which identified single morbidity was higher during the 24-47 months (meant fewer children were affected with multiple morbidities in this age group). This drew a pattern of two peaks of the burden of multiple morbidities, in the 0-23 and 48+ months of age, among the HIV-EI children.

In the 0-5 year HIV-EI children, the mean number of morbidity events among the children with multiple morbidities per assessment was 2.6. This showed a slow-declining trend over the yearly cross-sectional ages, except for a slight increase in the 12-23 months of age (0-11 months=2.6; 12-23 months=2.8; 24-35 months=2.6; 36-47 months=2.6; 48+ months=2.4). As such, there was a lesser burden of morbidity events among the children with multiple morbidities in the higher (24+ months) age. The mean number of morbidity events among all and the morbid children were 0.7 and 1.9 per assessment, in the 0-59 months of age.

Of the total, 4419 (94.6%) assessments were made for the 1316 HIV-EU children (0-59 months); 32.5% of these assessments exposed a morbid status. The share of the assessments which revealed a morbidity status fluctuated with two small-but-full spikes (in the 12-23

and 36-47 months) and drops (0-11 months=29.7%, 12-23 months=37.0%, 24-35 months=31.6%, 36-47 months=33.2%, 48+ months=31.5%). However, it showed an increasing trend with increasing age of the child, which meant a higher chance for the HIV-EU children to be morbid in the higher age groups, especially in years 2 and 4 of their life.

The shares of the children with single and multiple morbidities were 15.6% and 16.9% among all the assessments for the HIV-EU children. The share of the assessments which identified single morbidity fluctuated with two small-but-full spikes (in the 12-23 and 36-47 months) and drops; while, the share of the assessments which identified multiple morbidities increased in the 12-23 months, and then decreased in the 24+ months of age (0-11 months=12.8% and 16.9%, 12-23 months=16.9% and 20.1%, 24-35 months=14.5% and 17.0%, 36-47 months=17.1% and 16.2%, 48+ months=16.6% and 14.9%; respectively). As such, comparatively, the share of the assessments which identified multiple morbidities were higher during the 0-35 months (meant more children were affected with multiple morbidities in the younger age group), while the share of the assessments which identified single morbidity was higher during the 36+ months (meant fewer children were affected with multiple morbidities in the higher age group).

In the 0-5 year HIV-EU children, the mean number of morbidity events among the children with multiple morbidities per assessment was 2.5. This showed a slow-declining trend over the yearly cross-sectional ages, except for a slight increase in the 12-23 months of age (0-11 months=2.5; 12-23 months=2.6; 24-35 months=2.5; 36-47 months=2.4; 48+ months=2.4). As such, there was a lesser burden of morbidity events among the children with multiple morbidities in the higher (24+ months) age. The mean number of morbidity events among all and the morbid children were 0.6 and 1.8 per assessment, in the 0-59 months of age.

As such, compared to the HIV-EU counterpart:

- the chance of being of morbid was higher for the HIV-EI children in the 0-5 years, and in all the age groups except in the 36-47 months of age when it was near-equal;

- the chance of having single morbidity was higher for the HIV-EI children in the 0-47 months of age and lower in the 48+ months of age;
- the chance of having multiple morbidities was higher for the HIV-EI children in all the age groups; and,
- the mean number of morbidities among the children with multiple morbidities were slightly higher in the HIV-EI children in the 0-47 months of age, but equal in the 48+ months of age.

2397 (51.3%) of the total assessments were made on the 703 male children (0-59 months), to reveal morbidity status among 32.9% of assessments. The share of the assessments which revealed a morbidity status increased in the 12-23 months, and then showed a slow declining trend in the 24+ months of age (0-11 months=30.5%, 12-23 months=36.4%, 24-35 months=33.7%, 36-47 months=34.0%, 48+ months=31.0%). This meant a lower chance for the male children to be morbid in the higher (24+ months) ages.

The shares of the children with single and multiple morbidities were 15.9% and 16.9% among all the assessments for the male children. The share of the assessments which identified single morbidity increased in the 0-47 months of age and then declined in the 48+ months of age; while, the share of the assessments which identified multiple morbidities increased in the 12-23 months, and then decreased in the 24-35 months to remain nearly constant in the 36+ months of age; both these shares tend to be near-equal in the 48+ months of age (0-11 months=14.4% and 16.1%, 12-23 months=15.0% and 21.4%, 24-35 months=17.6% and 16.1%, 36-47 months=18.6% and 15.5%, 48+ months=15.3% and 15.8%; respectively). As such, comparatively, the share of the assessments which identified multiple morbidities were higher during the 0-23 months (meant more children were affected with multiple morbidities in the younger age group), while the share of the assessments which identified single morbidity was higher during the 24-47 months (meant less multiple morbidities in the higher age group).

In the 0-5 year male children, the mean number of morbidity events among the children with multiple morbidities per assessment was 2.5. This showed a slow-declining trend over

the yearly cross-sectional ages, except for a slight increase in the 12-23 months of age (0-11 months=2.4; 12-23 months=2.6; 24-35 months=2.5; 36-47 months=2.5; 48+ months=2.4). As such, there was a lesser burden of morbidity events among the children with multiple morbidities in the higher (24+ months) age. The mean number of morbidity events among all and the morbid children were 0.6 and 1.8 per assessment, in the 0-59 months of age.

For the 2274 female children (0-59 months), 687 (48.7%) assessments were made, to identify morbidity status among 33.0% of the assessments. The share of the assessments which revealed a morbidity status increased in the 12-23 months, decreased in the 24-35 months and then slowly increased in the 36+ months (0-11 months=30.1%, 12-23 months= 38.6%, 24-35 months=30.7%, 36-47 months=32.6%, 48+ months=33.0%). However, it showed an increasing trend with the increasing age of the child, which meant a higher chance for the female children to be morbid in the higher age groups, especially in years 2, 4 and 5 of their life.

The shares of the children with single and multiple morbidities were 15.5% and 17.5% among all the assessments for the female children. The share of the assessments which identified single morbidity increased in the 12-23 months, decreased in the 24-35 months and then slowly increased in the 36+ months; while, the share of the assessments which identified multiple morbidities remained constant in the 0-23 months, and then slowly decreased in the 24+ months of age (0-11 months=11.1% and 19.0%, 12-23 months=19.5% and 19.0%, 24-35 months=12.8% and 17.9%, 36-47 months=15.7% and 16.9%, 48+ months=17.5% and 15.5%; respectively). As such, comparatively, the share of the assessments which identified multiple morbidities were higher during the 0-11 and 24-47 months (meant more multiple morbidities in these age groups), while the share of the assessments which identified single morbidity was higher during the 12-23 and 48+ months (meant less multiple morbidities in these age groups).

In the 0-5 year female children, the mean number of morbidity events among the children with multiple morbidities per assessment was 2.5. This showed a slow-declining trend in

the 24+ months of age, after a near-constant situation in the 0-23 months (0-11 months=2.6; 12-23 months=2.6; 24-35 months=2.5; 36-47 months=2.4; 48+ months=2.4). As such, there was a lesser burden of the morbidity events among the children with multiple morbidities in the higher (24+ months) age. The mean number of morbidity events among all and the morbid children were 0.6 and 1.8 per assessment, in the 0-59 months of age.

As such, compared to the female counterpart:

- the chance of being morbid was near-equal for the male children in all the age groups;
- the chance of having single morbidity was higher for the male children in the 0-11 and 24-47 months of age, and lower in the 12-23 and 48+ months of age;
- the chance of having multiple morbidities was higher for the male children in the 12-23 months of age, and lower in the 0-11 and 24-47months of age, and near-equal in the 48+ months of age; and,
- the mean number of morbidities among the children with multiple morbidities were slightly higher in the female children in the 0-11 months of age, but equal in 12+ months of age.

The share of the types of various acute morbidities by events identified is given in table 43. From the 1538 assessments which identified morbidity, a total of 1743 events of morbidity were identified. Among all the children of age 0-59 months, the morbidities identified were ARI (60.2%), ADD (14.7%), FUO (13.6%), skin/mucosal conditions/ infections (9.5%), worm infestation (1.3%), tuberculosis (TB; 0.3%) and others (0.3%). The results of the patterns of the types of acute morbidities are given below:

- In all the categories of HIV-exposed children (by age, gender, and HIV status), the share of the:
    - ARI and ADD together formed more than half of all the acute morbidities (minimum total share=51.7%, for the 12-23 month HIV-EI children);
    - ARI, ADD and skin/mucosal conditions/infections formed more than three-quarters of all the acute morbidities (minimum total share=79.0%, for the 36-47 month female children); and,

Table 43. Share of types of acute morbidities among children by events.

Age group	Category	No. of assessments which identified morbidity	Total events	ADD	ARI	Fever, unknown origin	Skin/mucosal condition/infection	TB	Worm infestation	Others
<12 months	Male	167	189	25.9	51.9	15.9	5.8	0.5	0.0	0.0
	Female	106	125	31.2	57.6	8.0	2.4	0.0	0.0	0.8
	HIV-EI	18	22	27.3	45.5	18.2	9.1	0.0	0.0	0.0
	HIV-EU	255	292	28.1	54.8	12.3	4.1	0.3	0.0	0.3
	Total	273	314	28.0	54.1	12.7	4.5	0.3	0.0	0.3
12-23 months	Male	170	193	19.2	60.6	10.4	9.3	0.0	0.5	0.0
	Female	160	184	18.5	57.1	16.3	6.0	0.5	1.6	0.0
	HIV-EI	22	29	10.3	41.4	13.8	31.0	0.0	3.4	0.0
	HIV-EU	308	348	19.5	60.3	13.2	5.7	0.3	0.9	0.0
	Total	330	377	18.8	58.9	13.3	7.7	0.3	1.1	0.0
24-35 months	Male	132	149	14.1	61.1	12.1	10.1	0.7	1.3	0.7
	Female	149	173	16.8	59.0	12.7	9.8	0.0	1.7	0.0
	HIV-EI	18	22	18.2	36.4	4.5	36.4	4.5	0.0	0.0
	HIV-EU	263	300	15.3	61.7	13.0	8.0	0.0	1.7	0.3
	Total	281	322	15.5	59.9	12.4	9.9	0.3	1.6	0.3
36-47 months	Male	132	146	6.8	67.8	15.8	6.8	0.7	1.4	0.7
	Female	145	162	8.0	57.4	17.9	13.6	0.6	2.5	0.0
	HIV-EI	16	21	9.5	61.9	9.5	19.0	0.0	0.0	0.0
	HIV-EU	261	287	7.3	62.4	17.4	9.8	0.7	2.1	0.3
	Total	277	308	7.5	62.3	16.9	10.4	0.6	1.9	0.3
48+ months	Male	187	209	7.2	64.6	12.9	12.9	0.5	1.4	0.5
	Female	190	213	4.7	64.8	13.1	14.6	0.0	2.3	0.5

Age group	Category	No. of assessments which identified morbidity	Total events	ADD	ARI	Fever, unknown origin	Skin/mucosal condition/infection	TB	Worm infestation	Others
	HIV-EI	27	35	11.4	57.1	11.4	17.1	2.9	0.0	0.0
	HIV-EU	350	387	5.4	65.4	13.2	13.4	0.0	2.1	0.5
	Total	377	422	5.9	64.7	13.0	13.7	0.2	1.9	0.5
0-5 years	Male	788	886	14.9	60.9	13.3	9.1	0.5	0.9	0.3
	Female	750	857	14.6	59.5	13.9	9.8	0.2	1.8	0.2
	HIV-EI	101	129	14.7	48.8	11.6	22.5	1.6	0.8	0.0
	HIV-EU	1437	1614	14.7	61.2	13.8	8.4	0.2	1.4	0.3
	Total	1538	1743	14.7	60.2	13.6	9.5	0.3	1.3	0.3

All values mentioned are percentages unless otherwise specified; all percentages are with respect to horizontal row total.

  - ARI, ADD, skin/mucosal conditions/infections and FUO together formed more than 95% of all acute morbidities (minimum total share=95.5%, for the HIV-EI children of age 24-35 months).

- With the increase in the age of the child, the share of the:
  - the ADD events decreased (0-11 months=28.0%, 12-23 months=18.8%, 24-35 months=15.5%, 36-47 months=7.5%, 48+ months=5.9%);
  - the ARI events increased (0-11 months=54.1%, 12-23 months=58.9%, 24-35 months=59.9%, 36-47 months=62.3%, 48+ months=64.7%);
  - the FUO events remained nearly constant (0-11 months=12.7%, 12-23 months=13.3%, 24-35 months=12.4%, 36-47 months=16.9%, 48+ months= 13.0%); and,
  - the skin/mucosal conditions/infections increased (0-11 months=4.5%, 12-23 months=7.7%, 24-35 months=9.9%, 36-47 months=10.4%, 48+ months=13.7%).

- Compared to the female counterpart, the male children tend to have:
    - lower share of the events of ADD (male=25.9%, female=31.2%) and ARI (male=51.9%, female=57.6%), and higher share of the events of FUO (male=15.9%, female=8.0%) in the age group of 0-11 months;
    - lower share of the events of FUO (male=10.4%, female=16.3%) in the age group of 12-23 months; and,
    - higher share of the events of ARI (male=67.8%, female=57.4%) and lower share of the events of dermatological conditions (male=6.8%, female= 13.6%) in the age group of 36-47 months.

The share of the rest of the acute morbidities was nearly-equally distributed in the categories of children by gender and age. However, the differentials between the HIV-EI and HIV-EU children were not compared due to the smaller number of morbidity events in the HIV-EI group, which could drastically influence the shares. Still, TB was reported from among the HIV-EI children, considerably over and above that reported from among the HIV-EU children, in the age groups of 24-35 and 48+ months, and among the total children of 0-59 months of age.

4.5.3. The patterns of the trajectory of acute morbidity status.

The trajectory of the morbidity status of the unique children (0-47 months of age) through the 12-24 months of their subsequent life, categorized in the graver group of morbidity, is given in table 44 and figure 76. The trajectory of the unique children by category of morbidity status (single and multiple) was not attempted due to the small numbers figuring in each category. However, the detailed matrix of the number of children by morbidity status, age, gender, and HIV status is given in annexure 10.

(a) Baseline scenario: At the baseline, 57.1% of the total children were having acute morbidities. The share of the total children with acute morbidities decreased with the increase in the age of the child in the baseline age of 0-35 months but showed signs of reversal in the 36-47 months (0-11 months=60.5%, 12-23 months=57.7%, 24-35

Table 44. The pattern of the trajectory of acute morbidities among unique children.

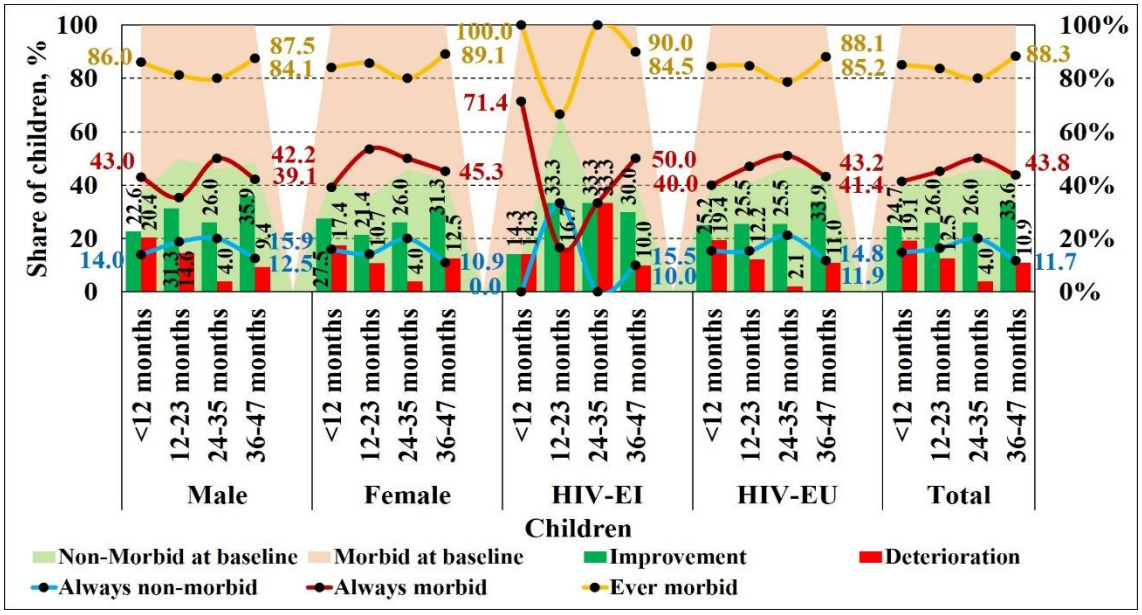
Characteristics			No. of children		At baseline		Morbidity status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice assessed	Non-morbid	Morbid	Always non-morbid	Always morbid	Deterioration	Improvement	Ever morbid
<12 months	Male	HIV-EI	6	5	20.0	80.0	0.0	60.0	20.0	20.0	100.0
		HIV-EU	116	88	37.5	62.5	14.8	42.0	22.7	20.5	85.2
		Total	122	93	36.6	63.4	14.0	43.0	22.6	20.4	86.0
	Female	HIV-EI	4	2	0.0	100.0	0.0	100.0	0.0	0.0	100.0
		HIV-EU	88	67	44.8	55.2	16.4	37.3	28.4	17.9	83.6
		Total	92	69	43.5	56.5	15.9	39.1	27.5	17.4	84.1
	Total	HIV-EI	10	7	14.3	85.7	0.0	71.4	14.3	14.3	100.0
		HIV-EU	204	155	40.6	59.4	15.5	40.0	25.2	19.4	84.5
		Total	214	162	39.5	60.5	14.8	41.4	24.7	19.1	85.2
12-23 months	Male	HIV-EI	4	4	50.0	50.0	25.0	25.0	25.0	25.0	75.0
		HIV-EU	45	44	50.0	50.0	18.2	36.4	31.8	13.6	81.8
		Total	49	48	50.0	50.0	18.8	35.4	31.3	14.6	81.3
	Female	HIV-EI	2	2	100.0	0.0	50.0	0.0	50.0	0.0	50.0
		HIV-EU	56	54	33.3	66.7	13.0	55.6	20.4	11.1	87.0
		Total	58	56	35.7	64.3	14.3	53.6	21.4	10.7	85.7
	Total	HIV-EI	6	6	66.7	33.3	33.3	16.7	33.3	16.7	66.7
		HIV-EU	101	98	40.8	59.2	15.3	46.9	25.5	12.2	84.7
		Total	107	104	42.3	57.7	16.3	45.2	26.0	12.5	83.7
24-35 months	Male	HIV-EI	3	3	33.3	66.7	0.0	33.3	33.3	33.3	100.0
		HIV-EU	53	47	46.8	53.2	21.3	51.1	25.5	2.1	78.7
		Total	56	50	46.0	54.0	20.0	50.0	26.0	4.0	80.0
	Female	HIV-EI	3	3	33.3	66.7	0.0	33.3	33.3	33.3	100.0

Characteristics			No. of children		At baseline		Morbidity status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice assessed	Non-morbid	Morbid	Always non-morbid	Always morbid	Deterioration	Improvement	Ever morbid
		HIV-EU	53	47	46.8	53.2	21.3	51.1	25.5	2.1	78.7
		Total	56	50	46.0	54.0	20.0	50.0	26.0	4.0	80.0
	Total	HIV-EI	6	6	33.3	66.7	0.0	33.3	33.3	33.3	100.0
		HIV-EU	106	94	46.8	53.2	21.3	51.1	25.5	2.1	78.7
		Total	112	100	46.0	54.0	20.0	50.0	26.0	4.0	80.0
36-47 months	Male	HIV-EI	7	6	33.3	66.7	16.7	66.7	16.7	0.0	83.3
		HIV-EU	62	58	50.0	50.0	12.1	39.7	37.9	10.3	87.9
		Total	69	64	48.4	51.6	12.5	42.2	35.9	9.4	87.5
	Female	HIV-EI	4	4	50.0	50.0	0.0	25.0	50.0	25.0	100.0
		HIV-EU	67	60	41.7	58.3	11.7	46.7	30.0	11.7	88.3
		Total	71	64	42.2	57.8	10.9	45.3	31.3	12.5	89.1
	Total	HIV-EI	11	10	40.0	60.0	10.0	50.0	30.0	10.0	90.0
		HIV-EU	129	118	45.8	54.2	11.9	43.2	33.9	11.0	88.1
		Total	140	128	45.3	54.7	11.7	43.8	33.6	10.9	88.3
0-4 years	Male	HIV-EI	20	18	33.3	66.7	11.1	50.0	22.2	16.7	88.9
		HIV-EU	276	237	44.7	55.3	16.0	42.2	28.7	13.1	84.0
		Total	296	255	43.9	56.1	15.7	42.7	28.2	13.3	84.3
	Female	HIV-EI	13	11	45.5	54.5	9.1	36.4	36.4	18.2	90.9
		HIV-EU	264	228	41.7	58.3	15.4	46.9	26.3	11.4	84.6
		Total	277	239	41.8	58.2	15.1	46.4	26.8	11.7	84.9
	Total	HIV-EI	33	29	37.9	62.1	10.3	44.8	27.6	17.2	89.7
		HIV-EU	540	465	43.2	56.8	15.7	44.5	27.5	12.3	84.3

Characteristics			No. of children		At baseline		Morbidity status in the subsequent 12-24 months of age				
Age	Gender	HIV status	Total	Twice assessed	Non-morbid	Morbid	Always non-morbid	Always morbid	Deterioration	Improvement	Ever morbid
		Total	573	494	42.9	57.1	15.4	44.5	27.5	12.6	84.6

All values mentioned are in percentage upon the number of children assessed twice, except for the number of children.

Fig. 76. Share of unique children by trajectory of morbidity status and age.



N of children: Male: N1=<12 months=93, N2=12-23 months=48, N3=24-35 months=50, N4=36-47 months=64; Female: N1=69, N2=56, N3=50, N4=64; HIV-EI: N1=7, N2=6, N3=6, N4=10; HIV-EU: N1=155, N2=98, N3=94, N4=118; Total: N1=162, N2=104, N3=100, N4=128.

months=54.0%, 36-47 months=54.7%). Thus, at the higher age groups, there was a lesser share of morbid children.

In the total group of HIV-exposed children, 62.1% of the HIV-EI children and 56.8% of the HIV-EU children were morbid at the baseline. Thus, the share of the morbid HIV-EI children was relatively higher than the share of the morbid HIV-EU children. The share of the morbid HIV-EI children were 85.7%, 33.3%, 66.7% and 60.0% in 0-11, 12-23, 24-35 and 36-47 months of age at the baseline respectively. On the other hand, the share of the morbid HIV-EU children showed a decreasing trend with the increase in the age of the child but showed the signs of reversal in the 36-47 months of baseline age (0-11 months=59.4%; 12-23 months=59.2%; 24-35 months=53.2%; 36-47 months=54.2%). Or in other words, this could indicate a similar chance for both the HIV-EI and the HIV-EU children being morbid in the 0-47 months of age.

In the total group of HIV-exposed children, 56.1% of the male and 58.2% of the female children had morbidity, thus retaining similar gender differentials. The share of both the male and the female morbid children fluctuated in opposite directions in the alternate age groups at the baseline, but were equal in the baseline age of 24-35 months (0-11 months: male=63.4%, female=56.5%; 12-23 months: male=50.0%, female=64.3%; 24-35 months: male=54.0%, female=54.0%; 36-47 months: male=51.6%, female=57.8%). When the male children had a declining trend in morbidity with the increase in the age, the female children had it near constant across all years except a surge in the 12-23 months of baseline age. As such, comparatively, the share of the morbid male children were higher in the 0-11 months than the morbid female children, while the share of the morbid female children was higher than the morbid male children in the 12-23 and 36-47 months of age at the baseline; among the male children, the morbidity was higher in the 0-11 and 24-35 months compared to other ages, while among the female children, it was higher in the 12-23 and 36-47 months compared to the other age groups. The trajectory of the morbidity status of the children is described against this background.

(b) Always-non-morbid and ever-morbid status: In the 12-24 months of follow-up, 15.4% of the total 0-47 month HIV-exposed children (from among the 42.9% of the initially-non-morbid HIV-exposed children; or 35.8% of the initially-non-morbid HIV-exposed children) were found to be having nil morbidity throughout the study period

(always-non-morbid), while the remaining 27.5% (or 64.2% of the initially-non-morbid HIV-exposed children) deteriorated. The share of the always-non-morbid HIV-exposed children among the total HIV-exposed children increased with the increase in the baseline age of 0-35 months, but dropped at the 36-47 months (0-11months=14.8%, 12-23 months= 16.3%, 24-35 months=20.0%, 36-47 months=11.7%). That is, the HIV-exposed children tend to be increasingly always-non-morbid (healthier) in the baseline age of 0-35 months, but got reversed in the 36-47 months (in the follow-up year 5). A similar trend and pattern was also observed in the proportion of the always-non-morbid HIV-exposed children among the initially-non-morbid HIV-exposed children (0-11 months=37.5%, 12-23 months=38.6%, 24-35 months=43.5%, 36-47 months=25.9%).

That is:

- the chance for having always-non-morbid (healthy) status for an HIV-exposed child was 15.4%, and this chance decreased with the increase in the age of the child from 14.8% for 0-11 months to 11.7% for 36-47 months, with an increase in between;
- if the HIV-exposed child was ever-identified with non-morbid status, his/her chance of always remaining so was 35.8%, and this chance also decreased with the increase in the age of the child from 37.5% for 0-11 months of age to 25.9% for 36-47 months of age, with an increase in between; and,
- 84.6% of the HIV-exposed children were ever-morbid, and they needed to have support to maintain their health in their life below 5 years of age; and that the support needs to be continuous, and for all HIV-exposed children, including the non-morbid children, as 64.2% of such children tend to be morbid subsequently.

10.3% of the HIV-EI (from among the 37.9% of the initially-non-morbid HIV-EI children; or 27.3% of the initially-non-morbid HIV-EI children) and 15.7% of the HIV-EU (from among the 43.2% of the initially-non-morbid HIV-EU children; or 36.3% of the initially-non-morbid HIV-EU children) children were always-non-morbid, while the remaining 27.6% of the HIV-EI (or 72.7% of initially-non-morbid HIV-EI children) and 27.5% of the HIV-EU (or 63.7% of the initially-non-morbid HIV-EU children) children deteriorated. Thus, the share of the always-non-morbid HIV-EI children (among both the total HIV-EI

and the initially-non-morbid HIV-EI children) was lower than the share of the always-non-morbid HIV-EU children (among both the total HIV-EU and the initially-non-morbid HIV-EU children).

The share of the always-non-morbid HIV-EI children were 0.0%, 33.3%, 0.0% and 10.0% among the total HIV-EI children, and 0.0%, 50.0%, 0.0% and 25.0% among the initially-non-morbid HIV-EI children, for the baseline age of 0-11, 12-23, 24-35 and 36-47 months (respectively). On the other hand, the shares of the always-non-morbid HIV-EU children (among both the total HIV-EU and the initially-non-morbid HIV-EU children) were near-constant in the baseline age of 0-23 months, increased in 24-35 months, and then declined to below-year-1-level in the 36-47 months (0-11 months=15.5% and 38.1%, 12-23 months=15.3% and 37.5%, 24-35 months=21.3% and 45.5%, 36-47 months=11.9% and 25.9%; among the total and the initially-non-morbid children respectively). That is, the HIV-EU children tend to be increasingly always-non-morbid (better health) in the 0-35 months, but this trend reversed in the 36-47 months (in the follow-up year 5).

That is:

- the overall chance for having always-non-morbid (healthy) status for an HIV-EI child was 10.3%; and, this chance inconsistently ranged from 0.0-33.3% in different age groups;
- if the HIV-EI child was ever-identified as non-morbid, his/her chance of always remaining so was 27.3%; and, and, this chance inconsistently ranged from 0.0-50.0% in different age groups;
- the overall chance for having always-non-morbid (healthy) status for an HIV-EU child was 15.7%; and, this chance decreased with the increase in the age of the HIV-EU child from 15.5% for 0-11 months of age to 11.9% for 36-47 months of age, with an increase in between;
- if the HIV-EU child was ever-identified as non-morbid, his/her chance of always remaining so was 36.3%; and, this chance decreased with the increase in the age of such HIV-EU child from 38.1% for 0-11 months of age to 25.9% for 36-47 months of age, with an increase in between; and,

- 89.7% of the HIV-EI and 84.3% of the HIV-EU children were ever-morbid, and they needed to have support to maintain their health in their life below 5 years of age; and that the support needs to be continuous and for both the HIV-EI and HIV-EU children, as 72.7% of such HIV-EI and 63.7% of such HIV-EU children tend to be morbid subsequently.

15.7% of the male (from among the 43.9% of the initially-non-morbid male children; or 35.7% of the initially-non-morbid male children) and 15.1% of the female (from among the 41.8% of the initially-non-morbid female children; or 36.0% of the initially-non-morbid female children) children were always-non-morbid, while the remaining 28.2% of the male (or 56.1% of the initially-non-morbid male children) and 26.8% of the female (or 58.2% of the initially-non-morbid female children) children deteriorated. Thus, the shares of the always-non-morbid male and the always-non-morbid female children were nearly equal, among the respective total and total initially-non-morbid children by gender.

The share of the always-non-morbid male children (among both the total male and the initially-non-morbid male children) increased with the increase in the baseline age of 0-35 months of age, and then declined in the 36-47 months (0-11 months=14.0% and 38.2%, 12-23 months=18.8% and 37.5%, 24-35 months=20.0% and 43.5%, 36-47 months=12.5% and 25.8%; among the total and the initially-non-morbid children respectively). On the other hand, the share of the always-non-morbid female children among the total female children showed a fluctuating-but-declining trend, while that among the initially-non-morbid female children increased with the increase in the baseline age of 0-35 months of age of the child at the baseline, and then declined in the 36-47 months (0-11 months=15.9% and 36.7%, 12-23 months=14.3% and 40.0%, 24-35 months=20.0% and 43.5%, 36-47 months= 10.9% and 25.9%; among the total and the initially-non-morbid children respectively). That is, both the male and the female children tend to be increasingly always-non-morbid (better health) in the 0-35 months, but this trend reversed in the 36-47 months (in the follow-up year 5). Thus, the shares of the always-non-morbid children showed no marked gender differentials.

That is:

- the overall chance for having always-non-morbid (healthy) status for a male child was 15.7%; this decreased with the increase in the age of the male child from 14.0% for 0-11 months to 12.5% for 36-47 months, with an increase in between;
- if the male child was ever-identified as non-morbid, his chance of always remaining so was 35.7%; this decreased with the increase in the age of such male child from 38.2% for 0-11 months of 25.8% for 36-47 months, with an increase in between;
- the overall chance for having always-non-morbid (healthy) status for a female child was 15.1%; this decreased with the increase in the age of the female child from 15.9% for 0-11 months of 10.9% for 36-47 months, with an increase in between;
- if the female child was ever-identified as non-morbid, her chance of always remaining so was above 36.0%; and, this chance decreased with the increase in the age of such female child from 36.7% for 0-11 months of age to 25.9% for 36-47 months of age, with an increase in between;
- this showed similar and near-equal chance for both the male and the female children, to fall ill or to remain healthy, in a period of 12-24 months of follow-up, during the 0-59 month life; and, there was some reason common to all categories of the HIV-exposed children to fall morbid in year 5 of their life; and,
- 84.3% of the male and 84.9% of the female children were ever-morbid, and they needed support to maintain their health in their life below 5 years of age; and that the support need to be continuous, and for both male and female children, as 56.1% of such male and 58.2% of such female children tend to be morbid subsequently.

(c) Always-morbid status: In the 12-24 months of follow-up, 44.5% of the total 0-47 month HIV-exposed children (from among the 57.1% of the initially-morbid HIV-exposed children; or 78.0% of the initially-morbid HIV-exposed children) were found to be always-morbid throughout the study period, while the remaining 12.6% (or 22.0% of the initially-morbid children) improved. The share of the always-morbid HIV-exposed children among the total HIV-exposed and the initially-morbid HIV-exposed children, increased with the increase in baseline age of 0-35 months, and then declined in the 36-47 months (0-11 months=41.4% and 68.4%, 12-23 months=45.2% and 78.3%, 24-35 months=50.0% and

92.6%, 36-47 months=43.8% and 80.0%; among the total and the initially-non-morbid children respectively). That is, the share of the always-morbid HIV-exposed children morbid both at the baseline and in the subsequent 12-24 months follow-up increased with the increase in the age of the child from 0 to 35 months; or in other words, once morbid, there was higher chance for the HIV-exposed child to be always-morbid in the subsequent life between 0 to 4 years. However, this trend was reversed only in year 5 of the life of the children, but the chance of being always-morbid was still higher than the year-1 level.

That is:

- the chance for having always-morbid (unhealthy) status for an HIV-exposed child was 44.5%, and this chance increased with the increase in the age of the child from 41.4% for 0-11 months of age to 43.8% for 36-47 months of age;
- if the child was ever-identified as morbid, his/her chance of always remaining so was 78.0%, and this chance increased with the increase in the age of the child from 68.4% for 0-11 months of age to 80.0% for 36-47 months of age; and,
- once morbid, there was a higher chance for the HIV-exposed child to be always-morbid in the subsequent life between 0 to 4 years, and this chance increased with the increase in the age between 0-35 months.

44.8% of the HIV-EI (from among the 62.1% of the initially-morbid HIV-EI children; or 72.2% of the initially-morbid HIV-EI children) and 44.5% of the HIV-EU (from among the 56.8% of the initially-morbid HIV-EU children; or 78.4% of the initially-morbid HIV-EU children) children were always-morbid, while the remaining 17.2% of the HIV-EI (or 27.8% of the initially-morbid HIV-EI children) and 12.3% of the HIV-EU (or 21.6% of the initially-morbid HIV-EU children) children improved. Thus, the share of the always-morbid HIV-EI children (among the total HIV-EI children) was nearly equal to the share of the always-morbid HIV-EU children (among the total HIV-EU children); but (contrary to the conventional wisdom), once morbid, the chance of being morbid in the subsequent 12-24 months was higher among the HIV-EU children, compared to the HIV-EI children. This finding can partly be attributed to the lower number of HIV-EI included in the study rendering non-comparability; but, to the bare minimum, it could be that there were no many

absolute differences in the chance of always-morbid status between the HIV-EI and the HIV-EU children.

The share of the always-morbid HIV-EI children among the total HIV-EI children were 71.4%, 16.7%, 33.3%, and 50.0%, and among the initially-morbid HIV-EI children were 83.3%, 50.0%, 50.0%, and 83.3%, in the baseline age of 0-11, 12-23, 24-35 and 36-47 months respectively. On the other hand, the share of the always-morbid HIV-EU children among both the total HIV-EU children and the initially-morbid HIV-EU children, increased with the increase in the baseline age between 0 and 35 months, and then declined in the 36-47 months (0-11 months=40.0% and 67.4%, 12-23 months=46.9% and 79.3%, 24-35 months=51.1% and 96.0%, 36-47 months=43.2% and 79.7%; among the total and the initially-non-morbid children respectively). That is, the share of the always-morbid HIV-EU children (among the total HIV-EU and the initially-non-morbid HIV-EU children) increased with the increase in the age of the child from 0 to 35 months; or in other words, once morbid, there was higher chance for the HIV-EU child to be always-morbid in the subsequent life between 0 to 4 years. However, this trend was reversed only in year 5 of the life of the HIV-EU children, but the chance was still higher than the year-1-level.

That is:

- the overall chance for having always-morbid (unhealthy) status for an HIV-EI child was 44.8%; and, this was more than 16.7% in any age group;
- if the HIV-EI child was ever-identified as morbid, his/her chance of always remaining so was 72.2%; and, this chance was more than 50.0% in any age group;
- the overall chance for having always-morbid (unhealthy) status for an HIV-EU child was 44.5%; and, this chance increased with the increase in the age of the HIV-EU child from 40.0% for 0-11 months of age to 43.2% for 36-47 months of age;
- if the HIV-EU child was ever-identified as morbid, his/her chance of always remaining so was 78.4%; and, this increased with the increase in the age of the HIV-EU child from 67.4% for 0-11 months to 79.7% for 36-47 months of age; and,
- there were no many absolute differences in the chance of always-morbid status between the HIV-EI and the HIV-EU children.

42.7% of the male (from among the 56.1% of the initially-morbid male children; or 76.2% of the initially-morbid male children) and 46.4% of the female (from among the 58.2% of the initially-morbid female children; or 79.9% of the initially-morbid female children) children were always-morbid, while the remaining 13.3% of the male (or 23.8% of the initially-morbid male children) and 11.7% of the female (or 20.1% of the initially-morbid female children) children improved. Thus, the shares of the always-morbid male and the always-morbid female children were nearly equal, among the respective total and total initially-morbid children by gender.

The share of the always-morbid male children among the total male children decreased in the 12-23 months of baseline age, increased in the 24-35 months, and then returned to near-year-1-level in the 36-47 months, thus completing a full sigmoid curve (0-11 months= 43.0%, 12-23 months=35.4%, 24-35 months=50.0%, 36-47 months=42.2%). However, the share of the always-morbid male children among the initially-morbid male children increased with the increase in the baseline age from 0 to 35 months and then declined in the 36-47 months (0-11 months=67.8%, 12-23 months=70.8%, 24-35 months=92.6%, 36-47 months=81.8%). That is, the share of the male children morbid both at the baseline and in the subsequent 12-24 months follow-up increased with the increase in the age of the child from 0 to 35 months; or in other words, once morbid, there was higher chance for the male child to be always morbid in the subsequent life between 0 to 4 years. However, this trend was reversed only in year 5 of the life of the male children, but the chance was still higher than the year-1-level. The share of the always-morbid female children among the total female children increased in the 12-23 months of baseline age and then decreased with the increase in the baseline age of 24+ months (0-11 months=39.1%, 12-23 months= 53.6%, 24-35 months=50.0%, 36-47 months=45.3%). However, the share of the always-morbid female children among the initially-morbid female children increased with the increase in the baseline age from 0 to 35 months of age and then declined in the 36-47 months (0-11 months=69.2%, 12-23 months=83.3%, 24-35 months=92.6%, 36-47 months=78.4%). That is, the share of the female children morbid both at the baseline and in the subsequent 12-24 months follow-up increased with the increase in the baseline age

from 0 to 35 months; or in other words, once morbid, there was higher chance for the female child to be always-morbid in the subsequent life between 0 to 4 years. However, this trend was reversed only in year 5 of the life of the female children, but the chance was still higher than the year-1-level. That is, despite their similar chance to be morbid/ always-morbid in the total 0-47 months of age, the male and the female children had a different chance of being so in the different age groups. They had equal or near-equal chance to be always-morbid in the 0-11 and 24+ months of the baseline age (that is, in the follow-up years 2, 4 and 5); but, the female children had a higher chance to be always-morbid in the baseline age of 12-23 months (in the follow-up year 3).

That is:

- the overall chance for having always-morbid (unhealthy) status for a male child was 42.7%; and, this chance was more than 35.4% in any age group;
- if the male child was ever-identified as morbid, his chance of always remaining so was 76.2%; and, this chance increased with the increase in the age at the baseline from 67.8% for 0-11 months of age to 81.8% for 36-47 months of age;
- the overall chance for having always-morbid (unhealthy) status for a female child was 46.4%; and, this chance increased with the increase in the age at the baseline from 39.1% for 0-11 months of age to 45.3% for 36-47 months of age;
- if the female child was ever-identified as morbid, her chance of always remaining so was 79.9%; and, this chance increased with the increase in the age at the baseline from 69.2% for 0-11 months of age to 78.4% for 36-47 months of age; and,
- this suggested the-near-equal chance for the male and the female child to remain unhealthy (always-morbid) always, except in year 3 of the 0-59 month life, where the female children tend to remain always-morbid more than the male children.

(d) Changes in the morbidity status: The switch in the morbidity status was due to the children either improving or dropping from their baseline morbidity status. In the 12-24 months of follow-up, 12.6% of the HIV-exposed children (or 22.0% of the initially-morbid HIV-exposed children) improved upon their initially-morbid status, while 27.5% (or 64.2% of the initially-non-morbid HIV-exposed children) deteriorated from their initially-non-

morbid status. As such, 40.1% of the HIV-exposed children had a chance to change their initial morbidity status in the subsequent 12-24 months of life; there was nearly three-time higher chance for the initially-non-morbid children to become morbid, compared to the initially-morbid children's chance for turning non-morbid; but, in effect, the share of children deteriorating was nearly two-time higher than that of those improving in the total group of HIV-exposed children.

The share of the HIV-exposed children deteriorating in their morbidity status (0-11 months= 24.7% and 62.5%, 12-23 months=26.0% and 61.4%, 24-35 months=26.0% and 56.5%, 36-47 months=33.6% and 74.1%; among the total HIV-exposed and the initially-non-morbid HIV-exposed children, respectively) was higher in all the baseline age-groups, compared to that of the children improving upon their morbidity status (0-11 months=19.1% and 31.6%, 12-23 months=12.5% and 21.7%, 24-35 months=4.0% and 7.4%, 36-47 months=10.9% and 20.0%; among the total HIV-exposed and the initially-morbid HIV-exposed children, respectively). The chance for the improvement was maximum in year 5, and that for deterioration was maximum in year 2. As such, the share of the HIV-exposed children experiencing changes in the morbidity status was highest among the baseline age of 36-47 months (44.5%), followed by 0-11 months (43.8%), 12-23 months (38.5%) and 24-35 months (30.0%) in the decreasing order. In short, the HIV-exposed children of all the baseline age groups had the share of the deteriorating children more than that of those improving; the maximum changes happened in the morbidity status of the children of baseline age of 36-47 months (year 5), with the deterioration having three-time higher chance than the improvement.

In the follow-up of 12-24 months, 17.2% of the HIV-EI children (or 27.8% of the initially-morbid HIV-EI children) improved upon their initially-morbid status, while 27.6% (or 72.7% of the initially-non-morbid HIV-EI children) deteriorated from their initially-non-morbid status. As such, 44.8% of the HIV-EI children had a chance to change their initial morbidity status in the subsequent 12-24 months of life.

Among the total HIV-EI children, the shares of those improving and deteriorating were 14.3% and 14.3%, 16.7% and 33.3%, 33.3% and 33.3%, 10.0% and 30.0% in the baseline age of 0-11, 12-23, 24-35 and 36-47 months, respectively. As such, the share of the HIV-EI children experiencing changes in the morbidity status was 28.6%, 50.0%, 66.7% and 40.0% in the baseline age of <12, 12-23, 24-35 and 36-47 months (respectively).

However, the shares of the HI-EI children improving and deteriorating with respect to their initial morbidity status were 16.7% and 100.0%, 50.0% and 50.0%, 50.0%, and 100.0%, and 16.7% and 75.0% in the baseline age of <12, 12-23, 24-35 and 36-47 months (respectively). Since very small numbers of the HIV-EI children were included in each of the baseline age groups, inferring on a pattern on the HIV-EI children was deemed less relevant, despite an empirical weight for the deterioration among the changes, among the total HIV-EI children and in all the age groups.

In the 12-24 months of follow-up, 12.3% of the HIV-EU children (or 21.6% of the initially-morbid HIV-EU children) improved their initially-morbid status, while 27.5% (or 63.7% of the initially-non-morbid HIV-EU children) deteriorated from their initially-non-morbid status. As such, 39.8% of the HIV-EU children had a chance to change their initial morbidity status in the subsequent 12-24 months of life, with the deterioration more than the improvement; there was nearly three-time higher chance for the initially-non-morbid HIV-EU children to deteriorate, compared to the initially-morbid HIV-EU children's chance for improvement (the trend was similar among the HIV-EI children, except for the ratio between the improvement and deterioration); but, in effect, the share of the HIV-EU children deteriorating was nearly two-time higher than that of those improving, in the total group of HIV-exposed children (the trend was again similar among the HIV-EI children, except for the ratio between the improvement and deterioration).

The share of the HIV-EU children deteriorating in their morbidity status (0-11 months=25.2% and 61.9%, 12-23 months=25.5% and 62.5%, 24-35 months=25.5% and 54.5%, 36-47 months=33.9% and 74.1%; among the total HIV-EU and the initially-non-morbid HIV-EU children, respectively) was higher in all age groups, compared to those

improving upon their morbidity status (0-11 months=19.4% and 32.6%, 12-23 months=12.2% and 20.7%, 24-35 months=2.1% and 4.0%, 36-47 months=11.0% and 20.3%; among the total HIV-EU and the initially-non-morbid HIV-EU children, respectively). The share of the deteriorating HIV-EU children among total HIV-EU children remained nearly constant in the baseline age of 0-35 months, and increased in the 36-47 months; while the share of such children among the initially-non-morbid HIV-EU children remained nearly the same for the baseline age of 0-23 months, declined in the 24-35 months, and increased in the 36-47 months. On the other hand, the share of the improving HIV-EU children (among both the total HIV-EU and the initially-morbid HIV-EU children) decreased with the increase in the baseline age between 0 and 35 months and then increased in the 35-47 months. That is, the chance for the improvement was highest in year 2 and that for the deterioration was maximum in year 5. As such, the share of the HIV-EU children experiencing changes in the morbidity status was highest among the baseline age of 36-47 months (44.9%), followed by 0-11 months (44.5%), 12-23 months (37.8%) and 24-35 months (27.7%) in the decreasing order. In short, the HIV-EU children in all the baseline age groups had the share of those deteriorating more than that of those improving; the maximum changes happened for the morbidity status in the year 5, with the deterioration having three-time higher chance than the improvement.

In the follow-up of 12-24 months, 13.3% of the male children (or 23.8% of the initially-morbid male children) improved upon their initially-morbid status, while 28.2% (or 64.3% of the initially-non-morbid male children) deteriorated from their initially-non-morbid status. As such, 41.6% of the male children had a chance to change their initial morbidity status in the subsequent 12-24 months of life, with the deterioration more than the improvement; there was nearly three-time higher chance for the initially-non-morbid male children to deteriorate, compared to the initially-morbid male children's chance for improvement; but, in effect, the share of male children deteriorating was nearly two-time higher than that of those improving in the total group of HIV-exposed children.

The share of the male children deteriorating in their morbidity status (0-11 months=22.6% and 61.8%, 12-23 months=31.3% and 62.5%, 24-35 months=26.0% and 56.5%, 36-47

months=35.9% and 74.2%; among the total male and the initially-non-morbid male children, respectively) was higher in all age groups, compared to those improving upon their morbidity status (0-11 months=20.4% and 32.2%, 12-23 months=14.6% and 29.2%, 24-35 months=4.0% and 7.4%, 36-47 months=9.4% and 18.2%; among the total male and the initially-non-morbid male children, respectively). As such, the shares of the deteriorating male children among total male children increased, decreased, and again increased in the baseline age of 12-23, 24-35 and 36-47 months; while the share of such male children with respect to the initially-non-morbid male children remained nearly the same for the baseline age of 0-23 months, declined in the 24-35 months, and increased in the 36-47 months. On the other hand, the share of the improving male children, among both the total male and the initially-morbid male children, decreased with the increase in the baseline age between 0 and 35 months and then increased in the 35-47 months. That is, the chance for the improvement was highest in year 2 and that for the deterioration was maximum in year 5. The shares of the male children experiencing changes in the morbidity status were nearly equal in baseline age of 0-11 (43.0%), 12-23 (45.8%) and 36-47 (45.3%) months, and was lower in the 24-35 months (30.0%). In short, the male children in all the baseline age groups had the share of those deteriorating more than that of those improving; the maximum changes happened in the morbidity status in the year 3, with the deterioration having a two-time higher chance than the improvement.

In the follow-up of 12-24 months, 11.7% of the female children (or 20.1% of the initially-morbid female children) improved upon their initially-morbid status, while 26.8% (or 64.0% of the initially-non-morbid female children) deteriorated from their initially-non-morbid status. As such, 38.5% of the female children had a chance to change their initial morbidity status in the subsequent 12-24 months of life, with the deterioration more than the improvement; there was nearly three-time higher chance for the initially-non-morbid female children to deteriorate, compared to the initially-morbid female children's chance for improvement; but, in effect, the share of female children deteriorating was nearly two-time higher than that of those improving in the total group of HIV-exposed children.

The share of the female children deteriorating in their morbidity status (0-11 months= 27.5% and 63.3%, 12-23 months=21.4% and 60.0%, 24-35 months=26.0% and 56.5%, 36-47 months=31.3% and 74.1%; among the total female and the initially-non-morbid female children, respectively) was higher in all the baseline age-groups, compared to those improving upon their morbidity status (0-11 months=17.4% and 30.8%, 12-23 months=10.7% and 16.7%, 24-35 months=4.0% and 7.4%, 36-47 months=12.5% and 21.6%; among the total female and the initially-non-morbid female children, respectively). As such, the share of the deteriorating female children among total female children decreased in the baseline age of 12-23 months, and increased in the 24+ months; while the share of such female children among the initially-non-morbid female children decreased with the increase in the baseline age between 0 and 35 months, and then increased in the 36-47 months. On the other hand, the share of the improving female children, among both the total female and the initially-morbid female children, decreased with the increase in the baseline age of the child between 0 and 35 months and then increased in the baseline age of 36-47 months. The chance for the improvement was highest in year 2, and that for the deterioration was maximum in year 5. As such, the share of the female children experiencing changes in the morbidity status decreased with the increase in the baseline age between 0 and 35 months (0-11 months=44.9%, 12-23 months=32.1%, 24-35 months= 30.0%), and then increased in the 36-47 months (43.8%). In short, the female children in all the baseline age groups had the share of those deteriorating more than that of those improving; the maximum changes happened in the morbidity status in the year 3, with the deterioration having a two-time higher chance than the improvement.

Comparing the male and female children, the chance of improvement and deterioration, and the share of children changing their morbidity status were near-equal in 0-59 month age group, except that:

- among the total children by respective gender,
    - the share of the improving children was higher among the males in the baseline age of 0-23 months (years 2 and 3 of life), while it was higher for the females in the 36-47 months (year 5); and,

Table 45. Unique children (0-59 months) ever identified with chronic diseases.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Chronic disease status of child	Present	0.0	0.0	0.0	1.3	1.3	1.3	1.2	1.2	8	1.2
	Absent	100.0	100.0	100.0	98.7	98.7	98.7	98.8	98.8	652	98.8
	Total, N	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

  - the share of the deteriorating children was higher among the females in the baseline age of 0-23 months (years 2 and 3 of life), while it was higher for the males in the 36-47 months (year 5); and,
  - the share of children changing their morbidity status was higher among the males in the baseline age of 12-23 months (year 3), compared that among the females; and,
- among the initially-morbid children, the chance for improvement was higher among the males in the baseline age of 12-23 months (year 3), compared to that among the females.

4.6. The patterns of chronic morbidity.

There were assessments of chronic morbidity for all children (0-59 months) on every data collection schedule. The results of each assessment were considered for 'ever having a chronic disease' and analyzed, but the events of chronic morbidities were very few. The characteristics of the unique children having chronic disease are described in table 45.

There were a total of 8 unique children (1.2%) with chronic morbidities; all of them were HIV-EU children; and 3 of these unique children had associated psychomotor, social, and language delay. The eight unique children reported 10 chronic diseases/conditions: 4 events of birth injury/congenital anomaly/cerebral palsy, 2 events each of cleft lip/cleft

Table 46. Sickness absenteeism among children (36-59 months).

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Sickness absenteeism in institutions	Present	14.3	0.0	9.5	7.8	13.0	10.5	8.3	12.5	39	10.5
	Absent	85.7	100.0	90.5	92.2	87.0	89.5	91.7	87.5	333	89.5
	Total, N	14	7	21	166	185	351	180	192	372	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

palate and epilepsy, and one event each of ichthyosis and bronchial asthma. As such, the presence of chronic morbidities was too small to be analyzed for any association and significance and hence was not considered as an outcome variable (for the analysis of associated factors). However, it was retained as a covariate for other outcome variables considered. Moreover, all the children with chronic disease also had acute morbidity during the study period, and hence were already considered as 'morbid' in the earlier analysis of acute morbidity.

4.7. Sickness absenteeism.

Sickness absenteeism was elicited among the subset of 372 (56.4%) children of age 36-59 months who were enrolled in an institution like anganwadi or school, as a proxy indicator for the severity of morbidities experienced by them. The characteristics of the unique children ever reported to have sickness absenteeism are described in table 46. Around one-in-ten children had reported sickness absenteeism at the institutions (10.5%; HIV-EI: male=14.3%, female=0.0%, total=9.5%; HIV-EU: male=7.8%, female=13.0%, total= 10.5%). As such, the sickness absenteeism was slightly higher among the female children in the HIV-EU subgroup, compared to the male children. However, it was near-equal among all the HIV-exposed children, irrespective of the HIV status or gender. Sickness absenteeism was considered only as a covariate for other outcome variables.

4.8. The patterns of mortality.

Table 47. Child (0-59 months) deaths during the study.

Characteristics	Attributes	HIV-EI children			HIV-EU children			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	N	%
Death of the child during study	Present	0.0	7.7	2.9	1.0	0.6	0.8	0.9	0.9	6	0.9
	Absent	100.0	92.3	97.1	99.0	99.4	99.2	99.1	99.1	654	99.1
	Total, N	22	13	35	315	310	625	337	323	660	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

The events of mortality among the study participants were very few. The characteristics of the unique dead children (0-59 months) are described in table 47. There were a total of 6 child deaths during the study; one HIV-EI child and 5 HIV-EU children. As such, the child deaths were too small to be analyzed for any association and significance and hence was not considered as an outcome variable (for analysis of associated factors). However, it was retained as a covariate for other outcome variables considered.

The mortality was deemed as an important factor in the natural course of the HIV infection among children, and it could not be dispensed with, despite encountering fewer numbers in this study. Hence, instead, verbal autopsies were attempted for the HIV-exposed child deaths <5 years of age, which happened post-2011 till the end of this study, using the information from the parent ICMR study. These results are provided along with the results of causes of death in the next chapter. As such, this provided crude patterns and the most probable causes of deaths. The causes of deaths could not be seen as predictors, and the patterns identified in this way for these ‘total’ deaths may not hold good for the cohort of the children included in this study; however, it could provide better information than nothing.

4.9. Consolidation of patterns of indicators of anthropometry, anaemia, and acute morbidity.

Consolidating the results from the three analyses (gross, age-wise measurements and trajectory) by classifying the shares of the children (among the total once/twice measured/ assessed in each group) into four quarters (quarter 1=<25%, quarter 2=25-<50%, quarter 3=50-<75% and quarter 4=>75%), table 48 and figures 77-82 were obtained. Also, a difference in the value of percentage <5% was considered as 'equal or near-equal', 5-<10% as 'difference present, but not so important', and ≥10% as 'important difference present'.

4.9.1. Consolidated results from the cross-sectional analysis.

4.9.1.1. Consolidated results from the gross analysis.

Grossly, ≥75% (quarter 4) of all the unique HIV-exposed children of age 0-59 months were ever morbid, and ≥50% (quarter 3) of them were ever anaemic, during the 29 months of this study. Similarly, the HFA and WFA were ever-inadequate in ≥50% (quarter 3) of the unique children, the MUACFA in ≥25% (quarter 2), and the HCFA in <25% (quarter 1). As such, this denoted a high level of ill-health among HIV-exposed children. Also:

- The proportion of the male children having ill-health (ever inadequate anthropometry/anaemia/morbidity) were the same (quarter-category) as that of the total children, except for the anaemia (quarter 4, higher) and HCFA (quarter 2, higher). The proportion of the female children having ill-health were the same as that of the total children, except for the MUACFA (quarter 1, lower). The gender differentials in all the outcome indicators were near-equal or <10%.
- The proportion of the HIV-EI children having ill-health were the same as that of the total children in case of the WFA and acute morbidity, but it was higher in case of the HFA and anaemia (quarter 4), MUACFA (quarter 3) and HCFA (quarter 2). The proportion of HIV-EU children having ill-health were the same as that of the total children, for all outcome indicators. The differentials in the share of HIV-EI and the HIV-EU children in all the outcome indicators were near-equal or <10%,

Table 48. Summary of patterns of the outcome indicators (categorized results).

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
HFA	Gross	Ever inadequate						T3; M3=F3; P4>>N3
	Age-cross-sections	Inadequate	T3; M3>F2; P3>>N3	T3; M3=F3; P4>N3	T3; M3=F3; P4>>N3	T3; F3>M2; P4>>N3	T2; F2>M2; P3>>N2	T3; M3=F3; P3>>N3
	Trajectory	Always adequate	T1; M1=F1; N1>>P1	T1; F2>>M1; N1>>P1	T2; M2>>F1; N2>>P1	T2; M2>>F2; N2>P2		T1; M1=F1; N1>>P1
		Inadequate at baseline	T4; M3=F4; P4>>N4	T4; M4>>F3; P4>>N3	T3; F3>>M3; P4>>N3	T3; F3>>M2; P3=N3		T3; M3=F3; P4>>N3
		Always inadequate	T3; M3>>F3; P3>>N3	T3; M4>>F3; P4>>N3	T3; F3>>M2; P4>>N3	T2; F2>M2; P2=N2		T3; M3=F3; P3>>N3
		Ever inadequate	T4; M4=F4; P4>>N4	T4; M4>>F3; P4>>N4	T3; F4>>M3; P4>>N3	T3; F3>>M3; P3>N3		T4; M4=F4; P4>>N4
		Improvement from inadequate	T1; F1>>M1; P1=N1	T1; M1>F1; P1>>N1	T1; M1=F1; N1>P1	T1; F1>M1; P1=N1		T1; F1>M1; P1=N1
		Deterioration from adequate	T1; M1=F1; P1=N1	T1; M1=F1; N1>P1	T1; M1=F1; N1>P1	T1; M1=F1; P1>>N1		T1; M1=F1; P1=N1
WFA	Gross	Ever inadequate						T3; M3=F3; P3>N3

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
	Age-cross-sections	Inadequate	T2; M2=F2; P3>>N2	T2; M2=F2; P3>>N2	T2; M2=F2; P3>>N2	T2; F2>M2; P3>>N2	T2; F2>M2; P3>>N2	T2; M2=F2; P3>>N2
	Trajectory	Always adequate	T2; M2=F2; N2>>P1	T2; F2>M2; N2>>P1	T2; M2>F2; P2=N2	T2; M2>>F2; N2>P2		T2; M2>F2; N2>P2
		Inadequate at baseline	T3; M3=F3; P3>>N3	T3; M3>>F2; P3>>N2	T3; F3>>M2; N3>>P2	T3; F3>>M2 P3>>N2		T3; M3=F3; P3>N3
		Always inadequate	T2; M2=F2; P3>>N2	T2; M2>F2; P3>>N2	T2; F3>>M2; N3>>P2	T2; F3>>M2; P3>N2		T2; F2>M2; P3>>N2
		Ever inadequate	T3; M3=F4; P4>>N3	T3; M3>F3; P4>>N3	T3; F3>M3; P3=N3	T3; F3>>M3; P3>N3		T3; F3>M3; P4>N3
		Improvement from inadequate	T2; M2>F1; N2>>P1	T1; M1=F1; N1>P1	T1; M1=F1; N1>P1	T1; M1=F1; P1>N1		T1; M1=F1; N1>P1
		Deterioration from adequate	T1; F1>M1; P1=N1	T1; F1>M1; P1=N1	T1; M1>F1; P1>>N1	T1; M1=F1; P1=N1		T1; M1=F1; P1=N1
HCFA	Gross	Ever inadequate						T1; M2>F1; P2>N1
	Age-cross-sections	Inadequate	T2; M2>F2; P2>>N2	T2; M2=F2; P2>>N2				T2; M2>F2; P2>>N2

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
	Trajectory	Always adequate	T2; F2>M2; N2>>P1					T2; F2>M2; N2>>P1
		Inadequate at baseline	T2; M2=F2; P3>>N2					T2; M2=F2; P3>>N2
		Always inadequate	T2; M2>F1; P3>>N2					T2; M2>F1; P3>>N2
		Ever inadequate	T3; M3>F3; P4>>N3					T3; M3>F3; P4>>N3
		Improvement from inadequate	T1; M1=F1; N1>P1					T1; M1=F1; N1>P1
		Deterioration from adequate	T1; M1>F1; P1>N1					T1; M1>F1; P1>N1
MUAC-FA	Gross	Ever inadequate						T2; M2>F1; P3>>N2
	Age-cross-sections	Inadequate	T1; M1=F1; P2>>N1	T1; M1=F1; P1>>N1	T1; M1=F1; P2>>N1	T1; M1>F1; P2>>N1	T1; M1=F1; P1>N1	T1; M1=F1; P2>>N1
	Trajectory	Always adequate	T3; M3=F3; N3>>P2	T4; F4>>M3; N4>>P3	T3; M3=F3; N3>>P2	T3; F4>M3; N4>>P3		T3; F4>M3; N3>>P2

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
		Inadequate at baseline	T1; M1=F1; P2>>N1	T1; M2>>F1; P2>>N1	T1; F2>>M1; P1=N1	T1; M1=F1; P2>>N1		T1; M1=F1; P2>>N1
		Always inadequate	T1; M1=F1; P2>>N1	T1; M1>F1; P2>>N1	T1; F1>M1; P1>>N1	T1; M1=F1; P2>>N1		T1; M1=F1; P2>>N1
		Ever inadequate	T2; M2=F2; P3>>N2	T2; M2>>F1; P3>>N1	T2; M2=F2; P3>>N2	T2; M2>F1; P3>>N1		T2; M2>F2; P3>>N2
		Improvement from inadequate	T1; M1=F1; P1=N1	T1; M1>>F1; N1>>P1	T1; F1>M1; N1>>P1	T1; M1=F1; N1>P1		T1; M1=F1; N1>P1
		Deterioration from adequate	T1; M1=F1; P2>>N1	T1; M1=F1; P1>>N1	T1; M1>F1; P2>>N1	T1; M1=F1; P1=N1		T1; M1=F1; P1>>N1
Anaemia	Gross	Ever anaemic						T3; M4>F3; P4>>N3
	Age-cross-sections	Anaemic	T3; M4>F3; P4>>N3	T4; F4>>M3; P4>>N4	T3; M3=F3; P4>>N3	T3; M3=F3; P4>>N3	T3; M3>>F2 P4>>N3	T3; M3=F3; P4>>N3
	Trajectory	Always non-anaemic	T1; F1>M1; N1>P1	T1; M1=F1; N1>P1	T1; M1=F1; N1>>P1	T1; F2>>M1 N2>>P1		T1; F1>M1; N1>>P1
		Anaemic at baseline	T4; M4=F4; P4>>N4	T4; F4>>M3; P4=N4	T3; M3=F3; P4>>N3	T3; M3>>F2 P3>>N3		T3; M4=F3; P4>>N3

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
		Always anaemic	T3; F3>M3; P4>>N3	T3; F3>>M3; P4>>N3	T3; F3>M2; P4>>N2	T2; M3>>F1 P3>>N2		T3; M3=F3; P4>>N3
		Ever anaemic	T4; M4>F4; P4>N4	T4; M4=F4; P4>N4	T4; M4=F4; P4>>N4	T4; M4>>F3 P4>>N3		T4; M4>F4; P4>>N4
		Improvement	T1; M1>F1; N1>>P1	T1; M1=F1; N1>>P1	T1; M2>F1; N1>>P1	T1; F2>>M1; P1=N1		T1; M1=F1; N1>>P1
		Deterioration	T1; M1>F1; N1>>P1	T1; M1>>F1; P1>N1	T1; M1>F1; N1>>P1	T1; F2>>M1 P2>>N1		T1; M1=F1; P1=N1
Acute morbidity	Gross	Ever morbid						T4; M4=F4; P4=N4
	Age-cross-sections	Morbid	T2; M2=F2; P2>>N2	T2; M2=F2; P2>N2	T2; M2=F2; P2>N2	T2; M2=F2; P2=N2	T2; M2=F2; P2>N2	T2; M2=F2; P2>N2
	Trajectory	Always non-morbid	T1; M1=F1; N1>>P1	T1; M1=F1; P2>>N1	T1; M1=F1; N1>>P1	T1; M1=F1; P1=N1		T1; M1=F1; N1>P1
		Morbid at baseline	T3; M3>F3; P4>>N3	T3; F3>>M3; N3>>P2	T3; M3=F3; P3>>N3	T3; F3>M3; P3>N3		T3; M3=F3; P3>N3
		Always morbid	T2; M2=F2; P3>>N2	T2; F3>>M2; N2>>P1	T3; M3=F3; N3>>P2	T2; M2=F2; P3>N2		T2; M2=F2; P2=N2

Outcome indicator	Type of analysis	Status	0-11 months	12-23 months	24-35 months	36-47 months	48+ months	All age groups
		Ever morbid	T4; M4=F4; P4>>N4	T4; M4=F4; N4>>P3	T4; M4=F4; P4>>N4	T4; M4=F4; P4=N4		T4; M4=F4; P4>N4
		Improvement	T1; M1=F1; N1>P1	T1; M1=F1; P1=N1	T1; M1=F1; P2>>N1	T1; M1=F1; P1=N1		T1; M1=F1; P1=N1
		Deterioration	T1; M1=F2; N2>>P1	T2; M2>F1; P2>N2	T2; M2=F2; P2>N2	T2; M2=F2; P2=N2		T2; M2=F2; P2=N2

Gross analysis=Unique children in a cross-sectional approach. Age-cross sections= Children attaining the particular age in the age group, ever during the cohort study; multiple measurements for the same child. Trajectory analysis=Changes in unique children over time; the row for 'inadequate at baseline' provides age-cross-section-wise information of unique children. In all analyses, children classified into graver group of ill-health in case of multiple results from multiple assessments. T=Total children. M=Male children. F=Female children. P=HIV-EI or HIV Positive children. N=HIV-EU or HIV Negative children. 1=Share <25%. 2=Share 25-<50%; 3=Share 50-<75%; 4=Share >75%. All shares are mentioned with respect to the total children. >: More than (if the difference was 5-<10%). >>: Much more than (if the difference was >10%). =: Equal/Near-equal (if difference was <5%). Red-coloured cells=Indicators denoting ill-health. Green-coloured cells=Indicators denoting health. Orange-coloured cells=Indicators denoting improvement from ill-health. Pink-coloured cells=Difference only by HIV status. Yellow-coloured cells=Difference only by gender. Blue-coloured cells=Difference by both gender and HIV status.

except for HFA, MUACFA, and anaemia, where the share was ≥10% higher for the HIV-EI children.

- 23.0% of the HIV-exposed children (or 30.6% of the anaemic children) experienced mild anaemia, 46.8% (62.4% of the anaemic) experienced moderate anaemia, and

5.2% (6.9% of the anaemic) experienced severe anaemia. The differentials by gender and HIV status were negligible, except the higher (≥10%) share of the HIV-EI children having moderate anaemia than the HIV-EU children.

- 62.9% of the HIV-exposed children (or 79.3% of morbid children) experienced <0.5 acute morbidities per month; the HIV-EU children had it higher (≥10%) than the HIV-EI children. On the other hand, 16.4% of the HIV-exposed children (or 20.7% of morbid children) had ≥0.5 acute morbidity per month; the HIV-EI children had it higher (≥10%) than the HIV-EU children. That is, despite a near-equal share of the morbid children in both, the HIV-EI children had a higher share of the frequency ≥0.5 morbidities per month, while the HIV-EU children had a higher share of the frequency <0.5 morbidities per month. The gender differentials were small (<5%) in both these categories.
- The mean number of acute morbidities per month also showed near-equal acute morbidity events among the male and female children, but slightly higher values for the HIV-EI children compared to the HIV-EU children (HIV-EI=0.33, HIV-EU=0.26, male=0.27, female=0.25).

Thus grossly, almost all the outcome ill-health indicators (denoting morbidity, and inadequate nutrition and growth and development; except HCFA and MUACFA) were present in the majority of children (50% or more); and all these ill-health indicators were near-uniformly present among all the HIV-exposed children, except for the slightly higher tendency for the HIV-EI children to have inadequate HFA and MUACFA and anaemia, ever in their life. Also, an assessment of anaemia, morbidity, HFA, and WFA could pick up more than 50% of the HIV-exposed children with ill-health and inadequate nutrition and growth and development.

4.9.1.2. Consolidated results from the age-wise measurements.

Caution was ensured while inferring on a pattern on the HIV-EI children, as it was deemed less relevant due to very small numbers of them included in the analysis, especially in the sub-groups of the HIV-exposed children.

a. 0-11 months of age: In the cross-sectional analysis (results from the indicator 'inadequate at baseline' of trajectory analysis), ≥75% (quarter 4) of the unique HIV-exposed children of age <12 months were ever anaemic, and ≥50% (quarter 3) were ever morbid, during the study. Similarly, the HFA was ever-inadequate in ≥75% (quarter 4) of the unique children, the WFA in ≥50% (quarter 3), the HCFA in ≥25% (quarter 2), and the MUACFA in <25% (quarter 1). As such, this denoted a high level of ill-health among the HIV-exposed children of age <12 months. Also:

- The proportion of male children having ill-health were the same as that of the total children, except for HFA (quarter 3, lower). The proportion of the female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the outcome indicators were near-equal or <10%.
- The proportion of the HIV-EI children having ill-health (by all the indicators) tend to be the same as or higher than that of the total children and the HIV-EU children.

However, in the cross-sectional analysis of all the measurements made for the HIV-exposed children (results from the indicator 'inadequate', 'anaemic' or 'morbid' from the analysis of the age-wise measurements) of age <12 months, ≥50% (quarter 3) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA was inadequate in ≥50% (quarter 3) of the unique children, the WFA and HCFA were inadequate in ≥25% (quarter 2), and the MUACFA was inadequate in <25% (quarter 1). As such, this denoted changes happening in all the indicators, especially the anaemia, acute morbidity, HFA, and WFA, among the HIV-exposed children of age <12 months. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the anaemia (quarter 4, higher). The proportion of the female children having ill-health were the same as that of the total children, except for the HFA (quarter 2, lower). The gender differentials in all the outcome indicators were near-equal or <10%.
- The proportion of the HIV-EI children having ill-health were the same as that of the total children, except for the anaemia (quarter 4, higher), WFA (quarter 3, higher) and MUACFA (quarter 2, higher). The proportion of the HIV-EU children

having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of the HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators.

Thus, almost all the outcome ill-health indicators (except HCFA and MUACFA) were present in the majority of children (50% or more); while all these ill-health indicators were near-uniformly present among the male and the female children, the HIV-EI children had a slightly higher chance than the HIV-EU children. Also, an assessment of anaemia, morbidity, HFA, and WFA could pick up more than 50% of the HIV-exposed children <12 months of age with ill-health and inadequate nutrition and growth and development.

b. 12-23 months of age: In the cross-sectional analysis (for all the indicators except HCFA), ≥75% (quarter 4) of all the unique HIV-exposed children of the age 12-23 months were ever anaemic, and ≥50% (quarter 3) of them were ever morbid, during the study. Similarly, the HFA was ever-inadequate in ≥75% (quarter 4) of the unique children, the WFA in ≥50% (quarter 3), and the MUACFA in <25% (quarter 1). As such, this denoted a high level of ill-health among the HIV-exposed children of age 12-23 months. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the anaemia (quarter 3, lower) and MUACFA (quarter 2, higher). The proportion of the female children having ill-health were the same as that of the total children, except for the HFA (quarter 3, lower) and WFA (quarter 2, lower). The gender differentials in all the outcome indicators were ≥10% in all the indicators; the male children had inadequate HFA, WFA and MUACFA higher than the female children, while the female children had anaemia and acute morbidity higher than the male children.
- The proportion of the HIV-EI children having ill-health tend to be higher and lower than for the MUACFA and acute morbidity (respectively), compared to that of the total children, while for it was the same for the HFA, WFA, and anaemia. Also, the proportion of the HIV-EU children having ill-health (by all the indicators) tend to be lesser than or equal to that of the total children. The share of the HIV-EI children was higher than that of the HIV-EU children for inadequate HFA, WFA, and

MUACFA, while it was near-equal for the anaemia, and lower for the acute morbidity.

However, in the cross-sectional analysis of all the measurements made for the HIV-exposed children of age 12-23 months, ≥75% (quarter 4) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA was inadequate in ≥50% (quarter 3) of the unique children, the WFA and HCFA were inadequate in ≥25% (quarter 2), and the MUACFA was inadequate in <25% (quarter 1). As such, this denoted changes happening in all the indicators, especially the acute morbidity, HFA, and WFA, among the HIV-exposed children of age 12-23 months. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the anaemia (quarter 3, lower). The proportion of the female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the outcome indicators were near-equal or <10%, except for the anaemia, where the difference was ≥10% higher for the female children.
- The proportion of the HIV-EI children having ill-health were the same as that of the total children, except for the HFA (quarter 4, higher) and WFA (quarter 3, higher). The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of the HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except for the acute morbidity and HFA where it was <10%.

Thus, almost all the outcome ill-health indicators (except HCFA and MUACFA) were present in the majority of children (50% or more), and this age had maximum turbulence for all the indicators and all the children. A higher share of the male children had inadequate HFA, WFA, and MUACFA, while a higher share of the female children had anaemia and acute morbidity, compared to their gender counterparts. The HIV-EI children had a slightly higher chance of having all these ill-health indicators (except acute morbidity and HCFA) than the HIV-EU children. Also, an assessment of anaemia, morbidity, HFA, and WFA

could pick up more than 50% of the HIV-exposed children 12-23 months of age with ill-health and inadequate nutrition and growth and development.

c. 24-35 months of age: The HCFA was not ascertained and analyzed for the children of age 24+ months. In the cross-sectional analysis, ≥50% (quarter 3) of all the unique HIV-exposed children of age 24-35 months were ever anaemic and ever morbid, during the study. Similarly, the HFA and the WFA was ever-inadequate in ≥50% (quarter 3) of the unique children, and the MUACFA was ever-inadequate in <25% (quarter 1). As such, this denoted a high level of ill-health among the HIV-exposed children of this age. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the WFA (quarter 2, lower). The proportion of the female children having ill-health were the same as that of the total children, except for the MUACFA (quarter 2, higher). The female children had inadequate HFA, WFA and MUACFA ≥10% higher than the male children; while both had near-equal shares as anaemic and morbid.
- The proportion of the HIV-EI children having inadequate HFA and anaemia tend to be higher than that of the total children, while it was the lesser for WFA. Also, the proportion of the HIV-EU children having ill-health (by all the indicators) were the same as that of the total children. The share of the HIV-EI children was higher than that of the HIV-EU children for inadequate HFA, anaemia and acute morbidity, while it was near-equal for the MUACFA, and lower for the WFA.

However, in the cross-sectional analysis of all the measurements made for the HIV-exposed children of age 24-35 months, ≥50% (quarter 3) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA was inadequate in ≥50% (quarter 3) of the unique children, the WFA was inadequate in ≥25% (quarter 2), and the MUACFA was inadequate in <25% (quarter 1). As such, this denoted changes happening in all the indicators, especially the acute morbidity and WFA, among the HIV-exposed children of age 24-35 months. Also:

- The proportion of the male and female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the outcome indicators were near-equal or <10%, for all the outcome indicators.
- The proportion of the HIV-EI children having ill-health were higher than that of the total children for all the outcome indicators, except for the acute morbidity, which was the same. The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of the HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except for the acute morbidity and HFA where it was <10%.

Thus, almost all the outcome ill-health indicators (except MUACFA) were present in the majority of children (50% or more). A higher share of the female children had inadequate HFA, WFA, and MUACFA than the male children. The HIV-EI children tend to have a slightly higher chance of having all these ill-health indicators (except acute morbidity) than the HIV-EU children. Also, an assessment of anaemia, morbidity, HFA, and WFA could pick up more than 50% of the HIV-exposed children 24-35 months of age with ill-health and inadequate nutrition and growth and development.

d. 36-47 months of age: In the cross-sectional analysis, ≥50% (quarter 3) of all the unique HIV-exposed children of age 36-47 months were ever anaemic and ever morbid, during the study. Similarly, the HFA and the WFA was ever-inadequate in ≥50% (quarter 3) of the unique children, and the MUACFA was ever-inadequate in <25% (quarter 1). As such, this denoted a high level of ill-health among the HIV-exposed children of this age. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the HFA and WFA (quarter 2, lower). The proportion of the female children having ill-health were the same as that of the total children, except for the anaemia (quarter 2, lower). The female children had inadequate HFA and WFA ≥10% higher than the male children; while the male children had anaemia ≥10% higher than the female children; and both had near-equal shares for the acute morbidity and inadequate MUACFA.

- The proportion of HIV-EI children having inadequate MUACFA tend to be higher than that of the total children, while it was the same for other indicators. Also, the proportion of HIV-EU children having inadequate HFA tend to be higher than that of the total children, while it was the same for other indicators. The share of the HIV-EI children was higher than that of the HIV-EU children for inadequate WFA and MUACFA and anaemia, while it was near-equal for HFA and acute morbidity.

However, in the cross-sectional analysis of all the measurements made for the HIV-exposed children of age 36-47 months, ≥50% (quarter 3) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA was inadequate in ≥50% (quarter 3) of the unique children, the WFA was inadequate in ≥25% (quarter 2), and the MUACFA was inadequate in <25% (quarter 1). As such, this denoted changes happening in all the indicators, especially the acute morbidity and WFA, among the HIV-exposed children of age 36-47 months. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the HFA (quarter 2, lower). The proportion of the female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the outcome indicators were near-equal or <10%.
- The proportion of the HIV-EI children having ill-health were higher than that of the total children for all outcome indicators, except for the acute morbidity, which was the same. The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except for the acute morbidity where it was <10%.

Thus, almost all the outcome ill-health indicators (except MUACFA) were present in the majority of children (50% or more). A higher share of the female children had inadequate HFA and WFA, and a higher share of the male children had anaemia. The HIV-EI children tend to have a slightly higher chance of having all these ill-health indicators (except acute morbidity) than the HIV-EU children. Also, an assessment of anaemia, morbidity, HFA,

and WFA could pick up more than 50% of the HIV-exposed children 36-47 months of age with ill-health and inadequate nutrition and growth and development.

e. 48+ months of age: In the cross-sectional analysis of all the measurements made for HIV-exposed children of age 48+ months, ≥50% (quarter 3) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA and the WFA was inadequate in ≥25% (quarter 2) of the unique children, and the MUACFA was inadequate in <25% (quarter 1). Also:

- The proportion of the male children having ill-health were the same as that of the total children, for all the outcome indicators. The proportion of the female children having ill-health were the same as that of the total children, except for the anaemia (quarter 2, lower). The gender differentials in all the outcome indicators were near-equal or <10%, except for the anaemia, which the male children had it ≥10% higher than the female children.
- The proportion of the HIV-EI children having ill-health were higher than that of the total children for all the outcome indicators, except for the MUACFA and acute morbidity, which was the same. The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except for the MUACFA and acute morbidity where it was <10%.

Thus, anaemia was present in the majority of children (50% or more), while all other indicators represented ill-health in less than half of the children. A higher share of the male children had anaemia. The HIV-EI children tend to have a slightly higher chance of having all these ill-health indicators (except MUACFA and acute morbidity) than the HIV-EU children. Also, an assessment of anaemia could pick up more than 50% of the HIV-exposed children 48+ months of age with ill-health and inadequate nutrition and growth and development.

f. 0-59 months of age: On the whole, in the cross-sectional analysis, ≥50% (quarter 3) of all the unique HIV-exposed children of age 0-59 months were ever anaemic and ever morbid, during the study. Similarly, the HFA and the WFA was ever-inadequate in ≥50% (quarter 3) of the unique children, the HCFA was ever-inadequate in ≥25% (quarter 2), and the MUACFA was ever-inadequate in <25% (quarter 1). As such, this denoted a high level of ill-health among the HIV-exposed children of age 0-47 months. Also:

- The proportion of the male children having ill-health were the same as that of the total children, except for the anaemia (quarter 4, higher). The proportion of the female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the other outcome indicators were near-equal.
- The proportion of the HIV-EI children having ill-health were the same as that of the total children in case of the WFA and acute morbidity, while it was higher than that of the total children for the HFA and anaemia (quarter 4), HCFA (quarter 3), and MUACFA (quarter 2). The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of the HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except the WFA and acute morbidity.

However, in the cross-sectional analysis of all the measurements made for the HIV-exposed children of age 0-59 months, ≥50% (quarter 3) were anaemic, and ≥25% (quarter 2) of them were morbid, during the study. Similarly, the HFA was inadequate in ≥50% (quarter 3) of the unique children, the WFA and HCFA were inadequate in ≥25% (quarter 2), and the MUACFA was inadequate in <25% (quarter 1). As such, this denoted changes happening in all the indicators, especially the acute morbidity and WFA, among the HIV-exposed children of age 0-59 months. Also:

- The proportion of the male and female children having ill-health were the same as that of the total children, for all the outcome indicators. The gender differentials in all the outcome indicators were near-equal or <10%.

- The proportion of the HIV-EI children having ill-health were the same as that of the total children, except for the anaemia (quarter 4, higher), WFA (quarter 3, higher) and MUACFA (quarter 2, higher). The proportion of the HIV-EU children having ill-health were the same as that of the total children, for all the outcome indicators. The differentials in the share of HIV-EI children were ≥10% higher than that of the HIV-EU children in all the outcome indicators, except for the acute morbidity, where the difference in the share was <10%.
- The shares of the mild, moderate and severe anaemia were 26.3%, 38.8% and 3.1% among all the measurements for all the HIV-exposed children; these were 38.5%, 57.0% and 4.5% among all the anaemic measurements; the mean Hb value for each category of anaemia were 10.4, 8.9 and 6.2 g/dl (respectively). The gender differential was near-nil, while the HIV-EI children had a higher chance of moderate-severe anaemia and lowered mean Hb values among anemic children compared to the HIV-EU children.
- The shares of the children with single and multiple morbidities were 15.7% and 17.2% for all the HIV-exposed children. The multiple morbidities were commoner in the children <36 months of age and single morbidities in the ≥36 months of age. The differential by gender and HIV status was minimal.
- The mean number of morbidity events among the multi-morbid, morbid and all children were 2.5, 1.8, and 0.6 per assessment.
- Among all the children of 0-59 months of age, the commonest morbidities identified were ARI (60.2%), ADD (14.7%), FUO (13.6%), and skin/mucosal conditions/infections (9.5%). The ARI and ADD formed more than half of all the acute morbidities among all the HIV-exposed children. With the increase in age, the events of ADD decreased, ARI, and skin/mucosal conditions/infections increased, and that of FUO remained near-constant. A screening for the ARI, ADD, skin/mucosal conditions/infections and FUO could help to identify >95% of acute morbidities among the HIV-exposed children.

Thus, ever-inadequate HFA and anaemia were present in more than half of the 0-59 month HIV-exposed children. All these ill-health indicators were near-uniformly present among

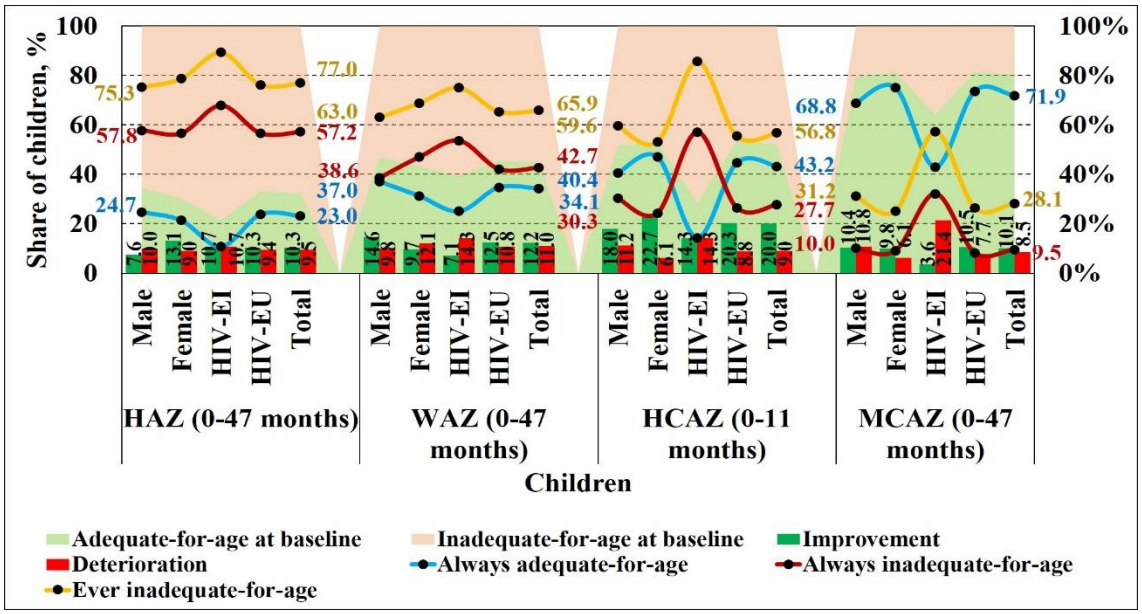
the male and the female children, while the HIV-EI children had a slightly higher chance than the HIV-EU children, except for acute morbidity. In general, an assessment of anaemia, morbidity, HFA, and WFA could pick up more than 50% of the HIV-exposed children 0-59 months of age with ill-health and inadequate nutrition and growth and development. All these could be sensitive to pick up a child of age 0-47 months, while only anaemia could do so for the age 48-59 months.

4.9.2. Consolidated results from the longitudinal analysis of the trajectory of changes.

4.9.2.1. Anthropometric indicators.

The summary of the indicators used in the trajectory analysis of anthropometric measurements for the whole group of the HIV-exposed children (0-47 months) is given in figure 77. It could be seen that cross-sectionally, the share of the children with the adequate anthropometric measurement at baseline increased in the order HFA<WFA<HCFA< MUACFA and the share of the children with the inadequate anthropometric measurement at baseline decreased in the order HFA>WFA>HCFA>MUACFA. On the other hand, trajectory-wise, the share of the children with always-adequate anthropometric measurement increased in the order HFA<WFA<HCFA<MUACFA and the share of the children with always-inadequate anthropometric measurement decreased in the order HFA>WFA>HCFA>MUACFA. The improvements or deteriorations in any of the anthropometric measurements were present in <25% of the total HIV-exposed children. The curve of the ever-inadequate anthropometric measurement assumed the same shape as that of the always-inadequate anthropometric measurement, but at a higher level; the gap between the same was the share of the children changing their anthropometric status (the sum of improvements and deteriorations). On the other hand, the curves for the always-adequate and the always- inadequate anthropometric measurements were complementary to each other (on either side of an arbitrary median horizontal axis line which passes through the mean of the values). Thus, for each category of children, and total children, the individual Y-axis scores (share of children) showed the trends as described below.

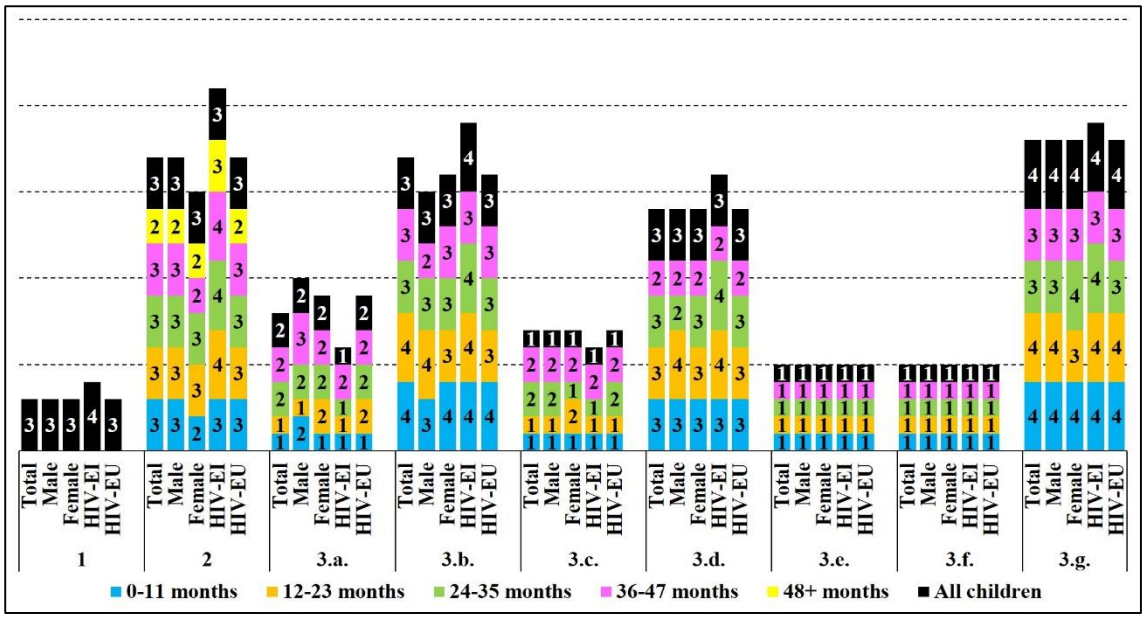
Fig. 77. Summary of trajectory of anthropometric measurements of children (0-47 months).



N of children: HAZ & WAZ: N1=Male=251, N2=Female=244, N3=HIV-EI=28, N4=HIV-EI=467, N5=Total=495; HCAZ: N1=89, N2=66, N3=7, N4=148, N5=155; MCAZ: N1=250, N2=244, N3=28, N4=466, N5=494.

(a) HFA patterns: Longitudinally, <25% of the 0-23-month-old and 25-<50% of the 24-47-month-old HIV-exposed children remained always-HFA-adequate (Fig. 78). With the increase in the age, there was a slow-but-consistent increase in the share of the always-HFA-adequate male children (0-23 months=<25%, 24-47 months=25-<50%), while, that of such female children tend to increase inconsistently (0-11 and 24-35 months=<25%, 12-23 and 36-47 months= 25-<50%). Among the always-HFA-adequate children, despite a similar share among the 0-11-month-old male and female children, the shares of the 12-23 month female and the 24-47 month male children were higher (≥10%) than their gender counterparts. With the increase in the age, there was a slow-but-consistent increase in the share of the always-HFA-adequate HIV-EU children (0-23 months=<25%, 24-47 months=25-<50%), while, that of such HIV-EI children was nearly constant in the 0-35 months of age and then increased (0-35 months=<25%, 36-47 months=25-<50%). Among the always-HFA-adequate children, the share of the HIV-EU children was higher (≥10%) than the HIV-EI children in the 0-35 months of age, while the gap reduced to <10% among the 36-47-month-old. On the whole, <25% of all (male, female, HIV-EI, HIV-EU and total)

Fig. 78. Summary of all indicators of HFA status (categorized values) by age, gender, and HIV status of children.



X-axis: Children by age and gender/HIV status; 1=gross analysis, ever-inadequate unique children; 2=inadequate among age-cross sections (multiple measurements possible for the same child); 3=trajectory analysis, changes in unique children over time: a=adequate at baseline, b=inadequate at baseline, c=always-adequate, d=always-inadequate, e=improvement, f=deterioration, g=ever-inadequate. Y-axis: Share; for X-axis categories (1) and (3): with respect to the total assessed children in that group, for X-axis category (2): with respect to the total measurements made among the children in that group; data labels (numbers mentioned in the bars): 1=<25%. 2=25-<50%; 3=50-<75%; 4=>75%.

The 0-47 month children were always-HFA-adequate. The share of the 0-47 month always-HFA-adequate HIV-EU children was higher (≥10%) than that of such HIV-EI children.

On the other end, 50-<75% of the 0-35 month old and 25-<50% of the 36-47-month-old HIV-exposed children remained always-HFA-inadequate. With the increase in the age, the share of the always-HFA-inadequate male children increased in the year 3 (among the 12-23 month male children with inadequate HFA) and then decreased (0-11 months=50-<75%, 12-23 months=>75%, 24-47 months=25-<50%), while, that of such female children was nearly constant in the 0-35 months of age and then decreased (0-35 months=50-<75%,

36-47 months=25-<50%). Among the always-HFA-inadequate children, the shares of the 0-23 month male and the 24-35 month female children were higher (≥10%) than their gender counterparts, while the gender differential was <10% among the 36-47-month-old. With the increase in the age, the share of the always-HFA-inadequate HIV-EI children increased in the years 2 and 3 (among the 12-35 month HIV-EI children with inadequate HFA) and then decreased (0-11 months=50-<75%, 12-35 months=>75%, 36-47 months= 25-<50%), while, that of such HIV-EU children was nearly constant in the 0-35 months of age and then decreased (0-35 months=50-<75%, 36-47 months=25-<50%). Among the always-HFA-inadequate children, the share of the HIV-EI children was higher (≥10%) than that of the HIV-EU children in the 0-35 months of age, while the gap reduced to <5% among the 36-47-month-old. On the whole, 50-<75% of all (male, female, HIV-EI, HIV-EU and total) the 0-47 month children were always-HFA-inadequate. The share of the 0-47 month always-HFA-inadequate HIV-EI children was higher (≥10%) than that of such HIV-EU children.

From an initial inadequate HFA status, <25% of the 0-47-month-old (in the individual categories by age and gender/HIV status, and total) HIV-exposed children improved their HFA status in the subsequent 12-24 months of life. Except for the higher (≥10%) share of the 0-11 month female and the 12-23 month HIV-EI children (compared to their gender/ HIV counterparts), all the other differentials (by the gender and HIV status) in all the age categories (and in the total group) were near-equal (<10%). As such, the improvement of HFA status, once inadequate, was minimal and near-constant in all the age groups.

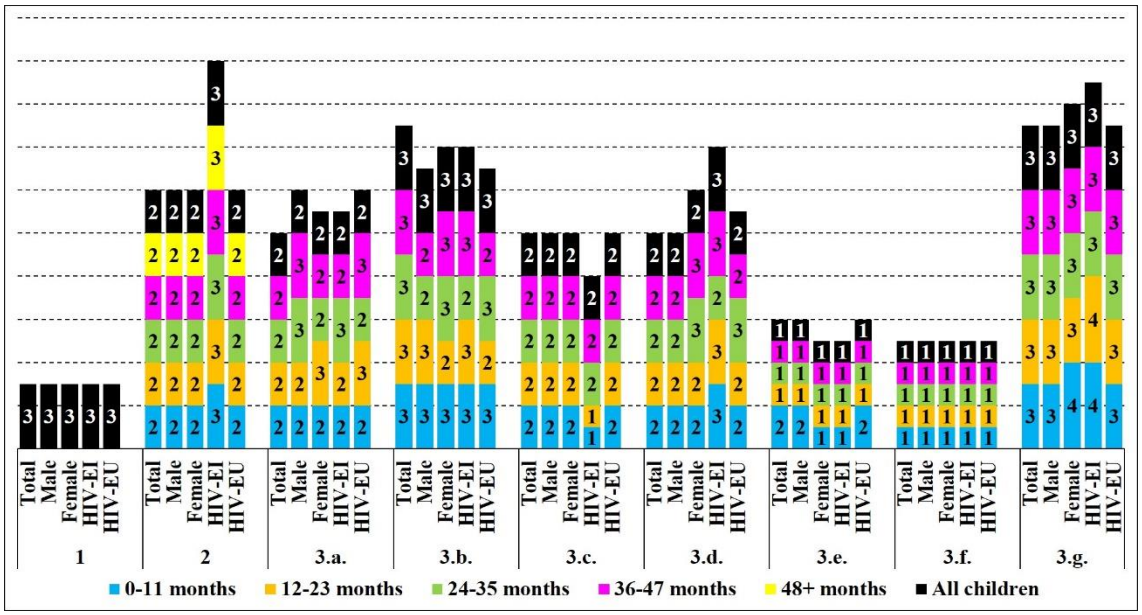
On the other hand, from an initial adequate HFA status, <25% of the 0-47-month-old (in total and individual age categories) HIV-exposed children deteriorated in their HFA status in the subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-EU children having deteriorated in their HFA status remained <25% in all the age categories and among the total children. Except for the higher (≥10%) share of the HIV-EI children compared to the HIV-EU children in the 36-47 months of age, all the other differentials (based on the gender and HIV status) in all the age categories (and total) were near-equal (<10%). As such, the deterioration of HFA status, once adequate, was minimal

and near-constant in all age groups, with differentials based on the gender and HIV status being <10%.

As such, ≥75% of the 0-23 month old and 50-<75% of the 24-47-month-old HIV-exposed children ran a risk of being inadequate HFA ever in life. With the increase in the age, there was a slow-but-consistent decrease in the share of the male children (0-23 months=>75%, 24-47 months=50-<75%) having ever-inadequate HFA status, while, the share of such female children were inconsistent (0-11 and 24-35 months=>75%, 12-23 and 36-47 months=50-<75%). The share of the 12-23 month male children and 24-47 month female children were higher (≥10%) than their gender counterparts in the same age group, while the gender differential was <10% in the 0-11-month-old. With the increase in the age, there was a slow-but-consistent decrease in the share of the HIV-EU children (0-23 months=>75%, 24-47 months=50-<75%) having ever-inadequate HFA status, while, the share of such HIV-EI children was nearly constant in the 0-35 months of age and then decreased (0-35 months=>75%, 36-47 months=50-<75%). The share of the 0-35-month-old HIV-EI children was higher (≥10%) than that of the HIV-EU children in the same age group, while the gap reduced to near-equal in the 36-47-month-old. On the whole, ≥75% of the total, male, female, HIV-EI and HIV-EU children ever had an inadequate HFA status in the 0-47 months of age. The share of the 0-47 month HIV-EI children having ever-inadequate HFA status was ≥10% higher than that of such HIV-EU children.

(b) WFA patterns: Longitudinally, 25-<50% of all the 0-47 month (total and yearly age groups) HIV-exposed children remained with always-adequate WFA in their subsequent 12-24 months of life (Fig.79). With the increase in the age, the shares of the male and female children retaining their adequate WFA status in the subsequent year remained constant (25-<50%). A similar share (<10%) of the 0-35 month male and female children retained their adequate WFA status in the subsequent year, but the share of the male children was higher (≥10%) than that of the female children in the 36-47 month age group. With the increase in the age, there was a slow-but-consistent increase in the share of the HIV-EI children (0-23 months= <25%, 24-47 months=25-<50%) retaining their adequate WFA status in the subsequent year, while, that of the HIV-EU children were nearly

Fig. 79. Summary of all indicators of WFA status (categorized values) by age, gender, and HIV status of children.



X-axis: Children by age and gender/HIV status; 1=gross analysis, ever-inadequate unique children; 2=inadequate among age-cross sections (multiple measurements possible for the same child); 3=trajectory analysis, changes in unique children over time: a=adequate at baseline, b=inadequate at baseline, c=always-adequate, d=always-inadequate, e=improvement, f=deterioration, g=ever-inadequate. Y-axis: Share; for X-axis categories (1) and (3): with respect to the total assessed children in that group, for X-axis category (2): with respect to the total measurements made among the children in that group; data labels (numbers mentioned in the bars): 1=<25%. 2=25-<50%; 3=50-<75%; 4=>75%.

constant (25-<50%) in the 0-47 months of age. So, the share of 0-23 month HIV-EU children were higher (≥10%) than the HIV-EI children in the same age group, while the gap reduced to <10% in 24-47 month children. On the whole, 25-<50% of the total, male, female, HIV-EI and HIV-EU children had always-adequate WFA status in the 0-47 months of age, with differentials based on the gender and HIV status being <10%.

On the other end, 25-<50% of all the 0-47 month (total and yearly age groups) HIV-exposed children remained with always-inadequate WFA in their subsequent 12-24 months of life. With the increase in the age, the share of the male children retaining their inadequate

WFA status in the subsequent year remained constant (25-<50%), while, that of the female children were nearly constant in the 0-23 months of age and then increased (0-23 months=25-<50%, 24-47 months=50-<75%). So, the share of the 24-47 month female children was higher (≥10%) than the male children in the same age group, while the gender differential was <10% in the other age groups. With the increase in the age, the share of the HIV-EI children retaining their inadequate WFA status in the subsequent year remained constant (50-<75%) in all the age groups except the baseline age group of 24-35 months (when it decreased to 25-<50%), while that of the HIV-EU children remained constant (25-<50%) in all the age groups except the baseline age group of 24-35 months (when it increased to 50-<75%). So, the shares of the HIV-EI children in the age groups of 0-23, 24-35 and 36-47 months were higher than, lower than (≥10% in both) and nearly equal to those of the HIV-EU children in the same age group. On the whole, 25-<50% of the total, male, female and HIV-EU children had always-inadequate WFA status in the 0-47 months of age, while it was higher (50-<75%) for the HIV-EI children, which was ≥10% higher than the share of the HIV-EU children.

From an initial inadequate WFA status, 25-<50% of the 0-11-month-old and <25% of the 12-47-month-old HIV-exposed children improved their WFA status in the subsequent 12-24 months of life. The share of the male, female, HIV-EI and HIV-EU children having improved their WFA status remained <25%, and the differentials by gender and HIV status were <10% in the 12-47 months of age. But, in the follow-up period of 0-11 month old (year 2), there was a higher share of the male and the HIV-EU children (25-<50%) improving than the female and the HIV-EI children (<25%); however, the differentials by gender was <10%, and thus, only the differentials by HIV status was important (≥10%). As such, the improvement of WFA status, once inadequate, was minimal and near-constant in 12-47 month age groups, but the improvements were more in the 0-11 month age group mostly because of the improvements in the HIV-EU children.

On the other hand, from an initial adequate WFA status, <25% of the 0-47 month (in total and yearly age categories) HIV-exposed children deteriorated in their WFA status in the subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-

EU children having deteriorated in their WFA status remained <25% in all the age categories and among the total children. Except for the higher (≥10%) share of the 24-35 month HIV-EI children compared to the HIV-EU children in that age group, all the other differentials based on the gender and HIV status in all the age categories (and total) were near-equal or <10%. As such, the deterioration of WFA status, once adequate, was minimal and near-constant in all the age groups, with the differentials based on the gender and HIV status being <10%.

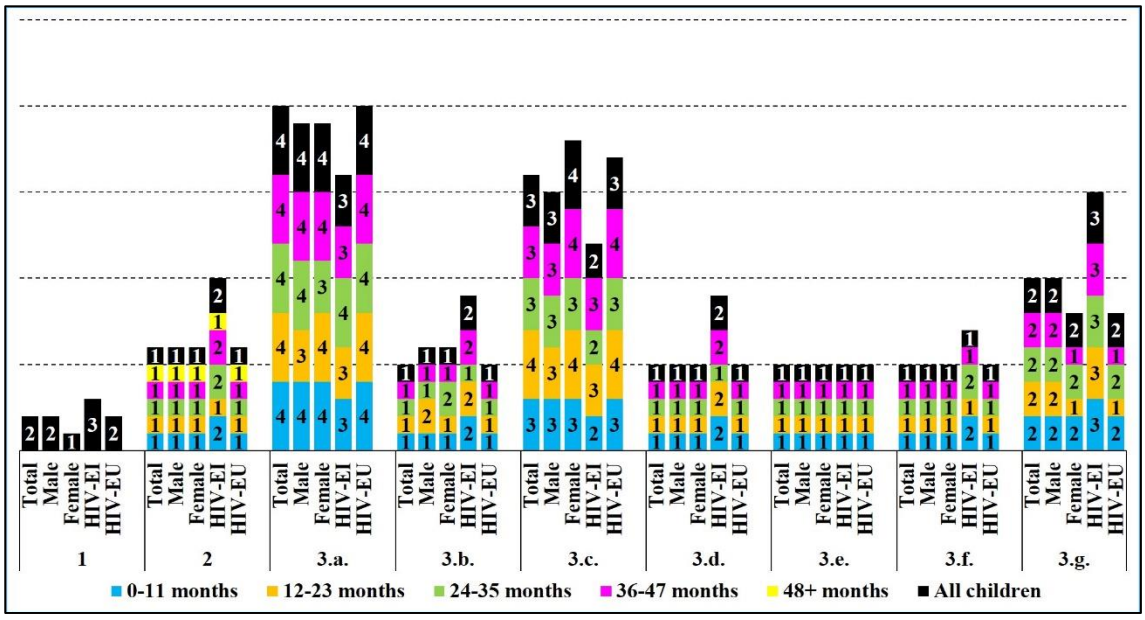
As such, 50-<75% of the 0-47 month (total and yearly age groups) HIV-exposed children ran a risk of being inadequate WFA ever in the subsequent 12-24 months of life. With the increase in age, there was a near-constant share of the male children who ever had inadequate WFA status in the subsequent year. Even if the share of the female children entered quarter 4 (≥75%) in the age group of 0-11 months, the difference with the male children was <5%, and hence both shares could be considered as near-equal. However, the share of the 36-47 month female children was higher (the difference being ≥10%) than that of the male children in the same age group, while the gender differential was <10% in 12-35-month-old. With the increase in the age, there was a slow-but-consistent decrease in the share of the HIV-EI children (0-23 months=>75%, 24-47 months=50-<75%) having ever-inadequate WFA status in the subsequent year, while, that of the HIV-EU children was nearly constant (50-<75%) in the 0-47 months of age (total and yearly age groups). The share of the 0-23 month HIV-EI children was higher (the difference being ≥10%) than the HIV-EU children in the same age group, while the gap reduced to near-equal in the 24-47 month children. On the whole, 50-<75% of the total, male, female and HIV-EU and >75% of the HIV-EI children ever had an inadequate WFA status in the 0-47 months of age, with the differentials based on the gender and HIV status being <10%.

(c) HCFA patterns: 25-<50% of the 0-11 month HIV-exposed children had inadequate HCFA at baseline, with nil gender differentials; but the share of the HIV-EI children was higher (50-<75%) than that of the HIV-EU children (25-<50%), and hence the difference was important (≥10%). 25-<50% of the 0-11 month HIV-exposed children had always-adequate HCFA, with near-nil gender differentials; but the share of the HIV-EI children

was lower (<25%) than that of the HIV-EU children (25-<50%), and hence the difference was important (≥10%). 25-<50% of the 0-11-month-old HIV-exposed children had always-inadequate HCFA; even if the male children (25-<50%) had a higher share than the female children (<25%), the differentials were <10%, and hence not important; but the share of the HIV-EI children was higher (50-<75%) than that of the HIV-EU children (25-<50%), and hence the difference was important (≥10%). The improvement and deterioration of the HCFA status (from an initial inadequate and adequate status respectively) was minimal (quarter 1, <25%), near-constant in all age groups, and with near-nil differentials by gender and HIV status. As such, 50-<75% of the children had inadequate HCFA ever, with nil gender differentials; but the share of the HIV-EI children was higher (>75%) than the HIV-EU children (50-<75%), and hence the difference was important (≥10%). Inadequacy for age was consistently higher in all the HCFA indicators for the HIV-EI children, indicating that those with inadequate HCFA in year 1 tend to continue so in year 2, as the changes were minimal; however, the differentials for the male and the female children were <10%.

(d) MUACFA patterns: Longitudinally, 50-<75% of the 0-11 and 24-47-month-old and >75% of the 12-23-month-old HIV-exposed children remained with always-adequate MUACFA in their subsequent 12-24 months of life (Fig. 80). With the increase in the age, there was a near-constant share (50-<75%) of the male children retaining their adequate MUACFA status in the subsequent year, while, that of the female children was inconsistent (0-11 and 24-35 months=50-<75%, 12-23 and 36-47 months=>75%). A similar share of the 0-11 and 24-35 month male and female children retained their adequate MUACFA status in the subsequent year. Even though the shares of the 12-23 and 36-47 month female children were higher than that of the male children quarter-wise, the difference was ≥10% only in the 12-23 month age group. Hence, except for the higher share of the female children having always-adequate MUACFA than that of such male children in the 12-23 month age group, there were no other gender differentials in the criteria of always-adequate MUACFA. With the increase in age, the shares of both the HIV-EU (0-11 and 24-35 months=50-<75%, 12-23 and 36-47 months=≥75%) and the HIV-EI (0-11 and 24-35 months=25-<50%, 12-23 and 36-47 months=50-<75%) children retaining their adequate MUACFA status in the subsequent year were inconsistent. However, the share of HIV-

Fig. 80. Summary of all indicators of MUACFA status (categorized values) by age, gender, and HIV status of children.



X-axis: Children by age and gender/HIV status; 1=gross analysis, ever-inadequate unique children; 2=inadequate among age-cross sections (multiple measurements possible for the same child); 3=trajectory analysis, changes in unique children over time: a=adequate at baseline, b=inadequate at baseline, c=always-adequate, d=always-inadequate, e=improvement, f=deterioration, g=ever-inadequate. Y-axis: Share; for X-axis categories (1) and (3): with respect to the total assessed children in that group, for X-axis category (2): with respect to the total measurements made among the children in that group; data labels (numbers mentioned in the bars): 1=<25%. 2=25-<50%; 3=50-<75%; 4=>75%.

EU children were higher (≥10%) than that of the HIV-EI children in all the age groups. On the whole, 50-<75% of the total, male and HIV-EU children, >75% of the female children and 25-<50% of the HIV-EI children had always-adequate MUACFA status in the 0-47 months of age. Even though the share of the female children was higher than that of the male children quarter-wise, the difference was <10%; however, the share of the HIV-EU children was higher than that of the HIV-EI children quarter-wise, with the difference being ≥10%. Hence, the share of the 0-47 month (in all the yearly age groups and the total) HIV-EU children having always-adequate MUACFA status was ≥10% higher than that of the HIV-EI children in the same age group.

On the other end, <25% of the 0-47 month (total and yearly age groups) HIV-exposed children remained with always-inadequate MUACFA in their subsequent 12-24 months of life. With the increase in the age, the shares of the male and female children (total and yearly age groups) retaining their inadequate MUACFA status in the subsequent year were nearly constant (<25%), and the difference was <10% (meant that the differential was near-nil). With the increase in the age, the shares of the HIV-EI children retaining their inadequate MUACFA status in the subsequent year remained constant for the 0-23 and 36-47 months of age, while it showed a decrease in 24-35 months of age (0-23, 36-47 months=25-<50%, 24-35 months=<25%); while the share of the HIV-EU children was nearly constant in 0-47 months of age (<25%). However, the share of all the 0-47 month (total and yearly age groups) HIV-EI children was higher (≥10%) than that of the HIV-EU children in the same age group. On the whole, <25% of the total, male, female and HIV-EU children had always-inadequate MUACFA status in the 0-47 months of age, while this was of the order 25-<50% for the HIV-EI children. The HIV-EI children had a higher share (≥10%) of always-inadequate MUACFA status, in all the yearly ages and the total 0-47 month life, compared to the HIV-EU children in the same age group.

From an initial inadequate MUACFA status, <25% of the 0-47 month (total and yearly age categories) HIV-exposed children improved their MUACFA status in the subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-EU children having improved their MUACFA status remained <25% in all the age categories and among the total children. Except for the higher (≥10%) share of the male children compared to the female children in the 12-23 month age group, and the higher (≥10%) share of the HIV-EU children compared to the HIV-EI children in the 12-35 month age group, all the other differentials based on the gender and HIV status in all the age categories and the total were near-nil (<10%). As such, the improvement of MUACFA status, once inadequate, was minimal and near-constant in all the age groups, except that it was higher among the male children compared to the female children in the 12-23 month age group.

On the other hand, from an initial adequate MUACFA status, <25% of the 0-47 month (total and yearly age categories) HIV-exposed children deteriorated in their MUACFA

status in the subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-EU children having deteriorated in their MUACFA status remained <25% among the total children. The gender differentials were not so marked (difference <10%) in all the age groups and among the total children. Even though the share of the deteriorating HIV-EI children was the same as that of the HIV-EU children in the yearly age group of 12-23 months and the total 0-47 month age group, the difference was≥10% in them; on the other hand, the higher quarter-wise share of the HIV-EI children implied a difference ≥10% compared to that of the HIV-EU children in the age groups of 0-11 and 24-35 months. Thus, there was a higher tendency among the HIV-EI children of the age 0-35 months, and among the total 0-47 month HIV-EI children, to deteriorate, compared to the HIV-EU children in the same age group. As such, the deterioration of MUACFA status, once adequate, was minimal and near-constant in all the age groups, except for the higher tendency of the HIV-EI children to deteriorate from their initial adequate HFA status in the initial 0-35 months.

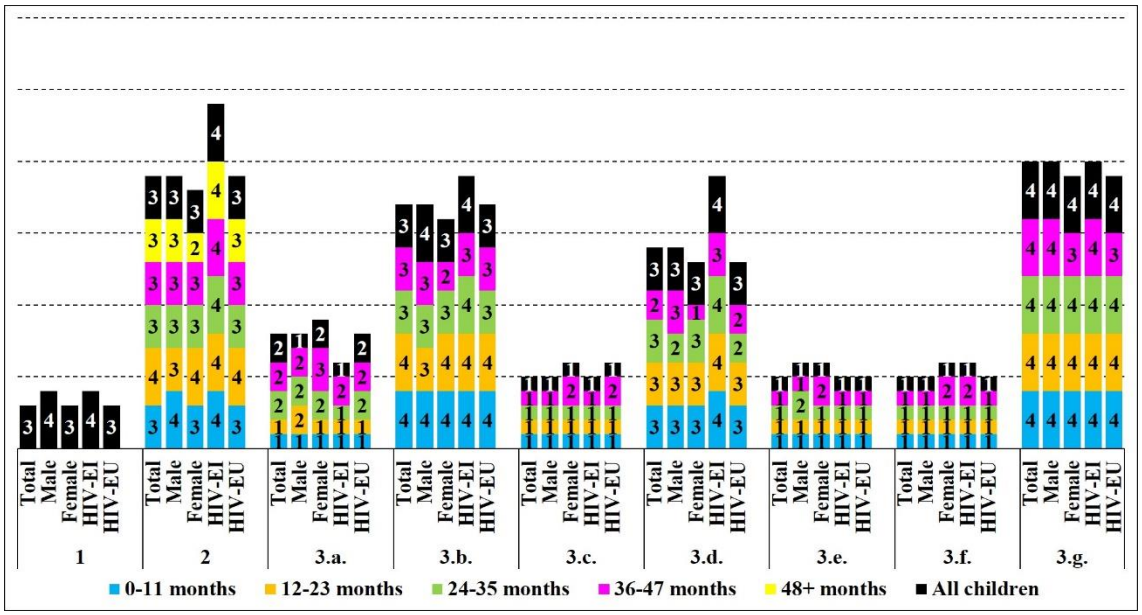
As such, 25-<50% of the 0-47 month (total and yearly age categories) HIV-exposed children ran a risk of being inadequate MUACFA ever in the subsequent 12-24 months of life. With the increase in the age, there was a constant share (25-<50%) of the male children who ever had inadequate MUACFA status, while, that of the female children was inconsistent (0-11 and 24-35 months=25-<50%, 12-23 and 36-47 months=<25%). However, only the share of the 12-23 month male children was higher (≥10%) than their gender counterpart in the same age group, while the gender differential was <10% in the other age groups. With the increase in the age, there was an inconsistent share of the HIV-EU children (0-11 and 24-35 months=25-<50%, 12-23 and 36-47 months=<25%) being ever-inadequate in the MUACFA status, while, that of the HIV-EI children was nearly constant (50-<75%) in the 0-47 months of age (total and yearly age categories). On the whole, 25-<50% of the total, male, female and HIV-EU children, and 50-<75% of the HIV-EI children ever had inadequate MUACFA status in the 0-47 months of age. The share of the HIV-EI children having ever-inadequate MUACFA status was ≥10% higher than that of the HIV-EU children in the same age group (total and yearly age categories).

4.9.2.2. Anaemia.

Longitudinally, <25% of the 0-47 month (total and yearly age groups) HIV-exposed children remained with always-adequate Hb in their subsequent 12-24 months of life (Fig. 81). With the increase in the age, the share of the male children retaining their adequate Hb status in the subsequent year remained constant (<25%), while, that of the female children also remained constant in the age of 0-35 months (<25%) and increased later (36-47 months=25-<50%). Hence, a similar share of the 0-35 month male and female children retained their adequate Hb status in the subsequent year, but the share of 36-47 month female children was higher (≥10%) than that of the male children in the same age group. With the increase in the age, the share of the HIV-EU children retaining their adequate Hb status in the subsequent year remained constant in the age of 0-35 months (<25%) and increased later (36-47 months=25-<50%), while that of the HIV-EI children remained constant (<25%). The share of the 24-47 month HIV-EU children was higher (≥10%) than that of the HIV-EI children in the same age group. On the whole, <25% of the total, male, female, HIV-EI and HIV-EU children had always-adequate Hb status in the 0-47 months of age (or years 0-5 of life). The share of the HIV-EU children having always-adequate Hb status was ≥10% higher than that of the HIV-EI children in the 0-47 months of age (the difference being mostly in the 24-47 months of age, or years 3-5 of life), while the gender differential was <10%.

On the other end, 50-<75% of the 0-35-month-old and 25-<50% of the 36-47-month-old HIV-exposed children remained with always-inadequate Hb in their subsequent 12-24 months of life. With the increase in the age, the shares of the male and the female children remained nearly constant (50-<75%), except for the male children in the age of 24-35 months (25-<50%) and for the female children in the age of 36-47 months (<25%). The shares of the 12-23 month female children and 36-47 month male children were higher (≥10%) than their gender counterpart in the same age group, while the gender differential was <10% in the other age groups, and in the total 0-47 months of age. With the increase in the age, there was a slow-but-consistent decrease in the share of the HIV-EI (0-35 months=>75%, 36-47 months=50-<75%) and the HIV-EU (0-35 months=50-<75%, 36-47

Fig. 81. Summary of all indicators of Hb status (categorized values) by age, gender, and HIV status of children.



X-axis: Children by age and gender/HIV status; 1=gross analysis, ever-inadequate unique children; 2=inadequate among age-cross sections (multiple measurements possible for the same child); 3=trajectory analysis, changes in unique children over time: a=adequate at baseline, b=inadequate at baseline, c=always-adequate, d=always-inadequate, e=improvement, f=deterioration, g=ever-inadequate. Y-axis: Share; for X-axis categories (1) and (3): with respect to the total assessed children in that group, for X-axis category (2): with respect to the total measurements made among the children in that group; data labels (numbers mentioned in the bars): 1=<25%. 2=25-<50%; 3=50-<75%; 4=>75%.

months=25-<50%) children retaining their inadequate Hb status in the subsequent year; and in each yearly age group and the total 0-47 months of age, the share of the HIV-EI children was higher than (≥10%) that of the HIV-EU children. On the whole, 50-<75% of the total, male, female and HIV-EU children, and >75% of the HIV-EI children, had always-inadequate Hb status in the 0-47 months of age. The share of the 0-47 month HIV-EI children having always-inadequate Hb status was≥10% higher than that of the HIV-EU children in the same age group, while the gender differential was <10%.

From an initial inadequate Hb status, <25% of the 0-47 month (total and yearly age categories) HIV-exposed children improved their Hb status in their subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-EU children having improved their Hb status remained <25% in all the age categories (except for the 24-35 month male children and the 36-47 month female children, 25-<50%) and among the total children. Except for the higher (≥10%) shares of the 36-47 month female children compared to the male children in that age group, and the 0-35 month HIV-EU children compared to the HIV-EI children in that age group, all the other differentials based on the gender and HIV status in all the age categories and the total were near-equal or <10%. As such, the improvement of Hb status, once inadequate, was minimal and near-constant in all the age groups, and mostly due to the improvements among the HIV-EU children.

On the other hand, from an initial adequate Hb status, <25% of the 0-47 month (total and yearly age categories) HIV-exposed children deteriorated in their Hb status in their subsequent 12-24 months of life. The share of the total, male, female, HIV-EI and HIV-EU children having deteriorated in their Hb status remained <25% in all the age categories (except for the female children and the HIV-EI children in the 36-47 months of age, 25-<50%) and among the total children. Except for the higher (≥10%) shares of the 12-23 month male children and the 36-47 month female children, compared to their gender counterpart in the same age group, there were no other important gender differentials in the deterioration. The share of the HIV-EU children deteriorating was higher (≥10%) than that of the HIV-EI children in the age groups of 0-11 and 24-35 months, while the share of the HIV-EI children was higher (≥10%) in the 36-47 months. As such, the deterioration of Hb status, once adequate, was minimal and near-constant in all the age groups, with the differentials based on the gender and HIV status being <10%.

As such, >75% of the HIV-exposed children (in the total 0-59 month life and in the individual yearly age groups) and the subgroups (the male, female, HIV-EI and HIV-EU children) ran a risk of being inadequate Hb ever in the subsequent 12-24 months of life, except for the female and the HIV-EU children (50-<75%) in the 36-47 month age group (year 5 of life). The share of the female children was higher (≥10%) than that of the male

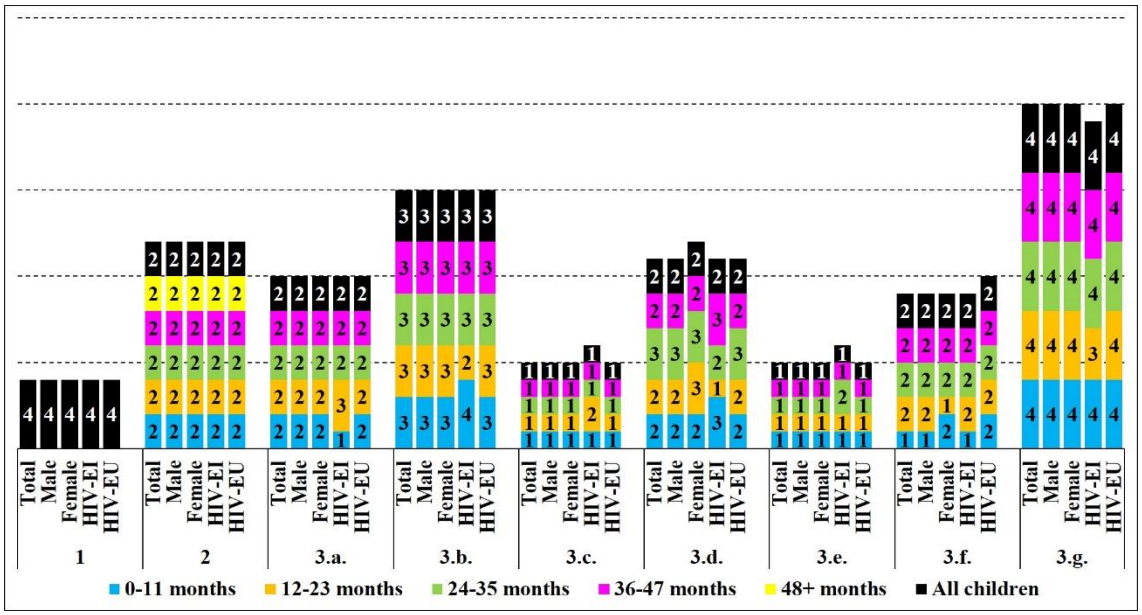
children in the age group of 36-47 months, and the share of the HIV-EI children was higher (≥10%) than that of the HIV-EU children in the age group of 24-47 months. However, the gender differential was <10% in the total age group (0-47 months) of children, and hence the only important differential was between the HIV-EI and HIV-EU children (≥10%).

4.9.2.3. Acute morbidity.

Most of the HIV-exposed (HIV-EI and HIV-EU) children were morbid at least once through the course of the study and were detected as morbid in the baseline assessment. Hence, very fewer numbers of the HIV-EI children remained non-morbid after baseline, rendering the variables used to describe the patterns of morbidity non-comparable between the HIV-EI and HIV-EU children, and reliably non-quantifiable for the HIV-EI children. So, the quantum of morbidity in the HIV-EI and HIV-EU children (quarter-values), and the differential between them, were ignored in the yearly age categories. As such, among the 0-47 month (total and yearly age groups) HIV-exposed children (total, male, female, HIV-EI and HIV-EU):

- 50-<75% of the HIV-exposed children were morbid at the baseline (cross-sectionally) (Fig. 82); the share of the morbid female children was higher (≥10%) than that of such male children in the age group of 12-23 months; and, during the subsequent 12-24 months of follow-up:
    - 25-<50% of the total children (or two-thirds of the morbid children) were always-morbid; the share of the always-morbid female children was higher (≥10%) than that of such male children in the age group of 12-23 months;
    - <25% of the total children (or one-third of the morbid children) improved upon their morbid status and became healthy;
- 25-<50% of the HIV-exposed children were non-morbid at baseline (cross-sectionally); and, during the subsequent 12-24 months of follow-up:
    - <25% of the total children (or half of the non-morbid children) were always-non-morbid;
    - 25-<50% of the total children (or most of the non-morbid children) deteriorated from their non-morbid status and became unhealthy;

Fig. 82. Summary of all indicators of morbidity status (categorized values) by age, gender, and HIV status of children.



X-axis: Children by age and gender/HIV status; 1=gross analysis, ever-morbid unique children; 2=morbid among age-cross sections (multiple measurements possible for the same child); 3=trajectory analysis, changes in unique children over time: a=non-morbid at baseline; b=morbid at baseline; c=always-non-morbid; d=always-morbid; e=improvement; f=deterioration; g=ever-morbid. Y-axis: Share; for X-axis categories (1) and (3): with respect to the total assessed children in that group, for X-axis category (2): with respect to the total measurements made among the children in that group; data labels (numbers mentioned in the bars): 1=<25%. 2=25-<50%; 3=50-<75%; 4=>75%.

- >75% of the children (or most of the children) were ever-morbid; and,
- 25-<50% of the assessments identified acute morbidity.

Box 5. Summary of the patterns of growth and development, nutrition, morbidity, and mortality among the HIV-exposed children.

In the trajectory analysis, there were two positive (adequate at baseline, and always-adequate) and three negative (inadequate at baseline, always-inadequate and ever-

inadequate) indicators used in the trajectory analysis of anthropometric z-scores, in addition to the improvement and deterioration. The indicators of 'adequate at baseline' and 'inadequate at baseline' meant the child's chances of being regarded as healthy and unhealthy (respectively) as inferred from one-time measurement (for the baseline age group). The other three (always-adequate, always-inadequate, and ever-inadequate) depicted the events that happened in the subsequent 12-24 months, and hence in the next year to that age mentioned in the baseline age. These indicators were also customized for the anaemia and morbidity status (always-anaemic, always-non-morbid, ever-morbid, etc.)

The gross one-shot picture of the anthropometry patterns among the HIV-exposed children (0-47 months) was that (Fig. 77):

- the adequate anthropometric measurement increased in the order HFA<WFA< HCFA<MUACFA and the inadequate anthropometric measurement decreased in the order HFA>WFA>HCFA>MUACFA,
- the always-adequate anthropometric measurement increased in the order HFA< WFA<HCFA<MUACFA and the always-inadequate anthropometric measurement decreased in the order HFA>WFA>HCFA> MUACFA,
- the improvements and/or deteriorations in any of the anthropometric measurements were present only in <25% of the total HIV-exposed children,
- the curve of the ever-inadequate anthropometric measurement assumed the same shape as that of the always-inadequate anthropometric measurement, but at a higher level in Y-axis; the gap between being the changes in anthropometric status over time (the sum of improvements and deteriorations), and,
- the curves for the always-adequate and the always-inadequate anthropometric measurements were complementary to each other (on either side of an arbitrary median horizontal axis line which passes through the mean of the values).

The inadequate HFA status was:

- present in the 0-59-month-old children, in the order of:
    - ≥75% among the HIV-EI children,

- 50-<75% among the male, female, HIV-EU and total HIV-exposed children, and,
- higher among the HIV-EI than the HIV-EU children, but near-equal among the male and female children;

- mostly encountered in the age of:
  - 12-23 months among the male, female and HIV-EU children,
  - 12-35 months among the HIV-EI and total HIV-exposed children, and,
  - became increasingly adequate at higher ages, for all the children;
- relatively higher among the:
  - male children (compared to the female children) in the age of <36 months,
  - female children (compared to the male children) in the age of 36+ months, and,
  - HIV-EI children (compared to the HIV-EU children) in all the age groups;
- present in the 0-47-month-old children, during the subsequent 12-24 month life, as:
  - always absent in (always-HFA-adequate) <25% of the male, female, HIV-EI, HIV-EU and total HIV-exposed children; more in the HIV-EU children (compared to the HIV-EI children), and near-equal in the male and female children,
  - always present in (always-HFA-inadequate) 50-<75% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
  - improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once inadequate, the improvement was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
  - newly developed (deterioration) in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once adequate, the deterioration was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,

- ever present in (ever-HFA-inadequate) ≥75% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
- for all the HIV-exposed children in general, the always-adequate HFA status increased, and the always-inadequate HFA status decreased, with the increase in the age, to converge and stabilize (at 25-<50%) during the follow-up of children of age 36-47 months (that is, year 5 of life),
- the HIV-EI children had a delay of 1 year for the always-adequate and ever-inadequate HFA status, and of 2 years for the always-inadequate HFA status to catch up with the rates of such HIV-EU children, and,
- the female children tend to catch up with the rates of the male children for always-adequate, always-inadequate and ever-inadequate HFA status in year 5 of the life (a year later than the male children) after they departed from their trails in the year 2 of life.

The inadequate WFA status was:

- present in the0-59-month-old children, in the order of:
  - 50-<75% among the male, female, HIV-EU, HIV-EI, and total HIV-exposed children, and,
  - near-equal among the male and female children, and the HIV-EI and HIV-EU children;
- mostly encountered in the age of:
  - <12 and 24-35 months among the male children, for whom it became increasingly adequate at higher ages,
  - 36-47 months among the HIV-EU, for whom it remained nearly unchanged in higher ages, and,
  - 36+ months among the female, HIV-EI and total HIV-exposed children, for whom it became increasingly inadequate at higher ages;
- relatively higher among the:
  - male children (compared to the female children) in the age of <36 months,

- female children (compared to the male children) in the age of 36+ months, and,
- HIV-EI children (compared to the HIV-EU children) in all the age groups;

- present in the 0-47-month-old children, during the subsequent 12-24 month life, as:
  - always absent in (always-WFA-adequate) 25-<50% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
  - always present in (always-WFA-inadequate) 50-<75% of the HIV-EI children, and 25-<50% of the male, female, HIV-EU and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
  - improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once inadequate, the improvement was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
  - newly developed (deterioration) in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once adequate, the deterioration was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
  - ever present in (ever-WFA-inadequate) ≥75% of the HIV-EI children and 50-<75% of the male, female, HIV-EU and total HIV-exposed children; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
  - the initial lesser share of the always-WFA-adequate HIV-EI children (in the age of 0-23 months) caught up with the rates of such HIV-EU children in the year 4 of life, and,
  - the HIV-EI children had a delay of 2 years (≥75% in the 0-23 month age) in catching up with the share of the ever-WFA-inadequate HIV-EU children (50-<75% in year 4).

The inadequate HCFA status was:

- present in the 0-59-month-old children, in the order of:
    - 25-<50% among the male and HIV-EI children,
    - <25% among the female, HIV-EU and total HIV-exposed children, and,
    - near-equal among the HIV-EI and HIV-EU children, and the male and female children;
- mostly encountered in the age of:
    - <12 months among the male, female, HIV-EI, HIV-EU and total HIV-exposed children, and,
    - became increasingly adequate at higher ages, for all the children;
- relatively higher among the:
    - male children (compared to the female children) in all the age groups, and,
    - HIV-EI children (compared to the HIV-EU children) in all the age groups;
- present in the 0-11-month-old children, during the subsequent 12-24 month life, as:
    - always absent in (always-HCFA-adequate) 25-<50% of the male, female, HIV-EU and total HIV-exposed children, and <25% of the HIV-EI children; more in the HIV-EU children (compared to the HIV-EI children), and near-equal in the male and female children,
    - always present in (always-HCFA-inadequate) 50-<75% of the HIV-EI children, 25-<50% of the male, HIV-EU and total HIV-exposed children, and <25% of the female children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
    - improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once inadequate, the improvement was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
    - newly developed (deterioration) in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once adequate, the deterioration was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children, and,

- ever present in (ever-HCFA-inadequate) ≥75% of the HIV-EI children and 50-<75% of the male, female, HIV-EU and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children.

The inadequate MUACFA status was:

- present in the 0-59-month-old children, in the order of:
  - 50-<75% among the HIV-EI children,
  - 25-<50% among the male, HIV-EU and total HIV-exposed children,
  - ≤25% among the female children, and,
  - higher among the HIV-EI than the HIV-EU children, but near-equal among the male and female children;
- mostly encountered in the age of:
  - <12 months among the female children, for whom it remained nearly unchanged in higher ages,
  - <12 and 36-47 months among the HIV-EI children, for whom it became increasingly inadequate at higher ages, but with fluctuations,
  - <12 and 36+ months among the male children, for whom it became slowly increasingly adequate at higher ages,
  - <12 and 48+ months among total HIV-exposed children, for whom it became increasingly inadequate at higher ages, especially after 24 months of age, and,
  - <12 and 48+ months among the HIV-EU children, for whom it became increasingly adequate at higher ages, but with fluctuations;
- relatively higher among the:
  - male children (compared to the female children) in all the age groups, and,
  - HIV-EI children (compared to the HIV-EU children) in all the age groups;
- present in the 0-47-month-old children, during the subsequent 12-24 month life, as:
  - always absent in (always-MUACFA-adequate) ≥75% of the female children, 50-<75% of the male, HIV-EU and total HIV-exposed children,

and 25-<50% of the HIV-EI children; more in the HIV-EU children (compared to the HIV-EI children), and near-equal in the male and female children,

- always present in (always-MUACFA-inadequate) 25-<50% of the HIV-EI children and <25% of the male, female, HIV-EU and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
- improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once inadequate, the improvement was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
- newly developed (deterioration) in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once adequate, the deterioration was minimal; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
- ever present in (ever-MUACFA-inadequate) 50-<75% of the HIV-EI children and 25-<50% of the male, female, HIV-EU and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children, and,
- the initial higher share of the always-MUACFA-inadequate HIV-EI children (in the age of 0-23 months) caught up with the (lower) rates of the HIV-EU children in the year 4 of life, but only to deteriorate and diverge further in the year 5 of life.

The anaemia was:

- present in the 0-59-month-old children, in the order of:
  - ≥75% among the male and HIV-EI children,
  - 50-<75% among the female, HIV-EU and total HIV-exposed children, and,
  - higher among the HIV-EI than the HIV-EU children, but near-equal among the male and female children;
- mostly encountered in the age of:

- 12-35 months among the HIV-EU and total HIV-exposed children, for whom it became increasingly non-anaemic at higher ages,
- <36 among the male and female children, for whom it became increasingly non-anaemic at higher ages, and,
- <48 months among the HIV-EI children, for whom it remained nearly unchanged between 0-47 months, but showed the signs of reversal in the 48+ months;

- relatively higher among the:
  - male children (compared to the female children) in the age of <12, 24-35 and 48+ months,
  - female children (compared to the male children) in the age of 12-23 and 36-47 months, and,
  - HIV-EI children (compared to the HIV-EU children) in all the age groups;
- present in the 0-47-month-old children, during the subsequent 12-24 month life, as:
  - always absent in (always-Hb-adequate) <25% of the male, female, HIV-EI, HIV-EU and total HIV-exposed children; more in the HIV-EU children (compared to the HIV-EI children), and near-equal in the male and female children,
  - always present in (always-Hb-inadequate) ≥75% of the HIV-EI children and 50-<75% of the male, female, HIV-EU and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
  - improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once inadequate, the improvement was minimal; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children,
  - newly developed (deterioration) in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once adequate, the deterioration was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,

    - ever present in (ever-Hb-inadequate) ≥75% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; more in the HIV-EI children (compared to the HIV-EU children), and near-equal in the male and female children, and,
    - the female and the HIV-EU children tend to improve in their always-adequate Hb status in the year 5 of their life more than the male and the HIV-EI children (respectively).
- of the types:
    - mild, moderate and severe, which formed 38.5%, 57.0% and 4.5% among all the anaemic measurements, and,
    - the HIV-EI children had a higher chance of moderate-severe anaemia and lowered mean Hb values compared to the HIV-EU children, but with near-nil gender differential.

The acute morbidity was:

- present in the 0-59-month-old children, in the order of:
    - ≥75% among the male, female, HIV-EI, HIV-EU and total HIV-exposed children,
    - near-equal among the HIV-EI and HIV-EU children, and the male and female children, and,
    - the mean number of morbidities among all, morbid and multi-morbid children were 0.6, 1.8 and 2.5 respectively;
- mostly encountered in the age of:
    - <59 months (all age groups) among the male, female, HIV-EI, HIV-EU and total HIV-exposed children, for whom it was near-equally and constantly present, but more:
        - multiple morbidities in <12 and 24-47 months, and single morbidities in 12-23 and 48+ months among the female children,
        - multiple morbidities in <24 months, and single morbidities in 24+ months among the male children,

        - multiple morbidities in <24 and 48+ months, and single morbidities in 24-47 months among the HIV-EI children, and,
        - multiple morbidities in <36 months, and single morbidities in 36+ months among the HIV-EU and total HIV-exposed children;
- present in the 0-47-month-old children, during the subsequent 12-24 month life, as:
    - always absent in (always-non-morbid) <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
    - always present in (always-morbid) 25-<50% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
    - improved in <25% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, once morbid, the improvement was minimal; near-equal in the male and female children, and the HIV-EI and HIV-EU children,
    - newly developed (deterioration) in 25-<50% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; hence, the deterioration was higher, even if identified as morbid once; near-equal in the male and female children, and the HIV-EI and HIV-EU children, and,
    - ever present in (ever-morbid) $\geq$75% of the male, female, HIV-EI, HIV-EU, and total HIV-exposed children; near-equal in the male and female children, and the HIV-EI and HIV-EU children;
- of the types:
    - ARI (60.2%), ADD (14.7%), FUO (13.6%), skin/mucosal conditions/ infections (9.5%), worm infestation (1.3%), tuberculosis (TB; 0.3%) and others (0.3%);
    - and cumulatively:
        - ARI and ADD formed >50% of all the acute morbidities,
        - ARI, ADD, and skin/mucosal conditions/infections formed >75% of all the acute morbidities, and,

        - ARI, ADD, skin/mucosal conditions/infections and FUO together formed >95% of all acute morbidities;
    - and with the increase in the age of the child, the:
        - ADD events decreased,
        - ARI and skin/mucosal conditions/infections events increased,
        - FUO events remained nearly constant,
        - TB was reported in higher ages among the HIV-EI children than the HIV-EU children, and,
        - other acute morbidities remained near-equally and constantly present in all ages;
    - and compared to the female children, the male children tend to have:
        - greater FUO events, and lesser ADD and ARI events in 0-11 months,
        - lesser FUO events in 12-23 months,
        - greater ARI events, and lesser dermatological events in 36-47 months, and,
        - other acute morbidities near-equally (present in both genders).

Nearly half (44.7%) of the HIV-exposed children had indicated vitamin/mineral deficiencies; the presence and severity of deficiencies were higher among the HIV-EI children, compared to the HIV-EU children. The mean maximum number of ever deficient vitamins/minerals among all children was 6.6. Vitamins B (B6, B7, B2, and B3), C and E were commonly deficient among all the children, while vitamins A and D and iron were additionally deficient among the HIV-EI children. More than 50% of the HIV-EI children had been indicated as deficient for the vitamins B2, B3, B6, B7, C and E. The deficiencies of the vitamins B3 and C tend to be higher among the HIV-EU children, and of the vitamin B6 among the HIV-EI children. The deficiency signs/symptoms persisted in about one-fifth of the children for $\geq$50% of the follow-up period, with a higher persistence among the HIV-EI children.

Only 1.2% of the total children were identified with chronic morbidities, and all of these were among the HIV-EU children. The chronic diseases/conditions were birth injury/congenital anomaly/cerebral palsy, cleft lip/cleft palate and epilepsy, and ichthyosis and bronchial asthma. All these children had acute morbidities, and some of them had associated developmental/language delay. On the other hand, only 0.6% of the total children had (psychomotor and social) developmental delay, and 1.1% had a language delay. Sickness absenteeism was reported in about one-in-tenth of the children; this was more among the male HIV-EI and the female HIV-EU children. Only 0.9% of the children were dead during the study, and most of these children were HIV-EU. As such, all these variables were excluded from the list of outcome variables and were retained only as a covariate. Causes and characteristics of the mortality are included in the next chapter.

CHAPTER 5

RESULTS:

FACTORS ASSOCIATED WITH INADEQUATE ANTHROPOMETRIC SCORES FOR AGE, ANAEMIA, ACUTE MORBIDITY, MORTALITY AND HIV INFECTION IN HIV-EXPOSED CHILDREN

This chapter includes:

CHAPTER 5
RESULTS: FACTORS ASSOCIATED WITH INADEQUATE ANTHROPOMETRIC SCORES FOR AGE, ANAEMIA, ACUTE MORBIDITY, MORTALITY AND HIV INFECTION IN HIV-EXPOSED CHILDREN

As per the plan for analysis mentioned in chapter 2 (section 4.2. and table 17), the OR and the p-value were ascertained to identify the key factors associated with the outcome indicators. As discussed in chapter 4, the outcome indicators for the BLR (BLR) were limited to anthropometric indices, anaemia, presence and burden of acute morbidity, and HIV infection. Subsequently, the child deaths were characterized, and cause(s) of deaths were analyzed. The covariates which were not found to be statistically significant during the BLR analysis are listed in annexure 11.

5.1. Factors associated with the inadequate anthropometric scores for age among the children.

The factors associated with the growth and development outcomes (ever-inadequate anthropometric scores for age) of the HIV-exposed children were ascertained.

5.1.1. Height for age.

The covariates for which the bivariate significance was obtained for the ever-inadequate HFA status among the children is listed in table 49. These covariates were applicable to the 6 sub-groups of children (children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy or sub-group HFA-2.1, children of the mothers who were alive any time during the study or sub-group HFA-4, children who were ever breastfed or sub-group HFA-5, children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) or sub-group HFA-6, children who were anaemic ever during the study or sub-group HFA-8.2, and HIV-EI children or sub-group

Table 49. Covariates with statistical significance for ever-inadequate HFA among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child ever had inadequate HFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Caste	General	35.6	64.4	101	0.027
	SC/ST/OBC	25.0	75.0	559	
Education of father	Schooled	30.5	69.5	446	0.001
	Non-schooled	18.8	81.2	213	
Age of the mother	≥25 years	30.2	69.8	434	0.005
	<25 years	19.9	80.1	226	
Socio-economic crisis in the family	Absent	29.6	70.4	422	0.022
	Present	21.4	78.6	238	
Age of the mother at the marriage	≥25 years	42.9	57.1	49	0.008
	<25 years	25.5	74.5	601	
Mother ever initiated on ART	No	43.3	56.7	30	0.033
	Yes	25.8	74.2	625	
Delay in starting ART for the mother after detecting HIV infection	31+ days	29.2	70.8	339	0.040
	≤30 days	21.9	78.1	274	
Anaemia in the mother	Absent	39.0	61.0	59	0.028
	Present	25.6	74.4	558	
Duration of ARV/ART given to the mother during pregnancy	≤30 days	23.3	76.7	424	<0.001
	31+ days	39.1	60.9	151	
Breastfeeding of the child (ever)	Absent	36.0	64.0	114	0.011
	Present	24.4	75.6	540	
Breastfeeding duration for the child	<29 weeks	30.7	69.3	231	0.003
	≥29 weeks	19.7	80.3	309	

Characteristics	Attributes	Whether the child ever had inadequate HFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Exclusive breastfeeding of the child (ever)	Absent (including breas-tfeeding-not-initiated)	35.0	65.0	120	0.018
	Present	24.4	75.6	532	
Mixed feeding of the child (ever)	Absent	34.6	65.4	263	<0.001
	Present	20.6	79.4	379	
Provision of ARV/ART to mother during the breastfeeding period	Partially/not covered	34.1	65.9	123	0.035
	Fully covered	24.8	75.2	520	
Age of the child at baseline	≥12 months	32.5	67.5	446	<0.001
	<12 months	14.5	85.5	214	
Gender of the child	Female	27.2	72.8	323	0.742
	Male	26.1	73.9	337	
HIV status of the child (ever)	Negative	27.4	72.6	625	0.089
	Positive	14.3	85.7	35	
Delay in starting ART to the child after detecting HIV infection	≥90 days	26.3	73.7	19	0.027
	<90 days	0.0	100.0	16	
Coverage of any immunization	Immunized for age	29.8	70.2	443	0.009
	Under-immunized for age	20.3	79.7	217	
Coverage of OPV immunization	Immunized for age	28.9	71.1	539	0.005
	Under-immunized for age	16.5	83.5	121	
Coverage of Hepatitis B immunization	Immunized for age	28.6	71.4	588	0.002
	Under-immunized for age	11.1	88.9	72	
Coverage of DPT immunization	Immunized for age	2.7	71.3	541	0.014
	Under-immunized for age	17.6	82.4	119	
Anaemia in the child	Absent	38.8	61.2	165	<0.001

Characteristics	Attributes	Whether the child ever had inadequate HFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
	Present	22.6	77.4	495	
Anaemia status of the child (ever)	Mild anaemia	28.9	71.1	152	0.025
	Moderate/severe anaemia	19.8	80.2	343	

All percentages are with respect to horizontal row total.

HFA-8.4), in addition to the generic group (HFA-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 50. As such, despite having bivariate significance, only 11 (of the 24) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group HFA-1): 95.3% of the eligible 660 children were included in the analysis. The general factors associated with the ever-inadequate HFA status among the HIV-exposed children were the underprivileged population (SC/ST/OBC; OR=1.644, CI=1.009-2.677; p=0.046), uneducated father (non-schooled father; OR=2.093, CI=1.363-3.213; p=0.001), younger age of the mother at the marriage (<25 years; OR=2.575, CI=1.323-5.014; p=0.005), younger age of the child (<12 months at baseline; OR=2.411, CI=1.512-3.844; p<0.001), and anaemia in the child (OR=2.006, CI=1.327-3.033; p=0.001). Neither the gender nor the HIV status of the child was linked to the inadequate HFA.

(b) Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (sub-group HFA-2.1): 94.3% of the eligible 592 children were included in the analysis. The factors associated with the ever-inadequate HFA status among the HIV-exposed children of the mothers who had undertaken PPTCT strategy with ARV/ART during pregnancy were the underprivileged population (SC/ST/OBC; OR= 1.831, CI=1.102-3.043; p=0.020), uneducated father (non-schooled father; OR=2.187, CI= 1.371-3.488; p=0.001), younger age of the mother at the marriage (<25 years; OR=2.249, CI=1.110-4.554; p=0.024), longer duration of ARV/ART given to the mother during

Table 50. Covariates with significant OR for ever-inadequate HFA among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HFA-1 (N=660; Included in analysis: 95.3%)	Caste	General	96	0.046	1.000		
		SC/ST/OBC	533		1.644	1.009	2.677
	Education of father	Schooled	425	0.001	1.000		
		Non-schooled	204		2.093	1.363	3.213
	Age of the mother at the marriage	≥25 years	44	0.005	1.000		
		<25 years	585		2.575	1.323	5.014
	Age of the child at baseline	≥12 months	423	<0.001	1.000		
		<12 months	206		2.411	1.512	3.844
	Anaemia in the child	Absent	154	0.001	1.000		
		Present	475		2.006	1.327	3.033
HFA-2.1 (N=592; Included in analysis: 94.3%)	Caste	General	88	0.020	1.000		
		SC/ST/OBC	470		1.831	1.102	3.043
	Education of father	Schooled	392	0.001	1.000		
		Non-schooled	166		2.187	1.371	3.488
	Age of the mother at the marriage	≥25 years	39	0.024	1.000		
		<25 years	519		2.249	1.110	4.554
	Duration of ARV/ART given to the mother during pregnancy	≤30 days	147	0.004	1.000		
		31+ days	411		1.911	1.224	2.983
	Age of the child at baseline	≥12 months	363	<0.001	1.000		
		<12 months	195		2.443	1.518	3.932
	Anaemia in the child	Absent	135	0.002	1.000		
		Present	423		2.008	1.298	3.106
		Schooled	404	0.003	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HFA-4 (N=644; Included in analysis: 92.4%)	Education of father	Non-schooled	191		1.952	1.258	3.029
	Age of the mother at the marriage	≥25 years	43	0.003	1.000		
		<25 years	552		2.792	1.413	5.517
	Age of the child at baseline	≥12 months	397	<0.001	1.000		
		<12 months	198		2.631	1.624	4.263
	Coverage of OPV immunization	Immunized for age	492	0.028	1.000		
		Under-immunized for age	103		2.063	1.082	3.933
	Anaemia in the child	Absent	134	0.001	1.000		
		Present	461		2.073	1.341	3.204
HFA-5 (N=546; Included in analysis: 95.8%)	Caste	General	74	0.018	1.000		
		SC/ST/OBC	449		1.985	1.123	3.510
	Education of father	Schooled	346	0.001	1.000		
		Non-schooled	177		2.362	1.440	3.873
	Age of the mother at the marriage	≥25 years	36	0.005	1.000		
		<25 years	487		2.990	1.404	6.369
	Breastfeeding duration for the child	<29 weeks	225	0.004	1.000		
		≥29 weeks	298		1.875	1.217	2.890
	Age of the child at baseline	≥12 months	341	0.006	1.000		
		<12 months	182		2.056	1.231	3.435
	Coverage of OPV immunization	Immunized for age	426	0.042	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
		Under-immunized for age	97		2.021	1.027	3.977
	Anaemia in the child	Absent	118	<0.001	1.000		
		Present	405		2.338	1.452	3.764
HFA-6 (N=653; Included in analysis: 95.1%)	Education of father	Schooled	420	<0.001	1.000		
		Non-schooled	201		2.188	1.409	3.398
	Age of the mother at the marriage	≥25 years	44	0.006	1.000		
		<25 years	577		2.592	1.320	5.090
	Mixed feeding of the child (ever)	Absent	253	<0.001	1.000		
		Present	368		2.056	1.393	3.036
	Age of the child at baseline	≥12 months	421	0.001	1.000		
		<12 months	200		2.384	1.460	3.895
	Anaemia in the child	Absent	149	0.008	1.000		
		Present	472		1.774	1.160	2.715
HFA-8.2 (N=495; Included in analysis: 96.0%)	Caste	General	76	0.036	1.000		
		SC/ST/OBC	399		1.846	1.040	3.275
	Education of father	Schooled	324	0.010	1.000		
		Non-schooled	151		2.012	1.182	3.424
	Age of the mother at the marriage	≥25 years	33	0.034	1.000		
		<25 years	442		2.362	1.066	5.235
	Breastfeeding of the child (ever)	Absent	70	0.034	1.000		
		Present	405		1.872	1.048	3.346
	Age of the child at baseline	≥12 months	303	0.005	1.000		
		<12 months	172		2.200	1.269	3.814
		Mild anaemia	147	0.029	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	Anaemia status of the child (ever)	Moderate/severe anaemia	328		1.716	1.056	2.788

HFA-1: Generic group of HIV-exposed children; HFA-2.1: Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy; HFA-4: Children of the mothers who were alive any time during the study; HFA-5: Children who were ever breastfed; HFA-6: Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children); HFA-8.2: Children who were anaemic ever during the study.

pregnancy (duration >30 days; OR=1.911, CI=1.224-2.983; p=0.004), younger age of the child (<12 months at baseline; OR=2.443, CI=1.518-3.932; p<0.001), and anaemia in the child (OR=2.008, CI=1.298-3.106; p=0.002). Thus, the HIV-exposed children, especially during the infancy, had a higher chance of having inadequate HFA, if the mothers had been on ARV/ART for >30 days during pregnancy; this could be due to the high ARV/ART coverage of the recent pregnancies and/or longer breastfeeding under the ARV/ART cover, or slower increase in the height during the infancy due to some unidentified biological reasons linked to the exposure to maternal HIV infection.

(c) Children of the mothers who were alive at any time during the study (sub-group HFA-4): 92.4% of the eligible 644 children were included in the analysis. The factors associated with the ever-inadequate HFA status among the HIV-exposed children of the mothers who were alive any time during the study were the uneducated father (non-schooled father; OR=1.952, CI=1.258-3.029; p=0.003), younger age of the mother at the marriage (<25 years; OR=2.792, CI=1.413-5.517; p=0.003), younger age of the child (<12 months at baseline; OR=2.831, CI=1.624-4.263; p<0.001), and anaemia in the child (OR=2.073, CI=1.341-3.204; p=0.001). Also, among such children, due to their stronger association, the under-immunization of OPV could serve as a predictor for the inadequate HFA status (OR=2.063, CI=1.082-3.933; p=0.028); it could be that, the HIV-exposed children ever identified with inadequate HFA (or ill-health due to undernourishment)

during infancy, missed (or deferred upon advice from a health care personnel) a higher number of the OPV immunizations (of which 3 out of the 4 doses were scheduled in the infancy, as per the Universal Immunization Program) for age, despite having their mothers alive to take care of them; it could also be a totally-unlinked spurious association.

(d) Children who were ever breastfed (sub-group HFA-5): 95.8% of the eligible 546 children were included in the analysis. The factors associated with the ever-inadequate HFA status among the HIV-exposed children who were ever breastfed were the underprivileged population (SC/ST/OBC; OR=1.985, CI=1.123-3.510; p=0.018), uneducated father (non-schooled father; OR=2.362, CI=1.440-3.873; p=0.001), younger age of the mother at the marriage (<25 years; OR=2.990, CI=1.404-6.369; p=0.005), longer duration of breastfeeding for the child (breastfeeding $\geq$29 weeks; OR=1.875, CI=1.217-2.890; p=0.004), younger age of the child (<12 months at baseline; OR=2.056, CI=1.231-3.435; p=0.006), and anaemia in the child (OR=2.338, CI=1.452-3.764; p<0.001). Thus, the longer breastfeeding, possibly under ARV/ART cover for the mother, could be the reason for the ever-inadequate HFA status among the HIV-exposed children, especially during infancy. These results also implied an association between the breastfeeding and anaemia among the children; the ever-breastfed children had a higher chance of anaemia, possibly due to the longer or excessive dependence on breast milk for the infant nutrition. Also, among such ever-breastfed children (which in turn implied live mothers; hence, like in the previous sub-group HFA-4), due to their stronger association, the under-immunization of OPV could serve as a predictor for the inadequate HFA status among the children (OR= 2.021, CI=1.027-3.977; p=0.042), due to the same reasons as cited above (in the sub-group HFA-4).

(e) Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; sub-group HFA-6): 95.1% of the eligible 653 children were included in the analysis. The factors associated with the ever-inadequate HFA status among the HIV-exposed children who were ever started on feeds other than breast milk were the uneducated father (non-schooled father; OR=2.188, CI=1.409-3.398; p<0.001), younger age of the mother at the marriage (<25 years; OR=2.592, CI=1.320-5.090; p=0.006), mixed

feeding of the child (OR=2.056, CI=1.393-3.036; p<0.001), younger age of the child (<12 months at baseline; OR=2.384, CI=1.460-3.895; p=0.001), and anaemia in the child (OR=1.774, CI=1.160-2.715; p=0.008). Thus, the mixed feeding posed a risk for the inadequate HFA status among the HIV-exposed children, along with others.

(f) Children who were anaemic ever during the study (sub-group HFA-8.2): 96.0% of the eligible 495 children were included in the analysis. The factors associated with the ever-inadequate HFA status among the HIV-exposed children who were ever anaemic during the study were the underprivileged population (SC/ST/OBC; OR=1.846, CI=1.040-3.275; p=0.036), uneducated father (non-schooled father; OR=2.012, CI=1.182-3.424; p=0.010), younger age of the mother at the marriage (<25 years; OR=2.362, CI=1.066-5.235; p=0.034), breastfeeding of the child (OR=1.872, CI=1.048-3.346; p=0.034), younger age of the child (<12 months at baseline; OR=2.200, CI=1.269-3.814; p=0.005), and moderate or severe anaemia in the child (OR=1.716, CI=1.056-2.788; p=0.029). Thus, among the anaemic children, moderate or severe anaemia posed a higher risk for the ever-inadequate HFA status among the HIV-exposed children. These results also pointed to the nexus of breastfeeding, anaemia among the children and undernourishment (ever-inadequate HFA), as seen in the sub-group HFA-5.

(g) HIV-EI children (sub-group HFA-8.4): Despite running a regression model with 16 covariates, none of them were found to be significantly associated with the ever-inadequate HFA among the HIV-EI children, possibly due to the small numbers included in the analysis, a limitation of this study. As such, the key associated factors identified for the generic HIV-exposed group of children alone could be held good for the HIV-EI children. Or in other words, the ever-inadequate HFA status could not be evidently linked to the HIV-EI status of the children. Or, based on the bivariate statistical significance, in addition to those significant factors in the generic and various sub-groups of the HIV-exposed children, it could be hypothesized that the higher age of the mother (≥25 years; p=0.005), socio-economic crisis in the family (p=0.022), initiation of ART for the mother (p=0.033), exclusive breastfeeding to the child (p=0.018), full ARV/ART coverage of mother during breastfeeding period (p=0.035), and shorter delay in starting ART to the child after

detecting the HIV infection (<90 days; p=0.027) could be linked to the ever-inadequate HFA status among the HIV-EI children. Further research is indicated to look into the same.

5.1.2. Weight for age.

The covariates for which the bivariate significance was obtained for the ever-inadequate WFA status among children is listed in table 51. These covariates were applicable to the 4 sub-groups of children (children of the mothers who were alive any time during the study or sub-group WFA-4, children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) or sub-group WFA-6, children more than 15 months of age any time during the study or sub-group WFA-7.1, and children who were anaemic ever during the study or sub-group WFA-8.2), in addition to the generic group (WFA-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 52. As such, despite having the bivariate significance, only 9 (of the 21) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group WFA-1): 88.0% of the eligible 660 children were included in the analysis. The general factors associated with the ever-inadequate WFA status among the HIV-exposed children were the uneducated father (non-schooled father; OR=1.651, CI=1.125-2.425; p=0.010), nil or partial ANC of the mother (OR=1.514, CI=1.052-2.181; p=0.026), breastfeeding ever (OR=1.970, CI=1.256-3.089; p=0.003), LBW (<2.5 kg; OR=1.720, CI=1.080-2.739; p=0.022), and anaemia in the child (OR=1.744, CI=1.172-2.596; p=0.006). Thus, the HIV status of the child was not linked to the inadequate WFA status. The nil or partial ANC implied less consumption of the IFA tablets during pregnancy, low haemoglobin status of the child and impaired assimilation of the nutrients from the food in the child, thereby resulting in the inadequate WFA status. Thus, the breastfeeding-anaemia nexus also tend to result in inadequate WFA, along with the inadequate HFA.

Table 51. Covariates with statistical significance for ever-inadequate WFA among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child ever had inadequate WFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Family size	>5	26.4	73.6	91	0.022
	≤5	38.8	61.2	569	
Education of father	Schooled	40.8	59.2	446	0.004
	Non-schooled	29.1	70.9	213	
Safely managed sanitation	Used	50.9	49.1	108	0.001
	Lacked	34.4	65.6	552	
Acute morbidity among mothers	Absent	39.7	60.3	441	0.035
	Present	31.0	69.0	203	
Composite morbidity indicator of sickness among mothers	Not indicated	38.7	61.3	538	0.043
	Indicated	28.3	71.7	106	
Vitamin deficiency among mothers	Absent	43.2	56.8	241	0.012
	Present	33.3	66.7	403	
BMI of mothers	Normal and above	45.2	54.8	299	<0.001
	Underweight	30.0	70.0	337	
Composite nutrition indicator of sickness among mothers	Not indicated	40.2	59.8	480	0.003
	Indicated	27.4	72.6	164	
Composite sickness indicator among mothers	Not indicated	43.6	56.4	303	0.001
	Indicated	31.1	68.9	341	
ANC among mothers	Full ANC received	40.2	59.8	396	0.039
	No/Partial ANC received	32.2	67.8	258	
Breastfeeding of the child (ever)	Absent	50.9	49.1	114	0.001
	Present	34.1	65.9	540	

Characteristics	Attributes	Whether the child ever had inadequate WFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Exclusive breastfeeding of the child (ever)	Absent (including breast-feeding-not-initiated)	49.2	50.8	120	0.002
	Present	34.4	65.6	532	
Mixed feeding of the child (ever)	Absent	43.3	56.7	263	0.004
	Present	32.2	67.8	379	
Age of the child at baseline	≥12 months	40.6	59.4	446	0.008
	<12 months	29.9	70.1	214	
Gender of the child	Male	39.2	60.8	337	0.266
	Female	35.0	65.0	323	
Birth weight of the child	≥2.5 kg	39.7	60.3	473	0.015
	<2.5 kg	27.6	72.4	116	
HIV status of the child (ever)	Negative	37.4	62.6	625	0.474
	Positive	31.4	68.6	35	
Coverage of any immunization	Immunized for age	39.7	60.3	443	0.048
	Under-immunized for age	31.8	68.2	217	
Coverage of MMR immunization	Immunized for age	40.3	59.7	444	0.028
	Under-immunized for age	30.1	69.9	143	
Anaemia in the child	Absent	46.7	53.3	165	0.003
	Present	33.9	66.1	495	
Anaemia status of the child (ever)	Mild anaemia	42.1	57.9	152	0.011
	Moderate/severe anaemia	30.3	69.7	343	

All percentages are with respect to horizontal row total.

(b) Children of the mothers who were alive at any time during the study (sub-group WFA-4): 87.7% of the eligible 644 children were included in the analysis. The factors associated with the ever-inadequate WFA status among the children whose mothers were

Table 52. Covariates with significant OR for ever-inadequate WFA among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
WFA-1 (N=660; Included in analysis: 88.0%)	Education of father	Schooled	393	0.010	1.000		
		Non-schooled	188		1.651	1.125	2.425
	ANC among mothers	Full ANC received	362	0.026	1.000		
		No/Partial ANC received	219		1.514	1.052	2.181
	Breastfeeding of the child (ever)	Absent	101	0.003	1.000		
		Present	480		1.970	1.256	3.089
	Birth weight of the child	≥2.5 kg	466	0.022	1.000		
		<2.5 kg	115		1.720	1.080	2.739
	Anaemia in the child	Absent	144	0.006	1.000		
		Present	437		1.744	1.172	2.596
WFA-4 (N=644; Included in analysis: 87.7%)	Education of father	Schooled	383	0.049	1.000		
		Non-schooled	182		1.497	1.003	2.235
	Composite morbidity indicator of sickness among mothers	Not indicated	470	0.050	1.000		
		Indicated	95		1.707	1.000	2.915
	BMI of mothers	Normal and above	259	<0.001	1.000		
		Underweight	306		1.968	1.364	2.838
	ANC among mothers	Full ANC received	351	0.014	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
		No/Partial ANC received	214		1.615	1.103	2.366
	Breastfeeding of the child (ever)	Absent	98	0.002	1.000		
		Present	467		2.114	1.321	3.382
	Birth weight of the child	≥2.5 kg	454	0.038	1.000		
		<2.5 kg	111		1.671	1.029	2.714
	Anaemia in the child	Absent	139	0.026	1.000		
		Present	426		1.603	1.057	2.430
WFA-6 (N=653; Included in analysis: 88.1%)	Education of father	Schooled	390	0.009	1.000		
		Non-schooled	185		1.674	1.136	2.468
	ANC among mothers	Full ANC received	357	0.026	1.000		
		No/Partial ANC received	218		1.517	1.051	2.190
	Breastfeeding of the child (ever)	Absent	101	0.002	1.000		
		Present	474		2.011	1.281	3.156
	Birth weight of the child	≥2.5 kg	461	0.018	1.000		
		<2.5 kg	114		1.765	1.103	2.824
	Anaemia in the child	Absent	140	0.012	1.000		
		Present	435		1.674	1.119	2.505
WFA-7.1 (N=587; Included in analysis: 89.9%)	Education of father	Schooled	357	0.033	1.000		
		Non-schooled	171		1.558	1.036	2.344
	ANC among mothers	Full ANC received	335	0.049	1.000		
		No/Partial ANC received	193		1.476	1.003	2.174
		Absent	96	0.027	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	Breastfeeding of the child (ever)	Present	432		1.700	1.064	2.716
	Gender of the child	Male	263	0.016	1.000		
		Female	265		1.575	1.089	2.278
	Birth weight of the child	≥2.5 kg	421	0.039	1.000		
		<2.5 kg	107		1.662	1.027	2.692
	Anaemia in the child	Absent	128	0.027	1.000		
		Present	400		1.614	1.056	2.467
WFA-8.2 (N=495; Included in analysis: 88.3%)	Safely managed sanitation	Used	64	0.023	1.000		
		Lacked	373		1.923	1.096	3.374
	ANC among mothers	Full ANC received	273	0.002	1.000		
		No/Partial ANC received	164		2.043	1.311	3.185
	Birth weight of the child	≥2.5 kg	348	0.010	1.000		
		<2.5 kg	89		2.095	1.192	3.683

WFA-1: Generic group of HIV-exposed children; WFA-4: Children of the mothers who were alive any time during the study; HFA-6: Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children); WFA-7.1: Children more than 15 months of age any time during the study; HFA-8.2: Children who were anaemic ever during the study.

alive during the study were the uneducated father (non-schooled father; OR=1.497, CI=1.003-2.235; p=0.049), composite morbidity indication of sickness in the mother (OR=1.707, CI=1.000-2.915; p=0.050), underweight mother (BMI<18.5; OR=1.968, CI=1.364-2.838; p<0.001), nil or partial ANC of the mother (OR=1.615, CI=1.103-2.366; p=0.014), breastfeeding ever (OR=2.114, CI=1.321-3.382; p=0.002), LBW (<2.5 kg; OR=1.671, CI=1.029-2.714; p=0.038), and anaemia in the child (OR=1.603, CI=1.057-

2.430; p=0.026). Morbidity-indicated sickness and underweight among the mothers could predict the chance of inadequate WFA, possibly due to compromised feeding.

(c) Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; sub-group WFA-6): 88.1% of the eligible 653 children were included in the analysis. The factors associated with the ever-inadequate WFA status among the children who were ever started on feeds other than breast milk were the uneducated father (non-schooled father; OR=1.674, CI=1.136-2.468; p=0.009), nil or partial ANC of the mother (OR=1.517, CI=1.051-2.190; p=0.026), breastfeeding ever (OR=2.011, CI=1.281-3.156; p=0.002), LBW (<2.5 kg; OR=1.765, CI=1.103-2.824; p=0.018), and anaemia in the child (OR=1.674, CI=1.119-2.505; p=0.012). Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

(d) Children more than 15 months of age any time during the study (sub-group WFA-7.1): 89.9% of the eligible 587 children were included in the analysis. The factors associated with the ever-inadequate WFA status among the children >15 months of age during the study were the uneducated father (non-schooled father; OR=1.558, CI=1.036-2.344; p=0.033), nil or partial ANC of the mother (OR=1.476, CI=1.003-2.174; p=0.049), breastfeeding ever (OR=1.700, CI=1.064-2.716; p=0.027), female gender (OR=1.575, CI=1.089-2.278; p=0.016), LBW (<2.5 kg; OR=1.662, CI=1.027-2.692; p=0.039), and anaemia in the child (OR=1.614, CI=1.056-2.467; p=0.027). Thus, above 15 months, the female children had a higher chance to be of inadequate WFA.

(e) Children who were anaemic ever during the study (sub-group WFA-8.2): 88.3% of the eligible 495 children were included in the analysis. The factors associated with the ever-inadequate WFA status among the anaemic children were the lack of safe sanitation in the household (OR=1.923, CI=1.096-3.374; p=0.023), nil or partial ANC of the mother (OR=2.043, CI=1.311-3.185; p=0.002), and LBW (<2.5 kg; OR=2.095, CI=1.192-3.683; p=0.010). Thus inadequate WFA status of the anaemic children had environmental and maternal predictors but was not linked to the degree of severity of anaemia.

5.1.3. Head circumference for age.

The covariates for which the bivariate significance was obtained for the ever-inadequate HCFA among the HIV-exposed children are listed in table 53. These covariates were applicable to the 11 sub-groups of children (children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy or sub-group HCFA-2.1, children of the mothers who were ever initiated on ART or sub-group HCFA-3, children of the mothers who were alive any time during the study or sub-group HCFA-4, children of the mothers who were identified as 'sick' during the study or sub-group HCFA-4.4, children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) or sub-group HCFA-6, children more than 9 months of age any time during the study or sub-group HCFA-7, children more than 15 months of age any time during the study or sub-group HCFA-7.1, children who were vitamin/mineral deficient ever during the study or sub-group HCFA-8.1, children who were anaemic ever during the study or sub-group HCFA-8.2, children who were having acute morbidity ever during the study or sub-group HCFA-8.3, and the HIV-EI children or sub-group HCFA-8.4), in addition to the generic group (HCFA-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 54. As such, despite having the bivariate significance, only 10 (of the 31) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group HCFA-1): 97.3% of the eligible 660 children were included in the analysis. The general factors associated with the ever-inadequate HCFA status among the HIV-exposed children were the underprivileged population (SC/ST/OBC; OR=2.368, CI=1.220-4.594; p=0.011), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=2.562, CI=1.141-5.751; p=0.023), and the younger age of the child (<12 months at baseline; OR=11.713, CI=7.615-18.017; p<0.001). Thus, the HIV status of the child was not linked to inadequate HCFA. The poorly-built houses could be considered as a proxy indicator for the socio-economic status, with which the ever-inadequate HCFA status could be associated. This also indicated that, during infancy, there was a slower development of HC among the HIV-exposed children.

Table 53. Covariates with statistical significance for ever-inadequate HCFA among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child ever had inadequate HCFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Caste	General	84.2	15.8	101	0.023
	SC/ST/OBC	73.5	26.5	559	
Age of the mother	≥25 years	79.3	20.7	434	0.001
	<25 years	67.3	32.7	226	
Whether mother working?	Yes	81.0	19.0	216	0.015
	No	72.3	27.7	444	
Type of house	Pukka electrified house	86.7	13.3	75	0.014
	Others	73.7	26.3	585	
Mother ever initiated on ART	No	93.3	6.7	30	0.017
	Yes	74.1	25.9	625	
Delay in starting ART for the mother after detecting HIV infection	31+ days	78.2	21.8	339	0.007
	≤30 days	68.6	31.4	274	
ART status of mother	On ART	72.2	27.8	508	0.002
	Not on ART	86.2	13.8	109	
Composite sickness indicator among mothers	Not indicated	78.5	21.5	303	0.041
	Indicated	71.6	28.4	341	
Composite sickness indicated among mothers involving nutrition criteria	Nutrition criteria in isolation	83.1	16.9	89	0.023
	Nutrition criteria in combination	68.0	32.0	75	
ANC among mothers	Full ANC received	78.3	21.7	396	0.014
	No/Partial ANC received	69.8	30.2	258	
	≤30 days	89.4	10.6	151	<0.001

Characteristics	Attributes	Whether the child ever had inadequate HCFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Duration of ARV/ART given to the mother during pregnancy	31+ days	69.6	30.4	424	
Place of delivery of the mother	Health care facility	75.9	24.1	622	0.049
	Others	60.0	40.0	30	
Breastfeeding of the child (ever)	Absent	84.2	15.8	114	0.012
	Present	73.0	27.0	540	
Mixed feeding of the child (ever)	Absent	83.3	16.7	263	<0.001
	Present	69.9	30.1	379	
Provision of ARV/ART to mother during the breastfeeding period	Partially/not covered	91.1	8.9	123	<0.001
	Fully covered	71.7	28.3	520	
Age of the child at baseline	≥12 months	90.4	9.6	446	<0.001
	<12 months	43.5	56.5	214	
Gender of the child	Female	79.9	20.1	323	0.006
	Male	70.6	29.4	337	
HIV status of the child (ever)	Negative	75.5	24.5	625	0.355
	Positive	68.6	31.4	35	
Duration of total life of the child on ART	≥50%	100.0	0.0	11	0.004
	<50%	46.2	53.8	13	
Coverage of any immunization	Immunized for age	81.3	18.7	443	<0.001
	Under-immunized for age	62.7	37.3	217	
Coverage of OPV immunization	Immunized for age	78.7	21.3	539	<0.001
	Under-immunized for age	59.5	40.5	121	
Coverage of Hepatitis B immunization	Immunized for age	77.2	22.8	588	<0.001
	Under-immunized for age	58.3	41.7	72	

Characteristics	Attributes	Whether the child ever had inadequate HCFA?			Bivariate p-value
		No, %	Yes, %	Total, N	
Coverage of DPT immunization	Immunized for age	78.4	21.6	541	<0.001
	Under-immunized for age	60.5	39.5	119	
Coverage of Measles immunization	Immunized for age	78.3	21.7	572	0.010
	Under-immunized for age	63.2	36.8	57	
Coverage of MMR immunization	Immunized for age	83.1	16.9	444	0.028
	Under-immunized for age	68.5	31.5	143	
Acute morbidity events among children per month of follow-up	<0.5 per month	79.0	21.0	415	0.001
	≥0.5 per month	63.0	37.0	108	
Maximum no. of deficient vitamins/minerals ever indicated in the child	1-6	80.1	19.9	156	0.014
	>6	67.6	32.4	139	
Anaemia in the child	Absent	83.6	16.4	165	0.004
	Present	72.3	27.7	495	
Anaemia status of the child (ever)	Mild anaemia	80.3	19.7	152	0.009
	Moderate/severe anaemia	68.8	31.2	343	
Death of the child during the study	Absent	75.7	24.3	654	0.001
	Present	16.7	83.3	6	

All percentages are with respect to horizontal row total.

(b) Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (sub-group HCFA-2.1): 96.3% of the eligible 592 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children whose mothers had undertaken PPTCT strategy involving ARV/ART during pregnancy were the underprivileged population (SC/ST/OBC; OR=2.431, CI=1.227-4.817; p=0.011), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=2.781, CI=1.191-6.494; p=0.018), longer duration of

Table 54. Covariates with significant OR for ever-inadequate HCFA among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HCFA-1 (N=660; Included in analysis: 97.3%)	Caste	General	98	0.011	1.000		
		SC/ST/OBC	544		2.368	1.220	4.594
	Type of house	Pukka electri-fied house	73	0.023	1.000		
		Others	569		2.562	1.141	5.751
	Age of the child at baseline	≥12 months	433	<0.001	1.000		
		<12 months	209		11.713	7.615	18.017
HCFA-2.1 (N=592; Included in analysis: 96.3%)	Caste	General	89	0.011	1.000		
		SC/ST/OBC	481		2.431	1.227	4.817
	Type of house	Pukka electri-fied house	66	0.018	1.000		
		Others	504		2.781	1.191	6.494
	Duration of ARV/ART given to the mother during pregnancy	≤30 days	148	0.041	1.000		
		31+ days	422		1.956	1.027	3.725
	Age of the child at baseline	≥12 months	372	<0.001	1.000		
		<12 months	198		10.300	6.453	16.441
HCFA-3 (N=630; Included in analysis: 95.6%)	Caste	General	94	0.011	1.000		
		SC/ST/OBC	508		2.366	1.215	4.606
	Type of house	Pukka electri-fied house	71	0.020	1.000		
		Others	531		2.604	1.159	5.848
	Age of the child at baseline	≥12 months	394	<0.001	1.000		
		<12 months	208		11.420	7.353	17.736

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HCFA-4 (N=644; Included in analysis: 93.8%)	Caste	General	92	0.017	1.000		
		SC/ST/OBC	512		2.287	1.157	4.520
	Type of house	Pukka electri-fied house	72	0.028	1.000		
		Others	532		2.476	1.103	5.558
	Age of the child at baseline	≥12 months	400	<0.001	1.000		
		<12 months	204		11.209	7.211	17.425
	Gender of the child	Female	296	0.033	1.000		
		Male	308		1.612	1.039	2.498
HCFA-4.4 (N=164; Included in analysis: 100.0%)	Age of the child at baseline	≥12 months	121	<0.001	1.000		
		<12 months	43		6.594	2.605	16.693
	Coverage of any immunization	Immunized for age	112	0.003	1.000		
		Under-immunized for age	52		4.590	1.667	12.639
HCFA-6 (N=653; Included in analysis: 96.8%)	Caste	General	96	0.012	1.000		
		SC/ST/OBC	536		2.369	1.212	4.631
	Type of house	Pukka electri-fied house	72	0.011	1.000		
		Others	560		3.011	1.286	7.051
	Mixed feeding of the child (ever)	Absent	260	0.015	1.000		
		Present	372		1.773	1.118	2.813
	Age of the child at baseline	≥12 months	429	<0.001	1.000		
		<12 months	203		11.429	7.373	17.715
	Gender of the child	Female	312	0.038	1.000		
		Male	320		1.584	1.025	2.448

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HCFA-7 (N=629; Included in analysis: 97.6%)	Caste	General	96	0.010	1.000		
		SC/ST/OBC	518		2.479	1.244	4.938
	Type of house	Pukka electri-fied house	70	0.016	1.000		
		Others	544		2.996	1.226	7.319
	Age of the child at baseline	≥12 months	433	<0.001	1.000		
		<12 months	181		10.369	6.503	16.536
HCFA-7.1 (N=587; Included in analysis: 97.6%)	Caste	General	91	0.009	1.000		
		SC/ST/OBC	482		2.705	1.279	5.724
	Type of house	Pukka electri-fied house	66	0.020	1.000		
		Others	507		3.115	1.197	8.106
	Age of the child at baseline	≥12 months	433	<0.001	1.000		
		<12 months	140		11.058	6.824	17.919
	Anaemia in the child	Absent	134	0.038	1.000		
		Present	439		2.086	1.043	4.171
HCFA-8.1 (N=295; Included in analysis: 98.6%)	Caste	General	35	0.044	1.000		
		SC/ST/OBC	256		3.479	1.032	11.730
	Age of the child at baseline	≥12 months	206	<0.001	1.000		
		<12 months	85		15.760	7.901	31.438
	Maximum no. of deficient vitamins/ minerals ever ind-icated in the child	1-6	154	0.016	1.000		
		>6	137		2.309	1.171	4.554
	Anaemia in the child	Absent	51	0.014	1.000		
		Present	240		8.112	1.524	43.178
	Caste	General	77	0.003	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HCFA-8.2 (N=495; Included in analysis: 98.4%)		SC/ST/OBC	410		3.127	1.467	6.667
	Type of house	Pukka electri-fied house	56	0.018	1.000		
		Others	431		2.993	1.203	7.450
	Age of the child at baseline	≥12 months	312	<0.001	1.000		
		<12 months	175		9.053	5.619	14.585
	Gender of the child	Female	229	0.018	1.000		
		Male	258		1.778	1.102	2.870
	Anaemia status of the child (ever)	Mild anaemia	152	0.027	1.000		
		Moderate/sev ere anaemia	335		1.833	1.072	3.137
HCFA-8.3 (N=523; Included in analysis: 98.1%)	Caste	General	68	0.023	1.000		
		SC/ST/OBC	445		2.590	1.141	5.878
	Type of house	Pukka electri-fied house	63	0.009	1.000		
		Others	450		3.272	1.339	7.993
	Age of the child at baseline	≥12 months	349	<0.001	1.000		
		<12 months	164		11.234	6.918	18.242

HCFA-1: Generic group of HIV-exposed children; HCFA-2.1: Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy; HCFA-3: Children of the mothers who were ever initiated on ART; HCFA-4: Children of the mothers who were alive any time during the study; HCFA-4.4: Children of the mothers who were identified as 'sick' during the study; HCFA-6: Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children); HCFA-7: Children more than 9 months of age any time during the study; HCFA-7.1: Children more than 15 months of age any time during the study; HCFA-8.1: Children who were vitamin/mineral deficient ever during the study; HCFA-8.2: Children who were anaemic ever during the study; HCFA-8.3: Children who were having acute morbidity ever during the study.

ARV/ART given to the mother during pregnancy (>30 days; OR=1.956, CI=1.027-3.725; p=0.041), and the younger age of the child (<12 months at baseline; OR=10.300, CI=6.453-16.441; p<0.001). Thus, the HIV-exposed children, especially during infancy, had a higher chance of having inadequate HCFA, if the mothers had been on ARV/ART for >30 days during pregnancy; this could be due to the high ARV/ART coverage of recent pregnancies and/or longer breastfeeding under ARV/ART cover, or slower increase in the head circumference during infancy due to some unidentified biological reasons linked to exposure to maternal HIV infection.

(c) Children of the mothers who were ever initiated on ART (sub-group HCFA-3): 95.6% of the eligible 630 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children whose mothers were ever initiated on ART were the underprivileged population (SC/ST/OBC; OR=2.366, CI=1.215-4.606; p=0.011), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=2.604, CI=1.159-5.848; p=0.020), and the younger age of the child (<12 months at baseline; OR=11.420, CI=7.353-17.736; p<0.001). Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

(d) Children of the mothers who were alive at any time during the study (sub-group HCFA-4): 93.8% of the eligible 644 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children whose mothers were alive any time during the study were the underprivileged population (SC/ST/OBC; OR=2.287, CI=1.157-4.520; p=0.017), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=2.476, CI=1.103-5.558; p=0.028), younger age of the child (<12 months at baseline; OR=11.209, CI=7.211-17.425; p<0.001), and the male gender (OR=1.612, CI=1.039-2.498; p=0.033). Thus, the male children of live mothers had a higher chance to be of inadequate HCFA.

(e) Children of the mothers who were identified as 'sick' during the study (sub-group HCFA-4.4): Even though this sub-group was expected to include a larger group of the

children of sick mothers, by virtue of the covariate which triggered the analysis, this sub-group was restricted only to the children of nutritionally sick mothers (mothers who were identified as 'sick' due to the nutritional factors). All the eligible 164 children were included in the analysis. The ever-inadequate HCFA status among the HIV-exposed children whose mothers were identified as 'nutritionally sick' during the study was found to be associated with the younger age of the child (<12 months at baseline; OR=6.594, CI=2.605-16.693; p<0.001). Also, among such children, due to their stronger association, the under-immunization of any vaccine (included in Universal Immunization Program) could serve as a predictor for the inadequate HCFA status (OR=4.590, CI=1.667-12.639; p=0.003); it could be that the HIV-exposed children identified with the inadequate HCFA status (or ill-health due to undernourishment) during the infancy, missed higher number of immunizations for age, probably due to the ill-health of their mothers on nutritional grounds; unless this was a spurious association.

(f) Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; sub-group HCFA-6): 96.8% of the eligible 653 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children who were ever started on feeds other than breast milk were the underprivileged population (SC/ST/OBC; OR=2.369, CI=1.212-4.631; p= 0.012), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=3.011, CI=1.286-7.051; p=0.011), mixed feeding of the child (OR=1.773, CI=1.118-2.813; p=0.015), younger age of the child (<12 months at baseline; OR=11.429, CI=7.373-17.715; p<0.001), and the male gender (OR=1.584, CI=1.025-2.448; p=0.038). Thus, the mixed-feeding posed a risk for the inadequate HCFA status among the HIV-exposed children, especially the male children and infants, along with the other factors.

(g) Children more than 9 months of age any time during the study (sub-group HCFA-7): 97.6% of the eligible 629 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children >9 months of age any time during the study were the underprivileged population (SC/ST/OBC; OR=2.479, CI=1.244-4.938; p=0.010), poorly-built houses (non-electrified or kuccha or semi-pukka

house; OR=2.996, CI=1.226-7.319; p=0.016), and the younger age of the child (<12 months at baseline; OR=10.369, CI=6.503-16.536; p<0.001). Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

(h) Children more than 15 months of age any time during the study (sub-group HCFA-7.1): 97.6% of the eligible 587 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children >15 months of age any time during the study were the underprivileged population (SC/ST/ OBC; OR=2.705, CI=1.279-5.724; p=0.009), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=3.115, CI=1.197-8.106; p=0.020), younger age of the child (<12 months at baseline; OR=11.058, CI=6.824-17.919; p<0.001), and anaemia in the child (OR=2.086, CI=1.043-4.171; p=0.038). Thus, the anaemia posed a risk for the inadequate HCFA status among the HIV-exposed children of age >15 months, along with the other factors. Also, the cohort of children recruited at the age <12 months, who otherwise had a higher chance of inadequate HCFA status, continued to have the same, even after 15 months of age.

(i) Children who were vitamin/mineral deficient ever during the study (sub-group HCFA-8.1): 98.6% of the eligible 295 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children who were ever vitamin/mineral deficient during the study were the underprivileged population (SC/ST/OBC; OR=3.479, CI=1.032-11.730; p=0.044), younger age of the child (<12 months at baseline; OR=15.760, CI=7.901-31.438; p<0.001), higher number of indicated deficient vitamins/minerals in the child (> 6 deficient vitamins/minerals; OR=2.309, CI= 1.171-4.554; p=0.016), and anaemia in the child (OR=8.112, CI=1.524-43.178; p=0.014). Thus, among the vitamin/mineral deficient HIV-exposed children, both the anaemia and more-severe deficiencies were associated with the inadequate HCFA status.

(j) Children who were anaemic ever during the study (sub-group HCFA-8.2): 98.4% of the eligible 495 children were included in the analysis. The factors associated with the

ever-inadequate HCFA status among the HIV-exposed children who were ever anaemic during the study were the underprivileged population (SC/ST/OBC; OR=3.127, CI= 1.467-6.667; p=0.003), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=2.993, CI=1.203-7.450; p=0.018), younger age of the child (<12 months at baseline; OR=9.053, CI=5.619-14.585; p<0.001), male gender (OR=1.778, CI=1.102-2.870; p=0.018), and moderate or severe anaemia in the child (OR=1.833, CI=1.072-3.137; p=0.027). Thus, among the anaemic children, moderate or severe anaemia posed a higher risk for the ever-inadequate HCFA status among the HIV-exposed children.

(k) Children who were having acute morbidity ever during the study (sub-group HCFA-8.3): 98.1% of the eligible 523 children were included in the analysis. The factors associated with the ever-inadequate HCFA status among the HIV-exposed children having acute morbidity ever during the study were the underprivileged population (SC/ST/OBC; OR=2.590, CI=1.141-5.878; p=0.023), poorly-built houses (non-electrified or kuccha or semi-pukka house; OR=3.272, CI=1.339-7.993; p=0.009), and the younger age of the child (<12 months at baseline; OR=11.234, CI=6.918-18.242; p<0.001). Thus, among the morbid children, no association was observed between the ever-inadequate HCFA status and the degree of burden of acute morbidity. Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

(l) HIV-EI children (sub-group HCFA-8.4): Despite running a regression model with 19 covariates, none of them were found to be significantly associated with the ever-inadequate HCFA status among the HIV-EI children, possibly due to the small numbers included in the analysis, a limitation of this study. As such, the key factors identified for the generic HIV-exposed group of children alone could be held good for the HIV-EI children. Or in other words, the ever-inadequate HCFA status could not be evidently linked to the HIV-EI status of the children. Or, based on the bivariate statistical significance, in addition to those significant factors identified in the generic and various sub-groups of the HIV-exposed children, it could be hypothesized that the higher age of the mother (≥25 years; p=0.001), working mother (p=0.015), initiation of ART for the mother (p=0.017), nil or partial ANC

of the mother (p=0.014), breastfeeding ever (p=0.012), full ARV/ART coverage of mother during breastfeeding period (p<0.001), and shorter life duration of the child on ART (<50%; p=0.004) could also be associated with the ever-inadequate HCFA status among the HIV-EI children. Further research is indicated to look into the same.

5.1.4. Mid upper arm circumference for age.

The covariates for which bivariate significance was obtained for the ever-inadequate MUACFA status among the HIV-exposed children are listed in table 55. These covariates were applicable to the 4 sub-groups of children (children of the mothers who were alive any time during the study or sub-group MUACFA-4, children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) or sub-group MUACFA-6, children who were vitamin/mineral deficient ever during the study or sub-group MUACFA-8.1, and children who were anaemic ever during the study or sub-group MUACFA-8.2), in addition to the generic group (MUACFA-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 56. As such, despite having the bivariate significance, only 6 (of the 13) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group MUACFA-1): 88.3% of the eligible 660 children were included in the analysis. The general factors associated with the ever-inadequate MUACFA status among the HIV-exposed children were the LBW (<2.5kg; OR=1.838, CI=1.178-2.867; p=0.007), HIV infection in the child (OR=3.293, CI=1.524-7.117; p=0.002), and the indication of vitamin A deficiency in the child (OR=1.881, CI=1.135-3.117; p=0.014). As such, the HIV infection of the child was linked to inadequate HCFA. The signs/symptoms of vitamin A deficiency and LBW were also associated with inadequate MUACFA status.

(b) Children of the mothers who were alive at any time during the study (sub-group MUACFA-4): 88.0% of the eligible 644 children were included in the analysis. The factors associated with ever-inadequate MUACFA status among the HIV-exposed children with

Table 55. Covariates with statistical significance for ever-inadequate MUACFA among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child ever had inadequate MUACFA?			Bivariate p-value
		No, %	Yes, %	Total	
Family size	>5	59.3	40.7	91	0.002
	≤5	74.7	25.3	569	
Education of father	Schooled	75.6	24.4	446	0.012
	Non-schooled	66.2	33.8	213	
BMI of mothers	Normal and above	77.3	22.7	299	0.011
	Underweight	68.2	31.8	337	
Place of delivery of the mother	Health care facility	73.5	26.5	622	0.044
	Others	56.7	43.3	30	
Mixed feeding of the child (ever)	Absent	78.3	21.7	263	0.008
	Present	68.9	31.1	379	
Age of the child at baseline	≥12 months	74.7	25.3	446	0.083
	<12 months	68.2	31.8	214	
Gender of the child	Female	75.9	24.1	323	0.065
	Male	69.4	30.6	337	
Birth weight of the child	>2.5 kg	76.1	23.9	473	0.004
	≤2.5 kg	62.9	37.1	116	
HIV status of the child (ever)	Negative	74.1	25.9	625	<0.001
	Positive	45.7	54.3	35	
Persistence of vitamin/ mineral deficiency among ever deficient children	<50% of time	75.3	24.7	231	0.023
	≥50% of time	60.9	39.1	64	
Vitamin A deficiency in the child	Not indicated	74.1	25.9	564	0.032
	Indicated	63.5	36.5	96	
	Mild anaemia	77.6	22.4	152	0.045

Characteristics	Attributes	Whether the child ever had inadequate MUACFA?			Bivariate p-value
		No, %	Yes, %	Total	
Anaemia status of the child (ever)	Moderate/severe anaemia	68.8	31.2	343	
Death of the child during the study	Absent	73.1	26.9	654	0.002
	Present	16.7	83.3	6	

All percentages are with respect to horizontal row total.

live mothers were the underweight mother (BMI <18.5; OR=1.552, CI=1.049-2.296; p=0.028), low birth weight (<2.5kg; OR=1.650, CI=1.044-2.606; p=0.032), HIV infection in the child (OR=3.385, CI=1.533-7.474; p=0.003), and the indication of vitamin A deficiency in the child (OR=1.719, CI=1.023-2.887; p=0.041). Thus, in addition to the key factors in general, the nutritional status of the mothers (underweight) was also associated with the inadequate MUACFA among the children.

(c) Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; sub-group MUACFA-6): 88.1% of the eligible 653 children were included in the analysis. The factors associated with the ever-inadequate MUACFA status among the HIV-exposed children who were ever started on feeds other than breast milk were the mixed feeding of the child (OR=1.528, CI=1.024-2.281; p=0.038), LBW (<2.5kg; OR=1.774, CI=1.125-2.794; p=0.013), HIV infection in the child (OR=3.368, CI=1.524-7.441; p=0.003), and the indication of vitamin A deficiency in the child (OR=1.849, CI=1.098-3.113; p=0.021). Thus, in addition to the general factors, mixed feeding was also associated with inadequate MUACFA among the children.

(d) Children who were vitamin/mineral deficient ever during the study (sub-group MUACFA-8.1): 88.1% of the eligible 295 children were included in the analysis. The factors associated with the ever-inadequate MUACFA status among the HIV-exposed children who were ever vitamin/mineral deficient during the study were the male gender (OR=1.848, CI=1.026-3.327; p=0.041), low birth weight (<2.5kg; OR=2.414, CI=1.212-

Table 56. Covariates with significant OR for ever-inadequate MUACFA among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
MUACFA-1 (N=660; Included in analysis: 88.3%)	Birth weight of the child	≥2.5 kg	468	0.007	1.000		
		<2.5 kg	115		1.838	1.178	2.867
	HIV status of the child (ever)	Negative	553	0.002	1.000		
		Positive	30		3.293	1.524	7.117
	Vitamin A deficiency in the child	Not indicated	500	0.014	1.000		
		Indicated	83		1.881	1.135	3.117
MUACFA-4 (N=644; Included in analysis: 88.0%)	BMI of mothers	Normal and above	260	0.028	1.000		
		Underweight	307		1.552	1.049	2.296
	Birth weight of the child	≥2.5 kg	456	0.032	1.000		
		<2.5 kg	111		1.650	1.044	2.606
	HIV status of the child (ever)	Negative	538	0.003	1.000		
		Positive	29		3.385	1.533	7.474
	Vitamin A deficiency in the child	Not indicated	486	0.041	1.000		
		Indicated	81		1.719	1.023	2.887
MUACFA-6 (N=653; Included in analysis: 88.1%)	Mixed feeding of the child (ever)	Absent	234	0.038	1.000		
		Present	341		1.528	1.024	2.281
	Birth weight of the child	≥2.5 kg	461	0.013	1.000		
		<2.5 kg	114		1.774	1.126	2.794
	HIV status of the child (ever)	Negative	546	0.003	1.000		
		Positive	29		3.368	1.524	7.441
	Vitamin A deficiency in the child	Not indicated	493	0.021	1.000		
		Indicated	82		1.849	1.098	3.113
	Child's gender	Female	136	0.041	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
MUACFA-8.1 (N=295; Included in analysis: 88.1%)		Male	124		1.848	1.026	3.327
	Birth weight of the child	≥2.5 kg	209	0.012	1.000		
		<2.5 kg	51		2.414	1.212	4.807
	HIV status of the child (ever)	Negative	241	0.024	1.000		
		Positive	19		3.360	1.173	9.627
	Vitamin A deficiency in the child	Not indicated	177	0.005	1.000		
		Indicated	83		2.395	1.301	4.409
MUACFA-8.2 (N=495; Included in analysis: 88.7%)	Birth weight of the child	≥2.5 kg	350	0.028	1.000		
		<2.5 kg	89		1.756	1.062	2.905
	HIV status of the child (ever)	Negative	412	0.001	1.000		
		Positive	27		4.036	1.795	9.073

MUACFA-1: Generic group of HIV-exposed children; MUACFA-4: Children of the mothers who were alive any time during the study; MUACFA-6: Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; MUACFA-8.1: Children who were vitamin/mineral deficient ever during the study; MUACFA-8.2: Children who were anaemic ever during the study.

4.807; p=0.012), HIV infection in the child (OR=3.360, CI=1.173-9.627; p=0.024), and the indication of vitamin A deficiency in the child (OR=2.395, CI=1.301-4.409; p=0.005). Thus, in addition to the general key associated factors, the vitamin/mineral deficient male children also had a higher chance for the inadequate MUACFA.

(e) Children who were anaemic ever during the study (sub-group MUACFA-8.2): 88.7% of the eligible 495 children were included in the analysis. The factors associated with the ever-inadequate MUACFA status among the HIV-exposed children who were

ever- anaemic during the study were the LBW (<2.5kg; OR=1.756, CI=1.062-2.905; p= 0.028) and the HIV infection in the child (OR=4.036, CI=1.795-9.073; p=0.001). Thus, among the anaemic children, no association was observed between the ever-inadequate MUACFA status and the degree of severity of anaemia. As such, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

5.2. Factors associated with the anaemia among the children.

The covariates for which the bivariate significance was obtained for the ever-inadequate Hb status (presence of anaemia) among the HIV-exposed children are listed in table 57. These covariates were applicable to the 5 sub-groups of children (children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy or sub-group Hb-2.1, children of the mothers who were ever initiated on ART or sub-group Hb-3, children of the mothers who were alive any time during the study or sub-group Hb-4, children who were ever breastfed or sub-group Hb-5, children more than 15 months of age any time during the study or sub-group Hb-7.1), in addition to the generic group (Hb-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 58. As such, despite having the bivariate significance, only 10 (of the 23) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group Hb-1): 95.9% of the eligible 660 children were included in the analysis. The general factors associated with the anaemia among the HIV-exposed children were the younger age of the mother (<25 years; OR= 1.690, CI=1.101-2.595; p=0.016), initiation of ART for the mother (OR=3.499, CI=1.583-7.737; p=0.002), presence of acute morbidity in the child (OR=1.748, CI=1.120-2.728; p=0.014) and the ever-inadequate HFA status in the child (OR=1.855, CI=1.237-2.781; p=0.003). Also, due to their stronger association, the under-immunization of any vaccine (included in the Universal Immunization Program) could serve as a predictor for the anaemia (OR=1.655, CI=1.069-2.562; p=0.024); it could be that the HIV-exposed children with anaemia tend to miss a higher number of immunizations for age; unless this was a

Table 57. Covariates with statistical significance for ever-inadequate Hb among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child ever anaemic?			Bivariate p-value
		No, %	Yes, %	Total, N	
Age of the mother	≥25 years	29.3	70.7	434	<0.001
	<25 years	16.8	83.2	226	
Whether mother working?	Yes	30.1	69.9	216	0.035
	No	22.5	77.5	444	
Mother ever initiated on ART	No	56.7	43.3	30	<0.001
	Yes	23.4	76.6	625	
Age of mother at start of ART (years)	≥25 years	26.9	73.1	227	<0.001
	<25 years	21.2	78.8	386	
BMI of mothers	Normal and above	29.1	70.9	299	0.015
	Underweight	20.8	79.2	337	
Anaemia in the mother	Absent	39.0	61.0	59	0.002
	Present	21.3	78.7	558	
Composite nutrition indicator of sickness among mothers	Not indicated	26.7	73.3	480	0.047
	Indicated	18.9	81.1	164	
Mother's ARV/ART status during pregnancy	On ARV/ART	24.2	75.8	575	0.046
	Not on ARV/ART	35.3	64.7	68	
Duration of ARV/ART given to the mother during pregnancy	≤30 days	33.1	66.9	151	0.003
	31+ days	21.0	79.0	424	
Breastfeeding of the child (ever)	Absent	32.5	67.5	114	0.041
	Present	23.3	76.7	540	
Breastfeeding duration for the child	<29 weeks	29.0	71.0	231	0.007
	≥29 weeks	19.1	80.9	309	
Weaning at <6 months and within two weeks	Done	29.8	70.2	141	0.019
	Not done	20.2	79.8	387	

Characteristics	Attributes	Whether the child ever anaemic?			Bivariate p-value
		No, %	Yes, %	Total, N	
Provision of ARV/ART to mother during the breastfeeding period	Partially/not covered	33.3	66.7	123	0.009
	Fully covered	22.1	77.9	520	
Age of the child at baseline	≥12 months	28.7	71.3	446	0.002
	<12 months	17.3	82.7	214	
Gender of the child	Female	28.2	71.8	323	0.065
	Male	22.0	78.0	337	
HIV status of the child (ever)	Negative	25.9	74.1	625	0.021
	Positive	8.6	91.4	35	
Coverage of any immunization	Immunized for age	28.7	71.3	443	0.002
	Under-immunized for age	17.5	82.5	217	
Coverage of MMR immunization	Immunized for age	26.8	73.2	444	0.009
	Under-immunized for age	16.1	83.9	143	
Acute morbidity among children (ever)	Absent	36.5	63.5	137	<0.001
	Present	22.0	78.0	523	
Inadequate HFA among children (ever)	Absent	36.4	63.6	176	<0.001
	Present	20.9	79.1	484	
Inadequate WFA among children (ever)	Absent	31.4	68.6	245	0.003
	Present	21.2	78.8	415	
Inadequate HCFA among children (ever)	Absent	27.8	72.2	496	0.004
	Present	16.5	83.5	164	
Any inadequate anthropometric measurement for age (ever)	Absent	36.1	63.9	119	0.002
	Present	22.6	77.4	541	

All percentages are with respect to horizontal row total.

Table 58. Covariates with significant OR for ever-inadequate Hb among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
Hb-1 (N=660; Included in analysis: 95.9%)	Age of the mother	≥25 years	411	0.016	1.000		
		<25 years	222		1.690	1.101	2.595
	Mother ever initiated on ART	No	29	0.002	1.000		
		Yes	604		3.499	1.583	7.737
	Coverage of any immunization	Immunized for age	424	0.024	1.000		
		Under-immunized for age	209		1.655	1.069	2.562
	Acute morbidity among children ever	Absent	128	0.014	1.000		
		Present	505		1.748	1.120	2.728
	Inadequate HFA among children ever	Absent	169	0.003	1.000		
		Present	464		1.855	1.237	2.781
Hb-2.1 (N=592; Included in analysis: 96.3%)	Age of the mother	≥25 years	365	0.037	1.000		
		<25 years	205		1.622	1.030	2.555
	Mother ever initiated on ART	No	21	0.031	1.000		
		Yes	549		2.753	1.095	6.923
	Coverage of any immunization	Immunized for age	377	0.032	1.000		
		Under-immunized for age	193		1.655	1.045	2.623
	Acute morbidity among children ever	Absent	111	0.027	1.000		
		Present	459		1.713	1.062	2.762
	Inadequate HFA among children ever	Absent	157	0.005	1.000		
		Present	413		1.834	1.197	2.812
	Age of the mother	≥25 years	382	0.029	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
Hb-3 (N=630; Included in analysis: 94.3%)		<25 years	212		1.639	1.051	2.558
	Breastfeeding of the child ever	Absent	103	0.043	1.000		
		Present	491		1.649	1.016	2.676
	Coverage of any immunization	Immunized for age	394	0.025	1.000		
		Under-immunized for age	200		1.689	1.067	2.672
	Acute morbidity among children ever	Absent	117	0.034	1.000		
		Present	477		1.660	1.038	2.655
	Inadequate HFA among children ever	Absent	155	0.002	1.000		
		Present	439		1.934	1.266	2.953
Hb-4 (N=644; Included in analysis: 92.9%)	Age of the mother	≥25 years	390	0.028	1.000		
		<25 years	208		1.677	1.057	2.660
	Mother ever initiated on ART	No	25	0.010	1.000		
		Yes	573		3.189	1.325	7.676
	Anaemia in the mother	Absent	58	0.018	1.000		
		Present	540		2.129	1.139	3.980
	The HIV status of the child ever	Negative	568	0.045	1.000		
		Positive	30		7.889	1.050	59.254
	Coverage of any immunization	Immunized for age	399	0.024	1.000		
		Under-immunized for age	199		1.711	1.072	2.733
	Acute morbidity among children ever	Absent	122	0.042	1.000		
		Present	476		1.635	1.017	2.628
	Inadequate HFA among children ever	Absent	162	0.006	1.000		
		Present	436		1.822	1.185	2.803

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
Hb-5 (N=546; Included in analysis: 94.3%)	Age of the mother	≥25 years	329	0.038	1.000		
		<25 years	186		1.691	1.030	2.777
	Mother ever initiated on ART	No	26	0.001	1.000		
		Yes	489		4.295	1.806	10.214
	Weaning at <6 months and within two weeks	Done	140	0.005	1.000		
		Not done	375		1.980	1.225	3.205
	Acute morbidity among children ever	Absent	102	0.006	1.000		
		Present	413		2.101	1.242	3.556
	Inadequate HFA among children ever	Absent	125	0.001	1.000		
		Present	390		2.236	1.386	3.607
Hb-7.1 (N=587; Included in analysis: 96.6%)	Mother ever initiated on ART	No	29	0.002	1.000		
		Yes	538		3.531	1.595	7.819
	Age of the child at baseline	≥12 months	429	0.011	1.000		
		<12 months	138		2.328	1.216	4.457
	Coverage of any immunization	Immunized for age	388	0.028	1.000		
		Under-immunized for age	179		1.778	1.066	2.968
	Inadequate HFA among children ever	Absent	157	0.037	1.000		
		Present	410		1.591	1.029	2.459

Hb-1: Generic group of HIV-exposed children; Hb-2.1: Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy; Hb-3: Children of the mothers who were ever initiated on ART; Hb-4: Children of the mothers who were alive any time during the study; Hb-5: Children who were ever breastfed; Hb-7.1: Children more than 15 months of age any time during the study.

spurious association. Thus, neither the age nor the gender of the child was linked to the anaemia among the children, probably because they were present in common in a majority.

(b) Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (sub-group Hb-2.1): 96.3% of the eligible 592 children were included in the analysis. The factors associated with the anaemia among the HIV-exposed children whose mothers had undertaken PPTCT strategy involving ARV/ART during pregnancy were the younger age of the mother (<25 years; OR=1.622, CI=1.030-2.555; p=0.037), initiation of ART for the mother (OR=2.753, CI=1.095-6.923; p=0.031), presence of acute morbidity in the child (OR=1.713, CI=1.062-2.762; p=0.027) and the ever-inadequate HFA status in the child (OR=1.834, CI=1.197-2.812; p=0.005). As in the generic group, the under-immunization of any vaccine could serve as a predictor for the anaemia (OR=1.655, CI=1.045-2.623; p=0.032). Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general.

(c) Children of the mothers who were ever initiated on ART (sub-group Hb-3): 94.3% of the eligible 630 children were included in the analysis. The factors associated with the anaemia among the HIV-exposed children whose mothers were ever initiated on ART were the younger age of the mother (<25 years; OR=1.639, CI=1.051-2.558; p=0.029), breastfeeding ever (OR=1.649, CI=1.016-2.676; p=0.043), presence of acute morbidity in the child (OR=1.660, CI=1.038-2.655; p=0.034) and the ever-inadequate HFA status in the child (OR=1.934, CI=1.266-2.953; p=0.002). As in the generic group, the under-immunization of any vaccine could serve as a predictor for the anaemia (OR=1.689, CI=1.067-2.672; p=0.025). Thus, breastfeeding by the mothers ever initiated on ART was associated with the anaemia among the children, possibly through ART in breast milk. These results also pointed to the nexus of breastfeeding, anaemia, and ever-inadequate HFA among the children, as also seen in the sub-groups HFA-5, HFA-8.2, and WFA-1.

(d) Children of the mothers who were alive at any time during the study (sub-group Hb-4): 92.9% of the eligible 644 children were included in the analysis. The factors associated with the anaemia among the HIV-exposed children whose mothers were alive

at any time during the study were the younger age of the mother (<25 years; OR=1.677, CI=1.057-2.660; p=0.028), initiation of ART for the mother (OR=3.189, CI=1.325-7.676; p=0.010), anaemia in the mother (OR=2.129, CI=1.139-3.980; p=0.018), HIV infection in the child (OR=7.889, CI=1.050-59.254; p=0.045), presence of acute morbidity in the child (OR=1.635, CI=1.017-2.628; p=0.042) and the ever-inadequate HFA status in the child (OR=1.822, CI=1.185-2.803; p=0.006). Also, as in the generic group, the under-immunization of any vaccine could serve as a predictor for the anaemia (OR=1.711, CI= 1.072-2.733; p=0.024). That is, in addition to the general factors, the maternal anaemia and HIV status of the child were associated with the anaemia among the children.

(e) Children who were ever breastfed (sub-group Hb-5): 94.3% of the eligible 546 children were included in the analysis. The factors associated with the anaemia among the HIV-exposed children who were ever breastfed were the younger age of the mother (<25 years; OR=1.691, CI=1.030-2.777; p=0.038), initiation of ART for the mother (OR=4.295, CI=1.806-10.214; p=0.001), weaning at >6 months of age or for >2 weeks duration (OR= 1.980, CI=1.225-3.205; p=0.005), presence of acute morbidity in the child (OR=2.101, CI= 1.242-3.556; p=0.006) and the ever-inadequate HFA status in the child (OR=2.236, CI= 1.386-3.607; p=0.001). That is, in addition to the key associated factors as in the generic group, the delayed or longer weaning, which restricted feeds other than breast milk and provided for mixed feeding, tend to predispose to the anaemia among the children.

(f) Children more than 15 months of age any time during the study (sub-group Hb-7.1): 96.6% of the eligible 587 children were included in the analysis. The factors associated with the anaemia among the HIV-exposed children >15 months of age were the initiation of ART for the mother (OR=3.531, CI=1.595-7.819; p=0.002), younger age of the child (<12 months at baseline; OR=2.328, CI=1.216-4.457; p=0.005) and the ever-inadequate HFA status in the child (OR=1.591, CI=1.029-2.459; p= 0.037). Also, as in the generic group, the under-immunization of any vaccine could serve as a predictor for the anaemia (OR=1.778, CI=1.066-2.968; p=0.028). In a real-world scenario, the higher presence of anaemia among the children >15 months of age who were ‘recruited’ into the study at age <12 months does not make any sense (other than satisfying a requirement for

a research study), and hence the association could be disregarded. Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association. However, the association between the acute morbidity and anaemia (observed in the general group) did not exist in the children ≥15 months of age; as such, this association held better in the children <15 months of age.

5.3. Factors associated with the acute morbidity among the children.

The factors associated with the presence and the burden of acute morbidity were analyzed separately.

5.3.1. Presence of acute morbidity.

The covariates for which the bivariate significance was obtained for the chance of acute morbidity (presence of acute morbidity) among the children is listed in table 59. These covariates were applicable to the 6 sub-groups of children (children of the mothers who were alive any time during the study or sub-group AMP-4, children of the mothers who were vitamin/mineral deficient during the study or sub-group AMP-4.1, children of the mothers who were having acute morbidity during the study or sub-group AMP-4.3, children of the mothers who were identified as 'sick' during the study or sub-group AMP-4.4, children who were ever breastfed or sub-group AMP-5, and children more than 9 months of age any time during the study or sub-group AMP-7), in addition to the generic group (AMP-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 60. Despite the bivariate significance, only 15 (of the 24) covariates were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group AMP-1): 96.2% of the eligible 660 children were included in the analysis. The general factors associated with the ever-morbid status among the HIV-exposed children were the underprivileged population (SC/ST/ OBC; OR=1.780, CI=1.048-3.024; p=0.033), joint or three-generation family (OR=1.598, CI=1.043-2.449; p=0.031), socio-economic crisis in the family (OR=1.604, CI=1.018-

Table 59. Covariates with statistical significance for ever-morbid status among children (results of bivariate analysis).

Characteristics	Attributes	Whether the child had acute morbidity (ever)?			Bivariate p-value
		No, %	Yes, %	Total, N	
Caste	General	31.7	68.3	101	0.003
	SC/ST/OBC	18.8	81.2	559	
Type of family	Nuclear	23.6	76.4	364	0.044
	Joint/three-generation	17.2	82.8	296	
Environment where the child lives	With mother	21.7	78.3	609	0.045
	Without mother's care	9.8	90.2	51	
Socio-economic crisis in the family	Absent	23.5	76.5	422	0.023
	Present	16.0	84.0	238	
HIV clinical stage of mother	Stage 1	27.6	72.4	174	0.010
	Stage 2+	18.3	81.7	486	
Acute morbidity among mothers	Absent	24.9	75.1	441	<0.001
	Present	12.3	87.7	203	
Acute disease status of the mother	Single morbidity	16.7	83.3	120	0.023
	Multiple morbidities	6.0	94.0	83	
Composite morbidity indicator of sickness among mothers	Not indicated	23.2	76.8	538	0.001
	Indicated	9.4	90.6	106	
Vitamin deficiency among mothers	Absent	26.6	73.4	241	0.007
	Present	17.6	82.4	403	
Maximum no. of deficient vitamins/minerals ever indicated in the mother	1-6	22.2	77.8	198	0.017
	>6	13.2	86.8	205	
BMI of mothers	Normal and above	24.7	75.3	299	0.025
	Underweight	17.5	82.5	337	

Characteristics	Attributes	Whether the child had acute morbidity (ever)?			Bivariate p-value
		No, %	Yes, %	Total, N	
Composite sickness indicator among mothers	Not indicated	25.4	74.6	303	0.009
	Indicated	17.0	83.0	341	
Composite sickness indicated among mothers involving nutrition criteria	Nutrition criteria in isolation	24.7	75.3	89	0.038
	Nutrition criteria in combination	12.0	88.0	75	
Drug history during pregnancy or after delivery	Absent	21.4	78.6	618	0.032
	Present	0.0	100.0	17	
Weaning at ≤6 months and within two weeks	Not done	24.0	76.0	387	0.001
	Done	10.6	89.4	141	
Age of the child at baseline	≥12 months	20.2	79.8	446	0.597
	<12 months	22.0	78.0	214	
Gender of the child	Female	20.4	79.6	323	0.841
	Male	21.1	78.9	337	
HIV status of the child (ever)	Negative	21.0	79.0	625	0.588
	Positive	17.1	82.9	35	
Coverage of OPV immunization	Under-immunized for age	29.8	70.2	121	0.007
	Immunized for age	18.7	81.3	539	
Coverage of DPT immunization	Under-immunized for age	29.4	70.6	119	0.010
	Immunized for age	18.9	81.1	541	
Coverage of Measles immunization	Under-immunized for age	33.3	66.7	57	0.008
	Immunized for age	18.5	81.5	572	
Vitamin/mineral deficiency among children	Absent	30.7	69.3	365	<0.001
	Present	8.5	91.5	295	
Vitamin A deficiency in the child	Not indicated	23.6	76.4	564	<0.001
	Indicated	4.2	95.8	96	

Characteristics	Attributes	Whether the child had acute morbidity (ever)?			Bivariate p-value
		No, %	Yes, %	Total, N	
Anaemia in the child	Absent	30.3	69.7	165	<0.001
	Present	17.6	82.4	495	

All percentages are with respect to horizontal row total.

2.527; p=0.041), HIV clinical stage 2 or more of the mother (OR=1.581, CI=1.005-2.486; p=0.047), indication of vitamin/mineral deficiency in the child (OR=3.480, CI=2.033-5.955; p<0.001), and anaemia in the child (OR=1.985, CI=1.262-3.122; p=0.003). Also, the ever-morbid HIV-exposed children had higher immunization status (for age) of the DPT vaccine (OR=1.883, CI=1.135-3.126; p=0.014); probably because they were vaccinated when they sought health care for their morbidity. Thus, acute morbidity was present irrespective of the age, gender, or HIV status of the HIV-exposed child.

(b) Children of the mothers who were alive at any time during the study (sub-group AMP-4): 96.3% of the eligible 644 children were included in the analysis. The factors associated with the presence of morbidity among the HIV-exposed children whose mothers were alive any time during the study were the underprivileged population (SC/ST/OBC; OR=1.933, CI=1.139-3.280; p=0.015), joint or three-generation family (OR=1.671, CI=1.077-2.591; p=0.031), composite morbidity indication of sickness in the mother (OR=2.639, CI=1.225-5.685; p=0.013), indication of vitamin/mineral deficiency in the mother (OR=1.561, CI=1.006-2.424; p=0.047), indication of vitamin/mineral deficiency in the child (OR=3.249, CI=1.891-5.582; p<0.001), and anaemia in the child (OR=2.056, CI=1.294-3.265; p=0.002). Also, as in the generic group, the higher immunization-for-age status of the DPT vaccine was found in those children with acute morbidity (OR=2.049, CI=1.219-3.444; p=0.007). That is, in addition to the generic factors, the presence of vitamin/mineral deficiency and the clue of composite morbidity indicator among the mothers, tend to predict the presence of acute morbidity among the children.

Table 60. Covariates with significant OR for the presence of acute morbidity among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
AMP-1 (N=660; Included in analysis: 96.2%)	Caste	General	97	0.033	1.000		
		SC/ST/OBC	538		1.780	1.048	3.024
	Type of family	Nuclear	352	0.031	1.000		
		Joint/three-generation	283		1.598	1.043	2.449
	Socio-economic crisis in the family	Absent	404	0.041	1.000		
		Present	231		1.604	1.018	2.527
	HIV clinical stage of the mother	Stage 1	161	0.047	1.000		
		Stage 2+	474		1.581	1.005	2.486
	Coverage of DPT immunization	Under-immu-nized for age	113	0.014	1.000		
		Immunized for age	522		1.883	1.135	3.126
	Vitamin/mineral deficiency among children	Absent	349	<0.001	1.000		
		Present	286		3.480	2.033	5.955
	Anaemia in the child	Absent	158	0.003	1.000		
		Present	477		1.985	1.262	3.122
AMP-4 (N=644; Included in analysis: 96.3%)	Caste	General	94	0.015	1.000		
		SC/ST/OBC	526		1.933	1.139	3.280
	Type of family	Nuclear	348	0.022	1.000		
		Joint/three-generation	272		1.671	1.077	2.591
	Composite morb-idity indicator of	Not indicated	518	0.013	1.000		
		Indicated	102		2.639	1.225	5.685

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	sickness among mothers						
	Vitamin deficiency among mothers	Absent	224	0.047	1.000		
		Present	396		1.561	1.006	2.424
	Coverage of DPT immunization	Under-immunized for age	109	0.007	1.000		
		Immunized for age	511		2.049	1.219	3.444
	Vitamin/mineral deficiency among children	Absent	343	<0.001	1.000		
		Present	277		3.249	1.891	5.582
	Anaemia in the child	Absent	153	0.002	1.000		
		Present	467		2.056	1.294	3.265
AMP-4.1 (N=403; Included in analysis: 98.3%)	Type of family	Nuclear	236	0.021	1.000		
		Joint/three-generation	160		2.022	1.112	3.677
	Maximum no. of deficient vitamins/minerals ever indicated in the mother	1-6	195	0.028	1.000		
		>6	201		1.890	1.072	3.331
	Vitamin/mineral deficiency among children	Absent	207	<0.001	1.000		
		Present	189		3.474	1.870	6.454
	Anaemia in the child	Absent	96	0.018	1.000		
		Present	300		2.035	1.128	3.672
		Stage 1	33	0.016	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
AMP-4.3 (N=203; Included in analysis: 98.0%)	HIV clinical stage of mother	Stage 2+	166		3.829	1.285	11.408
	Acute disease status of the mother	Single morbidity	118	0.050	1.000		
		Multiple morbidities	81		3.302	1.002	10.884
	Coverage of DPT immunization	Under-immu-nized for age	36	0.001	1.000		
		Immunized for age	163		6.012	2.011	17.972
	Vitamin/mineral deficiency among children	Absent	102	0.001	1.000		
		Present	97		12.746	2.690	60.394
AMP-4.4 (N=164; Included in analysis: 99.4%)	Composite sickness indicated among mothers involving nutrition criteria	Nutrition criteria in isolation	89	0.035	1.000		
		Nutrition criteria in combination	74		2.556	1.066	6.131
	Vitamin/mineral deficiency among children	Absent	83	0.004	1.000		
		Present	80		3.712	1.523	9.047
AMP-5 (N=546; Included in analysis: 94.5%)	Caste	General	74	0.018	1.000		
		SC/ST/OBC	442		2.083	1.132	3.832
	Environment where the child lives	With mother	487	0.025	1.000		
		Without mother's care	29		10.528	1.339	82.754
		Stage 1	133	0.008	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	HIV clinical stage of mother	Stage 2+	383		2.001	1.203	3.326
	Weaning at ≤6 months and within two weeks	Not done	378	0.003	1.000		
		Done	138		2.592	1.370	4.906
	Coverage of DPT immunization	Under-immu-nized for age	95	0.048	1.000		
		Immunized for age	421		1.776	1.005	3.141
	Vitamin/mineral deficiency among children	Absent	276	<0.001	1.000		
		Present	240		3.388	1.868	6.146
	Anaemia in the child	Absent	118	0.002	1.000		
		Present	398		2.341	1.371	3.997
AMP-7 (N=629; Included in analysis: 96.7%)	Caste	General	96	0.014	1.000		
		SC/ST/OBC	512		1.956	1.144	3.346
	Socio-economic crisis in the family	Absent	390	0.047	1.000		
		Present	218		1.625	1.007	2.622
	Coverage of Measles immunization	Under-immu-nized for age	53	0.004	1.000		
		Immunized for age	555		2.735	1.390	5.380
	Vitamin/mineral deficiency among children	Absent	326	<0.001	1.000		
		Present	282		3.474	2.023	5.966
	Anaemia in the child	Absent	145	0.016	1.000		
		Present	463		1.795	1.116	2.890

AMP-1: Generic group of HI exposed children; AMP-4: Children of the mothers who were alive any time during the study; AMP-4.1: Children of the mothers who were vitamin/mineral deficient during the study; AMP-4.3: Children of the mothers who were having acute morbidity during the study; AMP-4.4: Children of the mothers who were identified as 'sick' during the study; AMP-5: Children who were ever breastfed; AMP-7: Children more than 9 months of age any time during the study.

(c) Children of the mothers who were vitamin/mineral deficient during the study (sub-group AMP-4.1): 98.3% of the eligible 403 children were included in the analysis. The factors associated with the presence of morbidity among the HIV-exposed children whose mothers were vitamin/mineral deficient during the study were the joint or three-generation family (OR=2.022, CI=1.112-3.677; p=0.021), higher number of indicated deficient vitamins/minerals in the mother (> 6 deficient vitamins/minerals; OR=1.890, CI=1.072-3.331; p=0.028), indication of vitamin/mineral deficiency in the child (OR=3.474, CI=1.870-6.454; p<0.001), and anaemia in the child (OR=2.035, CI=1.128-3.672; p=0.018). Thus, in addition to those in the generic group, the higher number of the deficient vitamins/minerals indicated in the mothers, tend to predict the presence of acute morbidity among the children.

(d) Children of the mothers who were having acute morbidity during the study (sub-group AMP-4.3): 98.0% of the eligible 203 children were included in the analysis. The factors associated with the ever-morbid status of the HIV-exposed children of morbid mothers were the HIV clinical stage 2 or more of the mother (OR=3.829, CI=1.285-11.408; p=0.016), multiple morbidities in the mother (OR=3.302, CI=1.002-10.884; p=0.050) and indication of vitamin/mineral deficiency in the child (OR=12.746, CI=2.690-60.394; p= 0.001). Also, as in the generic group, the higher immunization-for-age status of the DPT vaccine was found in the ever-morbid children (OR=6.012, CI=2.011-17.972; p= 0.001). That is, in addition to those general factors, the higher number of acute morbidities in the mothers, tend to predict the presence of acute morbidity among the children.

(e) Children of the mothers who were identified as 'sick' during the study (sub-group AMP-4.4): Even though this sub-group was expected to include a larger group of the children of sick mothers, by virtue of the covariate which triggered the analysis, this sub-group was restricted only to the children of nutritionally sick mothers (mothers who were identified as 'sick' due to the nutritional factors). 99.4% of the eligible 164 children were included in the analysis. The factors associated with the presence of acute morbidity among the HIV-exposed children whose mothers were identified as 'nutritionally sick' during the study were the mother satisfying the nutritional criteria for composite indicator of sickness along with the other criteria (meant surmounting ill-health from multiple factors, including the nutritional; OR=2.556, CI=1.066-6.131; p=0.035) and indication of vitamin/mineral deficiency in the child (OR=3.712, CI=1.523-9.047; p=0.004). That is, in addition to those in the generic group, the surmounting (including the nutritional) factors suggesting ill-health among mothers, tend to predict the presence of acute morbidity among the children.

(f) Children who were ever breastfed (sub-group AMP-5): 94.5% of the eligible 546 children were included in the analysis. The factors associated with the ever-morbid status of the HIV-exposed children who were ever breastfed were the underprivileged population (SC/ST/OBC; OR=2.083, CI=1.132-3.832; p=0.018), child living without mother's care (OR=10.528, CI=1.339-82.754; p=0.025), HIV clinical stage 2 or more of the mother (OR=2.001, CI=1.203-3.326; p=0.008), weaning at >6 months of age or for >2 weeks duration (OR=2.592, CI=1.370-4.906; p=0.003), indication of vitamin/mineral deficiency in the child (OR=3.388, CI=1.868-6.146; p<0.001), and anaemia in the child (OR=2.341, CI=1.371-3.997; p=0.002). Also, as in the generic group, the higher immunization-for-age status of the DPT vaccine was found in the morbid children (OR=1.776, CI=1.005-3.141; p=0.048). That is, in addition to those in the generic group, the children who had delayed (meant restricted feeds other than breast milk) or longer (meant mixed feeding) weaning, and those not under the mother's care, had a higher chance for the acute morbidity.

(g) Children more than 9 months of age any time during the study (sub-group AMP-7): 96.7% of the eligible 629 children were included in the analysis. The factors associated with the ever-morbid status of the HIV-exposed children >9 months of age were the

underprivileged population (SC/ST/OBC; OR=1.956, CI=1.144-3.346; p=0.014), socio-economic crisis in the family (OR=1.625, CI=1.007-2.622; p=0.047), indication of vitamin/mineral deficiency in the child (OR=3.474, CI=2.023-5.966; p<0.001), and anaemia in the child (OR=1.795, CI=1.116-2.890; p=0.016). Also, the morbid HIV-exposed children >9 months of age had a higher immunization status (for age) of the measles vaccine (OR=2.735, CI=1.390-5.966; p=0.004); probably because they were vaccinated when they sought health care for their morbidity.

5.3.2. The burden of acute morbidity.

The covariates for which the bivariate significance was obtained for the burden (in terms of the frequency) of acute morbidity among the children is listed in table 61. These covariates were applicable to the 8 sub-groups of children (children of the mothers who had undertaken any PPTCT strategy during pregnancy or sub-group AMB-2, children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy or sub-group AMB-2.1, children of the mothers who were alive any time during the study or sub-group AMB-4, children of the mothers who were vitamin/mineral deficient during the study or sub-group AMB-4.1, children of the mothers who were having acute morbidity during the study or sub-group AMB-4.3, children of the mothers who were identified as 'sick' during the study or sub-group AMB-4.4, children who were vitamin/mineral deficient ever during the study or sub-group AMB-8.1, and children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi or sub-group AMB-8.3.1, in addition to the generic group (AMB-1, children who were having acute morbidity ever during the study, which was also the sub-group 18 of all HIV-exposed children), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 62. As such, despite having the bivariate significance, only 13 (of the 20) covariates were found to be statistically significant in the BLR.

(a) Generic group of morbid HIV-exposed children (Group AMB-1): All of the eligible 523 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children were the nuclear family (OR=1.634, CI=

Table 61. Covariates with statistical significance for acute morbidity events ≥0.5 per month (results of bivariate analysis).

Characteristics	Attributes	Acute morbidity events among children per month			Bivariate p-value
		<0.5, %	≥0.5, %	Total, N	
Type of family	Joint/three-generation	83.3	16.7	245	0.038
	Nuclear	75.9	24.1	278	
Safely managed drinking water	Used	84.6	15.4	273	0.002
	Lacked	73.6	26.4	250	
HIV clinical stage of mother	Stage 1	85.7	14.3	126	0.043
	Stage 2+	77.3	22.7	397	
Acute morbidity among mothers	Absent	84.6	15.4	331	<0.001
	Present	68.5	31.5	178	
Acute disease status of mother	Single morbidity	75.0	25.0	100	0.036
	Multiple morbidities	60.3	39.7	78	
Composite morbidity indicator of sickness among mothers	Not indicated	82.8	17.2	413	<0.001
	Indicated	62.5	37.5	96	
Maximum no. of deficient vitamins/minerals ever indicated in the mother	1-6	81.8	18.2	154	0.034
	>6	71.9	28.1	178	
Composite sickness indicated among mothers	By other criteria	83.0	17.0	188	<0.001
	By morbidity criteria	63.2	36.8	95	
Coverage of maternal PPTCT strategies during the pregnancy	Any one strategy	84.1	15.9	233	0.020
	Any two or more strategies	75.7	24.3	259	
Coverage of maternal PPTCT strategies	Undertaken in isolation	84.1	15.9	214	0.019

Characteristics	Attributes	Acute morbidity events among children per month			Bivariate p-value
		<0.5, %	≥0.5, %	Total, N	
involving ARV/ART during the pregnancy	Undertaken in combination	75.3	24.7	255	
Age of the child at baseline	≥12 months	84.6	15.4	356	<0.001
	<12 months	68.3	31.7	167	
Gender of the child	Female	80.9	19.1	257	0.379
	Male	77.8	22.2	266	
HIV status of the child (ever)	Negative	81.0	19.0	494	<0.001
	Positive	51.7	48.3	29	
Coverage of OPV immunization	Immunized for age	81.1	18.9	438	0.029
	Under-immunized for age	70.6	29.4	85	
Sickness absenteeism at an institution	Absent	86.2	13.8	261	0.007
	Present	69.2	30.8	39	
Inadequate HCFA among children (ever)	Absent	82.8	17.2	396	0.001
	Present	68.5	31.5	127	
Vitamin/mineral deficiency among children	Absent	83.4	16.6	253	0.027
	Present	75.6	24.4	270	
Maximum no. of deficient vitamins/minerals ever indicated in the child	1-6	82.1	17.9	140	0.009
	>6	68.5	31.5	130	
Persistence of vitamin/ mineral deficiency among ever deficient children	<50% of time	81.1	18.9	212	<0.001
	≥50% of time	55.2	44.8	58	
Vitamin A deficiency in the child	Not indicated	81.7	18.3	431	0.005
	Indicated	68.5	31.5	92	

All percentages are with respect to horizontal row total.

Table 62. Covariates with significant OR for acute morbidity events ≥0.5 per month among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
AMB-1 (N=523; Included in analysis: 100.0%)	Type of family	Joint/three-generation	245	0.036	1.000		
		Nuclear	278		1.634	1.034	2.585
	Safely managed drinking water	Used	273	0.005	1.000		
		Lacked	250		1.926	1.223	3.033
	Age of the child at baseline	≥12 months	356	<0.001	1.000		
		<12 months	167		3.162	1.979	5.052
	HIV status of the child (ever)	Negative	494	0.004	1.000		
		Positive	29		3.218	1.437	7.204
	Vitamin A deficiency in the child	Not indicated	431	0.005	1.000		
		Indicated	92		2.214	1.273	3.853
AMB-2 (N=492; Included in analysis: 100.0%)	Type of family	Joint/three-generation	236	0.047	1.000		
		Nuclear	256		1.612	1.007	2.582
	Safely managed drinking water	Used	256	0.006	1.000		
		Lacked	236		1.939	1.209	3.108
	Coverage of maternal PPTCT strategies	Any one strategy	233	0.049	1.000		
		Any two or more strategies	259		1.613	1.001	2.599
	Age of the child at baseline	≥12 months	327	<0.001	1.000		
		<12 months	165		3.067	1.892	4.969
	Vitamin A deficiency in the child	Not indicated	407	0.014	1.000		
		Indicated	85		2.081	1.161	3.730
AMB-2.1 (N=469; Included in	Safely managed drinking water	Used	243	0.009	1.000		
		Lacked	226		1.895	1.173	3.061
	Coverage of maternal PPTCT stra-	Undertaken in isolation	214	0.047	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
analysis: 100.0%)	tegies involving ARV/ART	Undertaken in combination	255		1.642	1.007	2.679
	Age of the child at baseline	≥12 months	309	<0.001	1.000		
		<12 months	160		3.013	1.846	4.917
	HIV status of the child (ever)	Negative	448	0.045	1.000		
		Positive	21		2.688	1.021	7.078
	Vitamin A deficiency in the child	Not indicated	387	0.026	1.000		
		Indicated	82		1.965	1.083	3.565
AMB-4 (N=509; Included in analysis: 100.0%)	Safely managed drinking water	Used	265	0.008	1.000		
		Lacked	244		1.876	1.178	2.988
	Acute morbidity among mothers	Absent	331	0.035	1.000		
		Present	178		1.798	1.042	3.101
	Age of the child at baseline	≥12 months	343	<0.001	1.000		
		<12 months	166		3.146	1.945	5.090
	HIV status of the child (ever)	Negative	481	0.037	1.000		
		Positive	28		2.490	1.057	5.869
	Vitamin A deficiency in the child	Not indicated	419	0.011	1.000		
		Indicated	90		2.087	1.183	3.682
AMB-4.1 (N=332; Included in analysis: 100.0%)	Safely managed drinking water	Used	170	0.036	1.000		
		Lacked	162		1.813	1.040	3.162
	Maximum no. of deficient vitamins/ minerals ever indicated in the mother	1-6	154	0.026	1.000		
		>6	178		1.910	1.079	3.379
	Age of the child at baseline	≥12 months	232	<0.001	1.000		
		<12 months	100		3.362	1.872	6.039

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	Vitamin A deficiency in the child	Not indicated	261	0.007	1.000		
		Indicated	71		2.450	1.284	4.674
AMB-4.3 (N=178; Included in analysis: 100.0%)	Safely managed drinking water	Used	89	0.008	1.000		
		Lacked	89		2.560	1.280	5.118
	Acute disease status of the mother	Single morbidity	100	0.022	1.000		
		Multiple morbidities	78		2.235	1.122	4.452
	Age of the child at baseline	≥12 months	119	0.010	1.000		
		<12 months	59		2.612	1.253	5.448
	Vitamin A deficiency in the child	Not indicated	134	0.008	1.000		
		Indicated	44		2.927	1.324	6.473
AMB 4.4 (N=283; Included in analysis: 100.0%)	HIV clinical stage of mother	Stage 1	59	0.033	1.000		
		Stage 2+	224		2.765	1.087	7.033
	Composite sickness indicated among the mothers	By other criteria	188	0.001	1.000		
		By morbidity criteria	95		2.881	1.572	5.281
	Age of the child at baseline	≥12 months	178	<0.001	1.000		
		<12 months	105		3.122	1.691	5.761
	HIV status of the child (ever)	Negative	259	0.002	1.000		
		Positive	24		4.434	1.731	11.361
AMB-8.1 (N=270; Included in analysis: 100.0%)	Type of family	Joint/three-generation	115	0.012	1.000		
		Nuclear	155		2.305	1.200	4.429
	Age of the child at baseline	≥12 months	193	0.014	1.000		
		<12 months	77		2.336	1.189	4.588
	HIV status of the child (ever)	Negative	250	0.013	1.000		
		Positive	20		3.606	1.307	9.949
	Persistence of vitamin/mineral	<50%	212	<0.001	1.000		
		≥50%	58		3.966	1.998	7.874

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	deficiency among children						
AMB 8.3.1 (N=348; Included in analysis: 86.2%)	Safely managed drinking water	Used	158	0.045	1.000		
		Lacked	142		1.994	1.014	3.919
	HIV status of the child (ever)	Negative	282	0.047	1.000		
		Positive	18		2.956	1.017	8.594
	Vitamin A deficiency in the child	Not indicated	240	0.006	1.000		
		Indicated	60		2.742	1.331	5.650

AMB-1: Generic group of morbid HIV-exposed children; AMB-2: Children of the mothers who had undertaken any PPTCT strategy during pregnancy; AMB-2.1: Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy; AMB-4: Children of the mothers who were alive any time during the study; AMB-4.1: Children of the mothers who were vitamin/mineral deficient during the study; AMB-4.3: Children of the mothers who were having acute morbidity during the study; AMB-4.4: Children of the mothers who were identified as 'sick' during the study; AMB-8.1: Children who were vitamin/mineral deficient ever during the study; AMB-8.3.1: Children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi.

1.034-2.585; p=0.036), lack of safely managed drinking water in the household (OR= 1.926, CI=1.223-3.033; p=0.005), younger age of the child (<12 months at baseline; OR=3.162, CI=1.979-5.052; p<0.001), HIV infection in the child (OR=3.218, CI=1.437-7.204; p=0.004) and the indication of vitamin A deficiency in the child (OR=2.214, CI= 1.273-3.853; p=0.005). Thus, the infants and HIV infected children had higher burden of acute morbidity; however, therer were no marked gender differentials.

(b) Children of the mothers who had undertaken any PPTCT strategy during pregnancy (sub-group AMB-2): All of the eligible 492 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-

exposed children of the mothers who had undertaken any PPTCT strategy during pregnancy were the nuclear family (OR=1.612, CI=1.007-2.582; p=0.047), lack of safely managed drinking water in the household (OR=1.939, CI=1.209-3.108; p=0.006), mother adopting two or more PPTCT strategies (OR=1.613, CI=1.001-2.599; p=0.049), younger age of the child (<12 months at baseline; OR=3.067, CI=1.892-4.969; p<0.001) and the indication of vitamin A deficiency in the child (OR=2.081, CI=1.161-3.730; p=0.014). The undertaking of two or more PPTCT strategies by the mother and the higher frequency of acute morbidities in the child could be a reflection of the same health consciousness and concern of the mother and its resultant healthcare-seeking behaviour.

(c) Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (sub-group AMB-2.1): All of the eligible 469 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy were the lack of safely managed drinking water in the household (OR=1.895, CI=1.173-3.061; p=0.009), mother adopting combination of ARV/ART with other strategies for PPTCT (OR=1.642, CI=1.007-2.679; p=0.047), younger age of the child (<12 months at baseline; OR=3.013, CI=1.846-4.917; p<0.001), HIV infection in the child (OR=2.688, CI=1.021-7.078; p=0.045) and the indication of vitamin A deficiency in the child (OR=1.965, CI=1.083-3.565; p=0.026). The undertaking of two or more PPTCT strategies (in the sub-group AMB-2) meant combining ARV/ART with the other strategies (commonly the breastfeeding strategy as per guidelines; chapter 3, section 4.6.). As such, the maternal adoption of multiple PPTCT strategies and the child's higher frequency of acute morbidities could be due to the same health consciousness and concern of the mother and the resultant healthcare-seeking behaviour. However, limited breastfeeding (and hence, maternal immunoglobulins) for 6 months also could result in the higher frequency of acute morbidities, as observed for the infants (in Group AMB-1).

(d) Children of the mothers who were alive at any time during the study (sub-group AMB-4): All of the eligible 509 children were included in the analysis. The factors

associated with the burden of acute morbidity among the HIV-exposed children of the alive mothers were the lack of safely managed drinking water in the household (OR=1.876, CI=1.178-2.988; p=0.008), presence of acute morbidity in the mother (OR=1.798, CI=1.042-3.101; p=0.035), younger age of the child (<12 months at baseline; OR=3.146, CI=1.945-5.090; p<0.001), HIV infection in the child (OR=2.490, CI=1.057-5.869; p=0.037) and the indication of vitamin A deficiency in the child (OR=2.087, CI=1.183-3.682; p=0.011). Thus, the presence of acute morbidity in the mother tended to enhance the frequency of acute morbidities in the child.

(e) Children of the mothers who were vitamin/mineral deficient during the study (sub-group AMB-4.1): All of the eligible 332 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children of the vitamin/mineral deficient mothers were the lack of safely managed drinking water in the household (OR=1.813, CI=1.040-3.162; p=0.036), higher number of indicated deficient vitamins/minerals in the mother (> 6 deficient vitamins/minerals; OR=1.910, CI=1.079-3.379; p=0.026), younger age of the child (<12 months at baseline; OR=3.362, CI=1.872-6.039; p<0.001) and the indication of vitamin A deficiency in the child (OR=2.450, CI=1.284-4.674; p=0.007). Thus, the indication of more number of deficient vitamins/ minerals among mothers suggested the higher frequency of acute morbidities in the child.

(f) Children of the mothers who were having acute morbidity during the study (sub-group AMB-4.3): All of the eligible 178 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children of the morbid mothers were the lack of safely managed drinking water in the household (OR=2.560, CI=1.280-5.118; p=0.008), multiple morbidities in the mother (OR=2.235, CI=1.122-4.452; p=0.022), younger age of the child (<12 months at baseline; OR=2.612, CI=1.253-5.448; p=0.010) and the indication of vitamin A deficiency in the child (OR= 2.927, CI=1.324-6.473; p=0.008). Thus, the presence of multiple acute morbidities in the mother tended to enhance the frequency of acute morbidities in the child.

(g) Children of the mothers who were identified as 'sick' during the study (sub-group AMB-4.4): All of the eligible 283 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children of the 'sick' mothers were the HIV clinical stage 2 or more of the mother (OR=2.765, CI=1.087-7.033; p=0.033), sick mothers indicated by morbidity criteria (OR=2.881, CI=1.572-5.281; p=0.001), younger age of the child (<12 months at baseline; OR=3.122, CI=1.691-5.761; p<0.001) and the HIV infection in the child (OR=4.434, CI=1.731-11.361; p=0.002). Thus, the advanced stage of HIV infection of the mother and mother's sickness due to morbidity in her tend to predict the higher frequency of acute morbidities in the child.

(h) Children who were vitamin/mineral deficient ever during the study (sub-group AMB-8.1): All of the eligible 270 children were included in the analysis. The factors associated with the burden of acute morbidity among the vitamin/mineral deficient HIV-exposed children were the nuclear family (OR=2.305, CI=1.200-4.429; p=0.012), younger age of the child (<12 months at baseline; OR=2.336, CI=1.189-4.588; p=0.014), HIV infection in the child (OR=3.606, CI=1.307-9.949; p=0.013) and the persistence of vitamin/mineral deficiency for more than 50% of the time (OR=3.966, CI=1.998-7.874; p<0.001). Thus, the longer persistence of vitamin/mineral deficiency among the children also predisposed to the higher burden (frequency) of morbidity among them.

(i) Children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi (sub-group AMB-8.3.1): 86.2% of eligible 348 children were included in the analysis. The factors associated with the burden of acute morbidity among the HIV-exposed children of age 3-5 years who had ever enrolled in a school/anganwadi were the lack of safely managed drinking water in the household (OR=1.994, CI=1.014-3.919; p=0.045), HIV infection in the child (OR=2.956, CI=1.017-8.594; p=0.047) and the indication of vitamin A deficiency in the child (OR=2.742, CI=1.331-5.650; p=0.006). Thus, the key associated factors among this sub-group of children were the same as that of the HIV-exposed children in general, but with a different degree of association.

5.4. The characteristics and causes of child death.

There were only 6 child deaths during the cohort study, and hence, the patterns and predictors of the child deaths could not be analyzed satisfactorily. As such, the information from the 68 verbal autopsies conducted into the <60-month child deaths that happened between 01 January 2011 and 30 November 2017 was used to look into the basic characteristics and causes of death.

5.4.1. Characteristics of the child death.

The basic information on child deaths is given in table 63. There were 6 HIV-EI (male= 4, female=2), 23 HIV-EU (male=12, female=11) and 39 HIV-exposed-but-infection-status-unknown (HIV-E?; male=18, female-21) child deaths for which the verbal autopsies were conducted. As per the NACO protocol, the earliest HIV test for the HIV-exposed child was scheduled at the child's age of 6 weeks; as such, the 59.0% (neonatal deaths=51.3%; death at the age of 28-41 days=7.7%) of the dead children were HIV-E? at death. The remaining 41.0% of HIV-E? children were untested for some reason before their death. As such, the gender differential within the HIV-EI and HIV-EU child deaths, and comparison between these categories by HIV status were not attempted for want of sufficient numbers.

Of the child deaths in the 0-59 months of age, 33.8% (HIV-EI=0.0%, HIV-EU=13.0%, HIV-E?=51.3%; male=26.5%, female=41.2%) were neonatal and 45.6% (HIV-EI=0.0%, HIV-EU=60.9%, HIV-E?=43.6%; male=47.1%, female=44.1%) were post-neonatal deaths of infancy, while the remaining 20.6% (HIV-EI=100.0%, HIV-EU=26.1%, HIV-E?=5.1%; male=26.5%, female=14.7%) were child deaths above one year of age. The neonatal deaths tend to be higher among the female children, while post-infancy deaths tend to be higher among the male children. The mean age of death was 228.8 days (HIV-EI=968.5, HIV-EU=312.4, HIV-E?=65.6; male=302.1, female=155.4); as such, a higher tendency for the male HIV-exposed child to live longer was observed. 52.9% (HIV-EI=100.0%, HIV-EU=43.5%, HIV-E?=51.3%; male=47.1%, female=58.8%) of the children died at home and 35.3% (HIV-EI=0.0%, HIV-EU=30.4%, HIV-E?=43.6%; male=44.1%, female=

Table 63. Characteristics of the child deaths.

Characteristics	Attributes	HIV-EI	HIV-EU	HIV-E?	Total			
		Total	Total	Total	Male	Female	N	%
Type of death	Neonatal	0.0	13.0	51.3	26.5	41.2	23	33.8
	Post-neonatal infant	0.0	60.9	43.6	47.1	44.1	31	45.6
	>1 year child	100.0	26.1	5.1	26.5	14.7	14	20.6
	Total, N	6	23	39	34	34	68	100.0
Age at the time of death (days)	<1	0.0	0.0	10.3	2.9	8.8	4	5.9
	1-6	0.0	8.7	23.1	14.7	17.6	11	16.2
	7-27	0.0	4.3	17.9	8.8	14.7	8	11.8
	28-41	0.0	4.3	7.7	8.8	2.9	4	5.9
	42-90	0.0	13.0	23.1	17.6	17.6	12	17.6
	91-182	0.0	26.1	5.1	17.6	5.9	8	11.8
	183-364	0.0	17.4	7.7	2.9	17.6	7	10.3
	365-729	16.7	17.4	5.1	8.8	11.8	7	10.3
	730-1094	33.3	0.0	0.0	2.9	2.9	2	2.9
	1095-1459	33.3	8.7	0.0	11.8	0.0	4	5.9
	1460+	16.7	0.0	0.0	2.9	0.0	1	1.5
	Total, N	6	23	39	34	34	68	100.0
	Mean age at death	968.5	312.4	65.6	302.1	155.4	228.8	
Place of death	Home	100.0	43.5	51.3	47.1	58.8	36	52.9
	Private tertiary hospital	0.0	21.7	17.9	23.5	11.8	12	17.6
	District hospital	0.0	8.7	17.9	17.6	8.8	9	13.2
	Taluka hospital	0.0	0.0	7.7	2.9	5.9	3	4.4
	Transit	0.0	17.4	5.1	8.8	8.8	6	8.8
	Orphanage	0.0	8.7	0.0	0.0	5.9	2	2.9
	Total, N	6	23	39	34	34	68	100.0
Religion	Hindu	100.0	100.0	94.9	97.1	97.1	66	97.1

Characteristics	Attributes	HIV-EI	HIV-EU	HIV-E?	Total			
		Total	Total	Total	Male	Female	N	%
	Muslim	0.0	0.0	5.1	2.9	2.9	2	2.9
	Total, N	6	23	39	34	34	68	100.0
Community	Scheduled caste	66.7	39.1	35.9	47.1	32.4	27	39.7
	OBC	0.0	30.4	30.8	23.5	32.4	19	27.9
	Scheduled tribe	16.7	17.4	12.8	17.6	11.8	10	14.7
	General	16.7	8.7	15.4	11.8	14.7	9	13.2
	Others	0.0	4.3	5.1	0.0	8.8	3	4.4
	Total, N	6	23	39	34	34	68	100.0
Socio-economic status	BPL	83.3	82.6	84.6	91.2	76.5	57	83.8
	APL	16.7	17.4	15.4	8.8	23.5	11	16.2
	Total, N	6	23	39	34	34	68	100.0
Transport option to reach HCF in 30 min.	Present	83.3	91.3	89.7	88.2	91.2	61	89.7
	Absent	16.7	8.7	10.3	11.8	8.8	7	10.3
	Total, N	6	23	39	34	34	68	100.0
Mode of transport	Public transport	80.0	63.6	67.6	73.3	61.3	41	67.2
	Private transport	20.0	31.8	26.5	23.3	32.3	17	27.9
	Ambulance	0.0	0.0	2.9	3.3	0.0	1	1.6
	Others	0.0	4.5	2.9	0.0	6.5	2	3.3
	Total, N	5	22	34	30	31	61	100.0
Type of family	Nuclear	0.0	47.8	46.2	52.9	32.4	29	42.6
	Joint	83.3	21.7	25.6	29.4	29.4	20	29.4
	Three-generation	16.7	30.4	28.2	17.6	38.2	19	27.9
	Total, N	6	23	39	34	34	68	100.0
Decision maker on health care	Father	66.7	47.8	53.8	64.7	41.2	36	52.9
	Mother	33.3	26.1	23.1	20.6	29.4	17	25.0
	Grandfather	0.0	13.0	7.7	8.8	8.8	6	8.8

Characteristics	Attributes	HIV-EI	HIV-EU	HIV-E?	Total			
		Total	Total	Total	Male	Female	N	%
needs (Relation to the child)	Grandmother	0.0	8.7	7.7	2.9	11.8	5	7.4
	Others	0.0	4.3	7.7	2.9	8.8	4	5.9
	Total, N	6	23	39	34	34	68	100.0
Father's education	Illiterate	50.0	34.8	15.8	24.2	26.5	17	25.4
	Class 1-4	0.0	8.7	18.4	15.2	11.8	9	13.4
	Class 5-7	33.3	17.4	26.3	27.3	20.6	16	23.9
	Class 8-12	0.0	39.1	34.2	30.3	35.3	22	32.8
	Graduate and above	16.7	0.0	5.3	3.0	5.9	3	4.5
	Total, N	6	23	38	33	34	67	100.0
Mother's education	Illiterate	16.7	30.4	38.5	41.2	26.5	23	33.8
	Class 1-4	33.3	8.7	7.7	11.8	8.8	7	10.3
	Class 5-7	33.3	26.1	25.6	17.6	35.3	18	26.5
	Class 8-12	16.7	34.8	28.2	29.4	29.4	20	29.4
	Total, N	6	23	39	34	34	68	100.0
Marriage of father and mother	Unrelated	66.7	73.9	56.4	61.8	64.7	43	63.2
	Consanguineous	33.3	26.1	43.6	38.2	35.3	25	36.8
	Total, N	6	23	39	34	34	68	100.0
Mother’s age (years)	18-24	33.3	56.5	41.0	44.1	47.1	31	45.6
	25-34	50.0	39.1	56.4	47.1	52.9	34	50.0
	35+	16.7	4.3	2.6	8.8	0.0	3	4.4
	Total, N	6	23	39	34	34	68	100.0
Previous child deaths in the family	Absent	66.7	91.3	87.2	82.4	91.2	59	86.8
	Present	33.3	8.7	12.8	17.6	8.8	9	13.2
	Total, N	6	23	39	34	34	68	100.0
Order of live birth of the child	1	16.7	39.1	35.9	35.3	35.3	24	35.3
	2	0.0	26.1	35.9	20.6	38.2	20	29.4
	3	33.3	21.7	20.5	29.4	14.7	15	22.1

Characteristics	Attributes	HIV-EI	HIV-EU	HIV-E?	Total			
		Total	Total	Total	Male	Female	N	%
	4	33.3	13.0	5.1	8.8	11.8	7	10.3
	5+	16.7	0.0	2.6	5.9	0.0	2	2.9
	Total, N	6	23	39	34	34	68	100.0
Prematurity at birth	Absent	66.7	91.3	74.4	82.4	76.5	54	79.4
	Present	33.3	8.7	25.6	17.6	23.5	14	20.6
	Total, N	6	23	39	34	34	68	100.0
Immunization status of child	Immunized for age	0.0	60.9	41.0	47.1	41.2	30	44.1
	Under-immunized for age	100.0	30.4	33.3	38.2	38.2	26	38.2
	Could not be ascertained	0.0	8.7	25.6	14.7	20.6	12	17.6
	Total, N	6	23	39	34	34	68	100.0

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

26.5%) died at a hospital, while the remaining 11.8% elsewhere. All the HIV-EI children and a higher number of female children died at home.

Majority of the dead children were from the Hindu religion (97.1%), the underprivileged caste (SC/ST/OBC; 82.4%) and from the BPL status (83.8%). However, a majority (89.7%) of these dead children lived in the households from which a transport facility was available to reach a nearby health care facility within half an hour, and most of them (67.2%) relied on the public transport. Around three-fifths (57.4%) of the child deaths happened in the joint or three-generation families, while the remaining were in the nuclear families. All the dead HIV-EI children belonged to the joint or three-generation families. The child's father was the decision-maker on the health care needs of the members in half (52.9%) of the families of the deceased children, while it was someone other than the mother in another 22.1% of the remaining families, so that the mother was the decision-maker only in a

quarter (25.0%) of the families. However, in the case of the dead HIV-EI children, it was either the father or the mother who was the decision-maker. The parents of the majority of the dead children were either illiterate or educated less than high school (father=62.7%, mother=70.6%). More than a third (36.8%) of the marriages between the parents of the deceased child were consanguineous. Around half of these dead children had their mothers of age <25 years (45.6%), while the remaining had it >25 years, at the time of their death. 13.2% of the dead children had a sibling death before in the family.

Around one-third (35.3%) of the dead children were born as the first child, half (51.5%) as the second or the third child, and the remaining were born in the 4+ order; and, one-fifth (20.6%) of them had been born prematurely. The immunization status could not be ascertained for 17.6% of the dead children; among those verified, 44.1% were immunized for age, and 38.2% were not. All the dead HIV-EI children were not immunized for age.

5.4.2. Causes of death among HIV-exposed children.

Two hundred twenty-seven reasons (immediate/most probable reasons=127, associated/facilitating reasons=100) had been identified for the 68 child deaths for which verbal autopsies were done. The causes of death are given in table 64.

The most probable immediate reasons for death among all the HIV-exposed children were ADD (with/without vomiting, hypovolemia; 18.1%), ARI (including pneumonia, otitis media, asthmatic bronchitis; 14.2%) and birth asphyxia (including respiratory distress syndrome, hypoxemia, hypothermia; 11.0%). However, these differed (both by reason and by frequency/burden) by the age of the child at death, HIV status, and gender. The most probable immediate reasons for neonatal death among the HIV-exposed children were birth asphyxia (34.2%), septicemia (18.4%) and meconium aspiration (13.2%); for post-neonatal infant deaths were ADD (26.3%), ARI (21.1%) and preventable reasons (including feed regurgitation/ aspiration, choking, fall, and suspected insect/snake bite; 12.3%); and for post infancy deaths were ADD (21.9%), other infections and fevers (including viral fever, infections, FUO, febrile fits; 15.6%) and child neglect (including denial of feeds,

Table 64. Causes of death among HIV-exposed children.

Characteristics	Cause of death	HIV-EI	HIV-EU	HIV-E?	Male	Female	Neonatal	Post-neonatal	Post-infancy	Total, N	Total, %
Most probable/immediate reasons	ADD (with/without vomiting, hypovolemia)	14.3	21.6	16.1	30.3	4.9	2.6	26.3	21.9	23	18.1
	ARI (pneumonia, otitis media, asthmatic bronchitis)	14.3	11.8	16.1	12.1	16.4	10.5	21.1	6.3	18	14.2
	Birth asphyxia, respiratory distress syndrome, hypoxemia, hypothermia	0.0	9.8	14.5	6.1	16.4	34.2	1.8	0.0	14	11.0
	Septicemia	14.3	9.8	9.7	6.1	14.8	18.4	5.3	9.4	13	10.2
	Child neglect, denial of feeds, unsuccessful feeding, delay in treatment	14.3	11.8	4.8	10.6	6.6	7.9	7.0	12.5	11	8.7
	Viral fever, infections, FUO, febrile fits	0.0	11.8	6.5	9.1	6.6	0.0	8.8	15.6	10	7.9
	Feed regurgitation/aspiration/choking, fall, suspected insect/snake bite	0.0	3.9	11.3	4.5	9.8	2.6	12.3	3.1	9	7.1
	Sudden infant death syndrome, cardiac arrest	0.0	3.9	6.5	3.0	6.6	5.3	7.0	0.0	6	4.7
	Meconium aspiration	0.0	3.9	4.8	3.0	4.9	13.2	0.0	0.0	5	3.9
	Meningitis-encephalitis, post meningitis sequelae	0.0	3.9	1.6	3.0	1.6	0.0	1.8	6.3	3	2.4
	Small intestinal intussusception/obstruction,	7.1	2.0	1.6	1.5	3.3	0.0	1.8	6.3	3	2.4

Characteristics	Cause of death	HIV-EI	HIV-EU	HIV-E?	Male	Female	Neonatal	Post-neonatal	Post-infancy	Total, N	Total, %
	obstructive jaundice, drug-induced hepatitis										
	Post-surgical complications, renal failure	14.3	0.0	1.6	1.5	3.3	0.0	1.8	6.3	3	2.4
	TB	14.3	2.0	0.0	3.0	1.6	0.0	1.8	6.3	3	2.4
	Cause of death could not be ascertained	7.1	3.9	4.8	6.1	3.3	5.3	3.5	6.3	6	4.7
	Total	14	51	62	66	61	38	57	32	127	127
Associated/facilitating reasons	Malnutrition, growth retardation, failure-to-thrive, anaemia, vitamin deficiencies	76.5	57.1	40.0	57.1	43.2	24.2	54.3	75.0	51	51.0
	LBW, premature child	0.0	14.3	52.7	26.8	40.9	69.7	28.6	0.0	33	33.0
	Congenital malformations, cerebral palsy, quadriplegia, cleft lip/palate, mental retardation	17.6	25.0	5.5	12.5	13.6	6.1	11.4	21.9	13	13.0
	Skin/mucous membrane conditions (ulcers, scabies, impetigo, furuncle, infections etc.)	5.9	3.6	1.8	3.6	2.3	0.0	5.7	3.1	3	3.0
	Total	17	28	55	56	44	33	35	32	100	100

All values mentioned are percentages unless otherwise specified; all percentages are with respect to vertical column total.

unsuccessful feeding, delay in treatment; 12.5%). The most probable immediate reasons for death among the male HIV-exposed children were ADD (30.3%), ARI (12.1%) and child neglect (10.6%); and among the female children were ARI (16.4%), birth asphyxia (16.4%), septicemia (14.8%) and preventable reasons (9.8%). The most probable immediate reasons for death among the HIV-EI children were ADD (14.3%), ARI (14.3%), septicemia (14.3%), child neglect (14.3%), post-surgical complications (including renal failure; 14.3%), TB (14.3%) and small intestinal intussusception (including intestinal obstruction, obstructive jaundice, drug-induced hepatitis; 7.1%); among the HIV-EU children were ADD (21.6%), ARI (11.8%), other infections and fevers (11.8%), child neglect (11.8%), birth asphyxia (9.8%) and septicemia (9.8%); and among the HIV-E? children were ADD (16.1%), ARI (16.1%), birth asphyxia (14.5%) and preventable reasons (11.3%). As such, even though the immediate reasons differed by the age of the child, these did not differ much by the gender or HIV status of the child (as these deaths happened due to infections, birth asphyxia, child neglect, and other preventable causes).

All the child deaths happened under with wider umbrella of a few associated/facilitating reasons, namely malnutrition (including growth retardation, failure-to-thrive, anaemia, vitamin deficiencies; 51.0%), LBW (including premature child; 33.0%), congenital malformations (including cerebral palsy, quadriplegia, cleft lip/palate, mental retardation; 13.0%) and skin/mucous membrane conditions (including ulcers, scabies, impetigo, furuncle, infections etc.; 3.0%). As such, the malnutrition and LBW facilitated immediate reasons to result in the majority of child deaths.

5.5. Factors associated with HIV infection among the children.

The covariates for which the bivariate significance was obtained for the factors associated with HIV infection among the HIV-exposed children are listed in table 65. These covariates were applicable to the 14 sub-groups of children (children of the mothers who had undertaken any PPTCT strategy during pregnancy or sub-group HIV-2, children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy or sub-group HIV-2.1, children of the mothers who were ever initiated on ART or sub-group

HIV-3, children of the mothers who were alive any time during the study or sub-group HIV-4, children who were ever mix-fed or sub-group HIV-5.1, children of age 0-2 year any time during the study and mix-fed or sub-group HIV-5.2, children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) or sub-group HIV-6, children of age 0-2 year any time during the study and started on feeds other than breast milk or sub-group HIV-6.1, children of age 6 months-2 years any time during the study and started on feeds other than breast milk or sub-group HIV-6.2, children of age >9 months any time during the study or sub-group HIV-7, children who were vitamin/mineral deficient ever during the study or sub-group HIV-8.1, children who were anaemic ever during the study or sub-group HIV-8.2, children who were having acute morbidity ever during the study or sub-group HIV-8.3, and children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi or sub-group HIV-8.3.1), in addition to the generic group (HIV-1), for which a BLR was done for each. The results of the regression which had identified significant OR is given in table 66. Only 11 (of the 23) covariates with bivariate significance were found to be statistically significant in the BLR.

(a) Generic group of HIV-exposed children (Group HIV-1): 87.6% of the eligible 660 children were included in the analysis. Generally, the factors associated with the HIV infection in the HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=3.159, CI=1.103-9.049; p=0.032), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.229, CI=1.490-11.999; p=0.007), non-initiation of CPT to the child (OR=4.090, CI=1.603-10.437; p=0.003), ever-inadequate MUACFA status in the child (OR=3.848, CI=1.477-10.025; p=0.006) and the indication of vitamin A deficiency in the child (OR=3.796, CI=1.401-10.288; p=0.009). As such, the lower perinatal CD4 count and partial or nil ARV/ART coverage of the mother during breastfeeding period could be the reasons associated with HIV infection in the child (MTCT), while the ever-inadequate MUACFA status and indication of vitamin A deficiency in the child could predict a hitherto unidentified HIV infection in the child. CPT was expected to reduce morbidities and mortality in the HIV-exposed children, but in this study, it was seen as associated with reducing MTCT. Or, at least, it could be viewed upon as a scenario that more of the HIV-EU children received the CPT than the HIV-EI children,

Table 65. Covariates of importance and their statistical significance for HIV infection among children (results of bivariate analysis).

Characteristics	Attributes	HIV status of child (ever)			Bivariate p-value
		Negative	Positive	Total	
Education of father	Schooled	96.0	4.0	446	0.035
	Non-schooled	92.0	8.0	213	
Delay in starting ART for the mother after detecting HIV infection	31+ days	92.9	7.1	339	0.038
	≤30 days	96.7	3.3	274	
ART status of the mother	On ART	95.7	4.3	508	0.039
	Not on ART	90.8	9.2	109	
Composite morbidity indicator of sickness among mothers	Not indicated	95.7	4.3	538	0.010
	Indicated	89.6	10.4	106	
BMI of mothers	Normal and above	96.7	3.3	299	0.048
	Underweight	93.2	6.8	337	
Composite nutrition indicator of sickness among mothers	Not indicated	96.3	3.8	480	0.003
	Indicated	90.2	9.8	164	
Composite sickness indicator among mothers	Not indicated	97.0	3.0	303	0.014
	Indicated	92.7	7.3	341	
ANC among mothers	Full ANC received	96.2	3.8	396	0.044
	No/Partial ANC received	92.6	7.4	258	
Mother's ARV/ART status during pregnancy	On ARV/ART	95.7	4.3	575	0.002
	Not on ARV/ART	86.8	13.2	68	
CD4 count of mother closest to the date of delivery	≥500	97.6	2.4	249	0.045
	<500	94.2	5.8	343	
Breastfeeding of the child	Absent	100.0	0.0	114	0.006

Characteristics	Attributes	HIV status of child (ever)			Bivariate p-value
		Negative	Positive	Total	
	Present	93.7	6.3	540	
Mixed feeding of the child (ever)*	Absent	96.6	3.4	263	0.101
	Present	93.7	6.3	379	
Duration of mixed feeding*	≤2 weeks	95.3	4.7	64	0.553
	>2 weeks	93.3	6.7	315	
Mixed feeding of the child during the study	Absent	98.9	1.1	92	0.044
	Present	93.5	6.5	216	
Duration of mixed feeding during the study*	≤2 weeks	92.9	7.1	28	0.879
	>2 weeks	93.6	6.4	188	
Food with minimum dietary diversity every time*	Ensured every time	100.0	0.0	34	0.156
	Not ensured	94.4	5.6	267	
Food with minimum dietary frequency every time*	Ensured every time	93.7	6.3	79	0.495
	Not ensured	95.6	4.4	227	
Minimum acceptable food every time*	Ensured every time	100.0	0.0	23	0.259
	Not ensured	94.7	5.3	285	
Provision of ARV/ART to the mother during the breastfeeding period	Fully covered	95.8	4.2	520	0.014
	Partially/not covered	90.2	9.8	123	
Maternal PPTCT strategies during the pregnancy	Undertaken	95.6	4.4	615	<0.001
	Not undertaken	82.5	17.5	40	
Coverage of maternal PPTCT strategies during the pregnancy	Any two or more strategies	97.2	2.8	324	0.039
	Any one strategy	93.8	6.2	291	
Coverage of maternal PPTCT strategies involving ARV/ART during the pregnancy	Undertaken in combination	97.2	2.8	320	0.035
	Undertaken in isolation	93.6	6.4	265	

Characteristics	Attributes	HIV status of child (ever)			Bivariate p-value
		Negative	Positive	Total	
Age of the child at baseline	≥12 months	94.4	5.6	446	0.617
	<12 months	95.3	4.7	214	
Gender of the child	Female	96.0	4.0	323	0.151
	Male	93.5	6.5	337	
HIV clinical stage of the child (ever)	Stage 1	0.0	100.0	11	NA
	Stage 2	0.0	100.0	24	
Coverage of Measles immunization	Immunized for age	95.5	4.5	572	0.012
	Under-immunized for age	87.7	12.3	57	
Acute morbidity in child ever during study period*	Absent	95.6	4.4	137	0.588
	Present	94.5	5.5	523	
Frequency of acute morb-idity among children	<0.5 per month	96.4	3.6	415	<0.001
	≥0.5 per month	87.0	13.0	108	
Sickness absenteeism at an institution*	Absent	94.3	5.7	333	0.882
	Present	94.9	5.1	39	
History of CPT for the child (ever)	Present	96.3	3.7	509	0.001
	Absent	89.4	10.6	151	
Inadequate HFA ever*	Absent	97.2	2.8	176	0.089
	Present	93.8	6.2	484	
Inadequate WFA ever*	Absent	95.5	4.5	245	0.474
	Present	94.2	5.8	415	
Inadequate HCFA ever*	Absent	95.2	4.8	496	0.355
	Present	93.3	6.7	164	
Inadequate MUACFA ever	Absent	96.7	3.3	479	<0.001
	Present	89.5	10.5	181	
Ever any inadequate anth-ropometry score for age*	Absent	97.5	2.5	119	0.135
	Present	94.1	5.9	541	

Characteristics	Attributes	HIV status of child (ever)			Bivariate p-value
		Negative	Positive	Total	
Vitamin/mineral deficiency among children*	Absent	96.2	3.8	365	0.061
	Present	92.9	7.1	295	
Maximum no. of deficient vitamins/minerals ever indicated in the child	1-6	98.1	1.9	156	<0.001
	>6	87.1	12.9	139	
Persistence of vitamin/ mineral deficiency among ever deficient children*	<50%	94.4	5.6	231	0.058
	≥50%	87.5	12.5	64	
Vitamin A deficiency in the child	Not indicated	96.1	3.9	564	<0.001
	Indicated	86.5	13.5	96	
Anaemia in the child	Absent	98.2	1.8	165	0.021
	Present	93.5	6.5	495	
Anaemia status of the child (ever)*	Mild anaemia	95.4	4.6	152	0.263
	Moderate/severe anaemia	92.7	7.3	343	
Death of child during the study*	Absent	94.8	5.2	654	0.212
	Present	83.3	16.7	6	

All percentages are with respect to horizontal row total. *In addition to the covariates of 'age of the child at baseline' and 'gender of the child' (which were always included in all the BLR models of all the outcome variables), these covariates were included in the BLR model of the HIV status despite their p-value being ≥0.05 (as they were related directly or indirectly with the HIV status of the child), and hence mentioned here.

and hence, if nothing else, this could help as an earliest sign of adherence or defection of the family to the HIV-related treatment, care and support services; as such, non-undertaking of the CPT could serve as a screening tool to prioritize HIV testing in a pool of untested HIV-exposed children, so as to identify the hidden HIV infections among them. Also, the HIV infection in the child was not associated with the age and gender of the child.

Table 66. Covariates with significant OR for HIV infection among children (results of BLR).

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
HIV-1 (N=660; Included in analysis: 87.6%)	Maternal CD4 count closest to delivery	≥500	244	0.032	1.000		
		<500	334		3.159	1.103	9.049
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	483	0.007	1.000		
		Partially/not covered	95		4.229	1.490	11.999
	History of CPT for the child (ever)	Present	458	0.003	1.000		
		Absent	120		4.090	1.603	10.437
	Inadequate MUACFA ever	Absent	418	0.006	1.000		
		Present	160		3.848	1.477	10.025
	Vitamin A deficiency in the child	Not indicated	493	0.009	1.000		
		Indicated	85		3.796	1.401	10.288
HIV-2 (N=615; Included in analysis: 90.9%)	Maternal CD4 count closest to delivery	≥500	239	0.050	1.000		
		<500	320		2.918	1.001	8.501
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	471	0.020	1.000		
		Partially/not covered	88		3.703	1.231	11.140
	History of CPT for the child (ever)	Present	444	0.005	1.000		
		Absent	115		4.141	1.540	11.136
	Inadequate MUACFA ever	Absent	406	0.019	1.000		
		Present	153		3.476	1.225	9.868
	Vitamin A deficiency in the child	Not indicated	480	0.026	1.000		
		Indicated	79		3.517	1.164	10.627
HIV-2.1 (N=592; Included	Maternal ARV/ART coverage during breastfeeding period	Fully covered	455	0.042	1.000		
		Partially/not covered	82		3.376	1.046	10.895

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
in analysis: 90.7%)	History of CPT for the child (ever)	Present	429	0.009	1.000		
		Absent	108		3.896	1.411	10.759
	Inadequate WFA ever	Present	343	0.046	1.000		
		Absent	194		3.281	1.023	10.524
	Inadequate MUACFA ever	Absent	388	0.016	1.000		
		Present	149		3.690	1.270	10.719
	Vitamin A deficiency in the child	Not indicated	460	0.023	1.000		
		Indicated	77		3.665	1.199	11.204
HIV-3 (N=630; Included in analysis: 87.6%)	Maternal CD4 count closest to delivery	≥500	224	0.034	1.000		
		<500	328		3.144	1.091	9.065
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	481	0.004	1.000		
		Partially/not covered	71		4.648	1.628	13.272
	History of CPT for the child (ever)	Present	439	0.003	1.000		
		Absent	113		4.055	1.585	10.370
	Inadequate MUACFA ever	Absent	400	0.007	1.000		
		Present	152		3.706	1.427	9.622
	Vitamin A deficiency in the child	Not indicated	471	0.010	1.000		
		Indicated	81		3.728	1.371	10.141
HIV-4 (N=644; Included in analysis: 83.9%)	Composite nutrition indicator of sickness among mothers	Not indicated	396	0.032	1.000		
		Indicated	144		2.943	1.098	7.891
	Maternal CD4 count closest to delivery	≥500	231	0.029	1.000		
		<500	309		3.529	1.135	10.974
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	456	0.007	1.000		
		Partially/not covered	84		4.881	1.558	15.292

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	History of CPT for the child (ever)	Present	431	0.017	1.000		
		Absent	109		3.460	1.246	9.611
	Inadequate MUACFA ever	Absent	391	0.001	1.000		
		Present	149		5.901	2.067	16.841
HIV-5.1 (N=390; Included in analysis: 88.2%)	Maternal CD4 count closest to delivery	≥500	159	0.007	1.000		
		<500	185		8.010	1.780	36.035
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	300	0.006	1.000		
		Partially/not covered	44		6.933	1.766	27.221
	History of CPT for the child (ever)	Present	276	0.010	1.000		
		Absent	68		4.608	1.438	14.768
	Inadequate MUACFA ever	Absent	238	0.026	1.000		
		Present	106		3.755	1.175	12.001
	Vitamin A deficiency in the child	Not indicated	300	0.025	1.000		
		Indicated	44		4.034	1.188	13.697
HIV-5.2 (N=227; Included in analysis: 88.5%)	Maternal CD4 count closest to delivery	≥500	103	0.023	1.000		
		<500	98		11.747	1.399	98.628
	Vitamin A deficiency in the child	Not indicated	178	0.016	1.000		
		Indicated	23		5.914	1.392	25.127
	Death of the child during the study	Absent	199	0.005	1.000		
		Present	2		169.808	4.707	6126.122
HIV-6 (N=653; Included in analysis: 87.4%)	Maternal CD4 count closest to delivery	≥500	239	0.015	1.000		
		<500	332		4.127	1.322	12.884
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	477	0.004	1.000		
		Partially/not covered	94		4.872	1.651	14.377
		Present	452	0.010	1.000		

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	History of CPT for the child (ever)	Absent	119		3.577	1.355	9.441
	Inadequate MUACFA ever	Absent	413	0.003	1.000		
		Present	158		4.669	1.710	12.751
	Vitamin A deficiency in the child	Not indicated	486	0.009	1.000		
		Indicated	85		3.903	1.413	10.781
HIV-6.1 (N=316; Included in analysis: 88.6%)	Maternal CD4 count closest to delivery	≥500	135	0.035	1.000		
		<500	145		5.673	1.131	28.462
	Death of the child during the study	Absent	276	0.029	1.000		
		Present	4		40.498	1.448	1132.311
HIV-6.2 (N=306; Included in analysis: 90.5%)	Maternal CD4 count closest to delivery	≥500	134	0.026	1.000		
		<500	143		6.338	1.247	32.204
	Death of the child during the study	Absent	275	0.028	1.000		
		Present	2		40.780	1.485	1119.788
HIV-7 (N=629; Included in analysis: 87.9%)	Maternal CD4 count closest to delivery	≥500	231	0.012	1.000		
		<500	322		4.309	1.373	13.520
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	459	0.005	1.000		
		Partially/not covered	94		4.752	1.612	14.011
	History of CPT for the child (ever)	Present	438	0.009	1.000		
		Absent	115		3.693	1.393	9.788
	Inadequate MUACFA ever	Absent	403	0.002	1.000		
		Present	150		4.839	1.761	13.297

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
	Vitamin A deficiency in the child	Not indicated	468	0.010	1.000		
		Indicated	85		3.772	1.365	10.428
HIV-8.1 (N=295; Included in analysis: 90.2%)	Maternal CD4 count closest to delivery	≥500	106	0.006	1.000		
		<500	160		12.498	2.067	75.574
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	215	0.008	1.000		
		Partially/not covered	51		6.515	1.641	25.859
	History of CPT for the child (ever)	Present	213	0.035	1.000		
		Absent	53		3.829	1.096	13.374
	Inadequate MUACFA ever	Absent	193	0.001	1.000		
		Present	73		10.415	2.750	39.448
HIV-8.2 (N=495; Included in analysis: 89.5%)	Maternal CD4 count closest to delivery	≥500	192	0.032	1.000		
		<500	251		3.159	1.103	9.049
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	378	0.007	1.000		
		Partially/not covered	65		4.229	1.490	11.999
	History of CPT for the child (ever)	Present	348	0.003	1.000		
		Absent	95		4.090	1.603	10.437
	Inadequate MUACFA ever	Absent	318	0.006	1.000		
		Present	125		3.848	1.477	10.025
	Vitamin A deficiency in the child	Not indicated	373	0.009	1.000		
		Indicated	70		3.796	1.401	10.288
HIV-8.3 (N=523; Included in	Mother's ARV/ART drug status during pregnancy	On drugs	430	0.011	1.000		
		Not on drugs	36		5.345	1.459	19.579
	Maternal CD4 count closest to delivery	≥500	200	0.004	1.000		
		<500	266		11.095	2.201	55.937

Group of children	Characteristics	Attributes	N included	p-value	OR	95% CI	
analysis: 89.1%)	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	388	0.030	1.000		
		Partially/not covered	78		4.278	1.150	15.917
	Frequency of acute morbidity among children per month	<0.5/month	372	0.007	1.000		
		≥0.5/month	94		4.660	1.519	14.300
	Vitamin A deficiency in the child	Not indicated	384	0.015	1.000		
		Indicated	82		4.039	1.313	12.426
HIV-8.3.1 (N=430; Included in analysis: 74.0%)	Maternal CD4 count closest to delivery	≥500	121	0.024	1.000		
		<500	197		9.221	1.332	63.818
	Maternal ARV/ART coverage during the breastfeeding period	Fully covered	235	0.012	1.000		
		Partially/not covered	83		7.358	1.560	34.714
	History of CPT for the child (ever)	Present	249	0.031	1.000		
		Absent	69		4.730	1.150	19.461
	Inadequate MUACFA ever	Absent	232	0.002	1.000		
		Present	86		11.685	2.382	57.328
	Vitamin/mineral deficiency among children	Absent	162	0.022	1.000		
		Present	156		8.082	1.354	48.237

HIV-1: Generic group of morbid HIV-exposed children (N, HIV-EU=552; HIV-EI=26); HIV-2: Children of the mothers who had undertaken any PPTCT strategy during pregnancy (N, HIV-EU=538; HIV-EI=21); HIV-2.1: Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (N, HIV-EU=517; HIV-EI=20); HIV-3: Children of the mothers who were ever initiated on ART (N, HIV-EU=526; HIV-EI=26); HIV-4: Children of the mothers who were alive any time during the study (N, HIV-EU=517; HIV-EI=23); HIV-5.1: Children who were ever mix-fed (N, HIV-EU=325; HIV-EI=19); HIV-5.2: Children of age 0-2 year any time during the study and mix-fed (N, HIV-

EU=190; HIV-EI=11); HIV-6: Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) (N, HIV-EU=546; HIV-EI=25); HIV-6.1: Children of age 0-2 year any time during the study and started on feeds other than breast milk (N, HIV-EU=268; HIV-EI=12); HIV-6.2: Children of age 6 months-2 years any time during the study and started on feeds other than breast milk (N, HIV-EU=265; HIV-EI=12); HIV-7: Children of age >9 months any time during the study (N, HIV-EU=528; HIV-EI=25); HIV-8.1: Children who were vitamin/mineral deficient ever during the study (N, HIV-EU=248; HIV-EI=18); HIV-8.2: Children who were anaemic ever during the study (N, HIV-EU=417; HIV-EI=26); HIV-8.3: Children who were having acute morbidity ever during the study (N, HIV-EU=444; HIV-EI=22); HIV-8.3.1: Children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi (N, HIV-EU=303; HIV-EI=15).

(b) Children of the mothers who had undertaken any PPTCT strategy during pregnancy (subgroup HIV-2): 90.9% of the eligible 615 children were included in the analysis. The factors associated with the HIV infection in the HIV-exposed children of the mothers who undertook any PPTCT strategy during pregnancy were the lower CD4 count of the mother near to the delivery (<500; OR=2.918, CI=1.001-8.501; p=0.050), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=3.703, CI=1.231-11.140; p=0.020), non-initiation of CPT to the child (OR=4.141, CI=1.540-11.136; p=0.005), ever-inadequate MUACFA status in the child (OR=3.476, CI=1.225-9.868; p=0.019) and the indication of vitamin A deficiency in the child (OR=3.517, CI= 1.164-10.627; p=0.026). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(c) Children of the mothers who had undertaken PPTCT strategy involving ARV/ART during pregnancy (sub-group HIV-2.1): 90.7% of the eligible 592 children were included in the analysis. The factors associated with the HIV infection in the HIV-exposed children of the mothers who undertook the PPTCT strategy with ARV/ART during pregnancy were the partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=3.376, CI=1.046-10.895; p=0.042), non-initiation of CPT to the

child (OR=3.896, CI=1.411-10.759; p=0.009), ever-inadequate MUACFA status in the child (OR=3.690, CI=1.270-10.719; p=0.016) and the indication of vitamin A deficiency in the child (OR=3.665, CI=1.199-11.204; p=0.023). Additionally, the always-adequate (never inadequate) WFA status showed an association with the HIV infection, which could be spurious as the p-value (0.222) of bivariate analysis was not significant in the larger group. Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(d) Children of the mothers who were ever initiated on ART (sub-group HIV-3): 87.6% of the eligible 630 children were included in the analysis. The factors associated with the HIV infection in the HIV-exposed children of the mothers ever initiated on ART were the lower CD4 count of the mother near to the delivery (<500; OR=3.144, CI=1.091-9.065; p=0.034), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.648, CI=1.628-13.272; p=0.004), non-initiation of CPT to the child (OR= 4.055, CI=1.585-10.370; p=0.003), ever-inadequate MUACFA status in the child (OR= 3.706, CI=1.427-9.622; p=0.007) and the indication of vitamin A deficiency in the child (OR=3.728, CI=1.371-10.141; p=0.010). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(e) Children of the mothers who were alive at any time during the study (sub-group HIV-4): 83.9% of the eligible 644 children were included in the analysis. The factors associated with the HIV infection in the HIV-exposed children of the alive mothers were the composite nutrition indication of sickness in the mother (OR=2.943, CI=1.098-7.891; p=0.032), lower CD4 count of the mother near to the delivery (<500; OR=3.529, CI=1.135-10.974; p=0.029), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.881, CI=1.558-15.292; p=0.007), non-initiation of CPT to the child (OR=3.460, CI=1.246-9.611; p=0.017) and the ever-inadequate MUACFA status in the child (OR=5.901, CI=2.067-16.841; p=0.001). Thus, in addition to the factors associated with the HIV infection in the generic group, the mothers indicated as sick by nutritional reasons could also predict the HIV infection among the HIV-exposed children.

(f) Children who were ever mix-fed (sub-group HIV-5.1): 88.2% of the eligible 390 children were included in the analysis. However, before interpreting the results of this group, it was important to note that all the HIV-EI children in the study had been breastfed; and as such, there were no non-breastfed-but-HIV-EI children in this study. However, it could not be evidenced that all these HIV infections in the children are due to breastfeeding, as it could be due to a perinatal infection or infection in utero. The factors associated with the HIV infection in the ever mix-fed HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=8.010, CI=1.780-36.035; p=0.007), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=6.933, CI=1.766-27.221; p=0.006), non-initiation of CPT to the child (OR=4.608, CI=1.438-14.768; p=0.010), ever-inadequate MUACFA status in the child (OR=3.755, CI=1.175-12.001; p=0.026) and the indication of vitamin A deficiency in the child (OR=4.034, CI=1.188-13.697; p=0.025). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(g) Children of age 0-2 year any time during the study and mix-fed (sub-group HIV-5.2): 88.5% of the eligible 227 children were included in the analysis. The factors associated with the HIV infection in the 0-2 year mix-fed HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=11.747, CI=1.399-98.628; p=0.023), the indication of vitamin A deficiency in the child (OR=5.914, CI=1.392-25.127; p=0.016), and the death of the child (OR=169.808, CI=4.707-6126.122; p=0.005). Even though the high OR and wide CI could be due to the lower numbers of the HIV-EI and the dead children included in the analysis, and as the HIV infection was not found associated with the mixed feeding in the generic group, this result pointed to the predictive value of the HIV infection as a reason for death in the 0-2 year mix-fed children. Or, this association could also be a spurious association that the more of the deaths of HIV-EI children occurred in the <2 year age group and did not bear any association with the mixed feeding as such.

(h) Children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children; sub-group HIV-6): 87.4% of the eligible 653 children were included in the analysis. The factors associated with the HIV infection in the HIV-exposed

children who were ever started on feeds other than breast milk (inclusive of the non-breastfed children) were the lower CD4 count of the mother near to the delivery (<500; OR=4.127, CI=1.322-12.884; p=0.015), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.872, CI=1.651-14.377; p=0.004), non-initiation of CPT to the child (OR=3.577, CI=1.355-9.441; p=0.010), ever-inadequate MUACFA status in the child (OR=4.669, CI=1.710-12.751; p=0.003) and the indication of vitamin A deficiency in the child (OR=3.903, CI=1.413-10.781; p=0.009). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(i) Children of age 0-2 year any time during the study and started on feeds other than breast milk (sub-group HIV-6.1): 88.6% of the eligible 316 children were included in the analysis. The factors associated with the HIV infection in the 0-2 year HIV-exposed children who were started on feeds other than breast milk were the lower CD4 count of the mother near to the delivery (<500; OR=5.673, CI=1.131-28.462; p=0.035) and the death of the child (OR=40.498, CI=1.448-1132.311; p=0.029). Even though the high OR and wide CI could be due to the lower numbers of the HIV-EI and the dead children included in the analysis, and as the HIV infection was not found associated with the started on feeds other than breast milk in the generic group, this result pointed to the predictive value of the HIV infection as a reason for death in the 0-2 year children who were started on feeds other than breast milk. Or, this association could also be a spurious association that more of the deaths of HIV-EI children occurred in the <2 year age group and did not bear any association with the feeding with foods other than breast milk, as such.

(j) Children of age 6 months-2 years any time during the study and started on feeds other than breast milk (sub-group HIV-6.2): 90.5% of the eligible 306 children were included in the analysis. The factors associated with the HIV infection in the 0.5-2 year HIV-exposed children who were started on feeds other than breast milk were the lower CD4 count of the mother near to the delivery (<500; OR=6.338, CI=1.247-32.204; p=0.026) and the death of the child (OR=40.780, CI=1.485-1119.788; p=0.028). Again, even though the high OR and wide CI could be due to the lower numbers of the HIV-EI

and the dead children included in the analysis, and the HIV infection was not found associated with the started on feeds other than breast milk in the generic group, this result pointed to the predictive value of the HIV infection as a reason for death in the 0.5-2 year children who were started on feeds other than breast milk. Or, this association could also be a spurious association that more of the deaths of HIV-EI children occurred in the 0.5-2 year age group and did not bear any association with such feeding.

(k) Children of age >9 months any time during the study (sub-group HIV-7): 87.9% of the eligible 629 children were included in the analysis. The factors associated with the HIV infection in the >9 month HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=4.309, CI=1.373-13.520; p=0.012), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.752, CI=1.612-14.011; p=0.005), non-initiation of CPT to the child (OR=3.693, CI=1.393-9.788; p=0.009), ever-inadequate MUACFA status in the child (OR=4.839, CI=1.761-13.297; p=0.002) and the indication of vitamin A deficiency in the child (OR=3.772, CI=1.365-10.428; p=0.010). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(l) Children who were vitamin/mineral deficient ever during the study (sub-group HIV-8.1): 90.2% of the eligible 295 children were included in the analysis. The factors associated with the HIV infection in the vitamin/mineral deficient HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=12.498, CI=2.067-75.574; p=0.006), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=6.515, CI=1.641-25.859; p=0.008), non-initiation of CPT to the child (OR=3.829, CI=1.096-13.374; p=0.035) and the ever-inadequate MUACFA status in the child (OR=10.415, CI=2.750-39.448; p=0.001). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(m) Children who were anaemic ever during the study (sub-group HIV-8.2): 89.5% of the eligible 495 children were included in the analysis. The factors associated with the

HIV infection in the anaemic HIV-exposed children were the lower CD4 count of the mother near to the delivery (<500; OR=3.159, CI=1.103-9.049; p=0.032), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.229, CI=1.490-11.999; p=0.007), non-initiation of CPT to the child (OR=4.090, CI=1.603-10.437; p=0.003), ever-inadequate MUACFA status in the child (OR=3.848, CI=1.477-10.025; p=0.006) and the indication of vitamin A deficiency in the child (OR=3.796, CI=1.401-10.288; p=0.009). Thus, the factors associated with the HIV infection were the same as that of the HIV-exposed children in general, but with a different degree of association.

(n) Children who were having acute morbidity ever during the study (sub-group HIV-8.3): 89.1% of the eligible 523 children were included in the analysis. The factors associated with the HIV infection in the morbid HIV-exposed children were the non-provision of ARV/ART to the mother during pregnancy (OR=5.345, CI=1.459-19.579; p=0.011), lower CD4 count of the mother near to the delivery (<500; OR=11.095, CI=2.201-55.937; p=0.004), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=4.278, CI=1.150-15.917; p=0.030), presence of acute morbidity $\geq$0.5 per month in the child (OR=4.660, CI=1.519-14.300; p=0.007) and the indication of vitamin A deficiency in the child (OR=4.039, CI=1.313-12.426; p=0.015). Thus, even though the HIV infection in the child was not associated with the presence of morbidity in the child, it was associated with the higher frequency of acute morbidities among the HIV-exposed children (also seen in the results of chapter 5, sections 3.1 and 3.2). On the other hand, a history of non-ARV/ART status of mothers during pregnancy in a morbid HIV-exposed child could suggest an HIV infection in them.

(o) Children of age 3-5 years any time during the study and ever enrolled in a school/anganwadi (sub-group HIV-8.3.1): 74.0% of the eligible 430 children were included in the analysis. The factors associated with the HIV infection in the 3-5 year HIV-exposed children ever enrolled in a school/anganwadi were the lower CD4 count of the mother near to the delivery (<500; OR=9.221, CI=1.332-63.818; p=0.024), partial or nil ARV/ART coverage of the mother during breastfeeding period (OR=7.358, CI=1.560-34.714; p=0.012), non-initiation of CPT to the child (OR=4.730, CI=1.150-19.461;

p=0.031), ever-inadequate MUACFA status in the child (OR=11.685, CI=2.382-57.328; p=0.002) and the indication of vitamin/mineral deficiency in the child (OR=8.082, CI=1.354-48.237; p=0.022). Thus, in addition to the factors associated with the HIV infection in the generic group, the indication of vitamin/mineral deficiency (in general) among the 3-5 year HIV-exposed children ever enrolled in a school/anganwadi could also predict the HIV infection among the HIV-exposed children; this could be used as a screening criteria in the school health programs to identify the hidden HIV infections among the children.

5.6. Consolidation of the factors associated with outcome variables.

The association between the core outcome indicators of ever-inadequate anthropometric measurements for age, anaemia, morbidity (presence and frequency) and HIV infection is presented in figure 83. The factors associated with each of these outcomes among the HIV-exposed children are listed and presented as a matrix in tables 67 and 68.

Fig. 83. Association between the core outcome indicators in the HIV-exposed children.

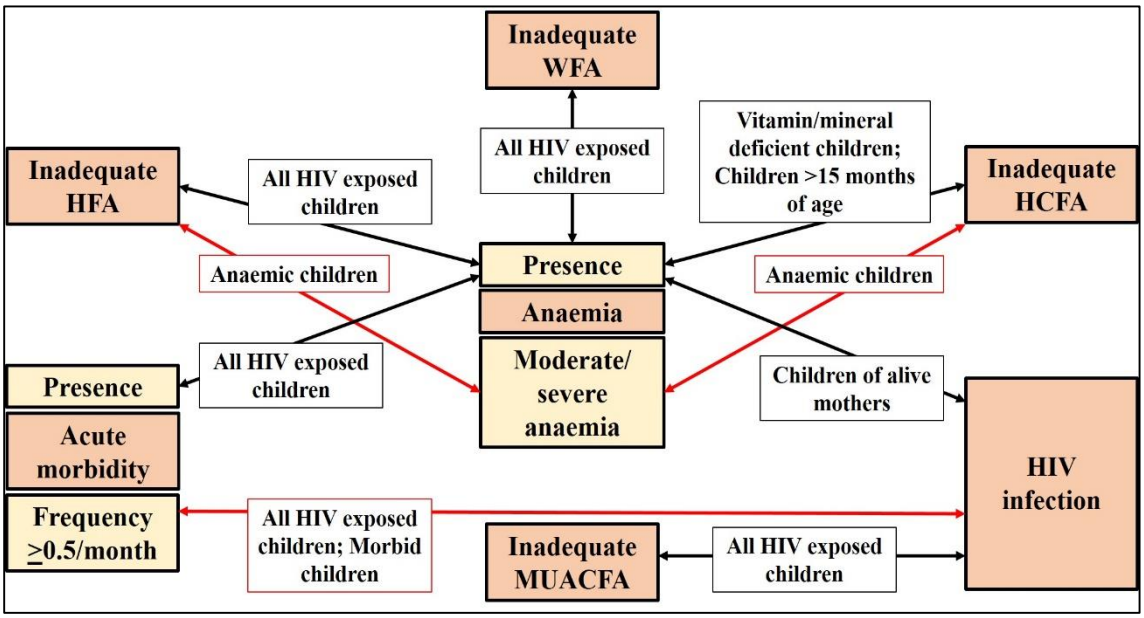


Table 67. Summary of the factors associated with the outcome variables (by children and OR).

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
All HIV-exposed children	Family/HH	Underprivileged (SC/ST/OBC) caste	1.644		2.368			1.78		
		Joint/three-generation family						1.598		
		Nuclear family							1.634	
		Uneducated (non-schooled) father	2.093	1.651						
		Poor socio-economic status/Poor (non-electrified/kuccha/semi-pukka) housing			2.562					
		Lack of safe drinking water							1.926	
		Presence of a socio-economic crisis						1.604		
	Mother	Younger (<25 years) age					1.69			
		Younger (<25 years) age at marriage	2.575							
		HIV clinical stage 2 or more						1.581		
		Initiation of ART					3.499			
	Pregnancy	Partial/nil ANC		1.514						
		Partial/nil ARV/ART coverage during breastfeeding								4.229

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
		Lower (<500) CD4 count near to delivery								3.159
	Child	LBW (<2.5 kg)		1.72		1.838				
		Younger (<12 months) age	2.411		11.713				3.162	
		Breastfeeding ever		1.97						
		Non-initiation of CPT								4.09
		Presence of vitamin/mineral deficiency						3.48		
		Presence of vitamin A deficiency				1.881			2.214	3.796
		Presence of anaemia	2.006	1.744				1.985		
		Inadequate HFA status					1.855			
		Inadequate MUACFA status								3.848
		Presence of acute morbidity					1.748			
		HIV infection				3.293			3.218	
		Immunization with DPT vaccine						1.883		
		Under-immunization of any vaccine					1.655			
Children of the mothers adopt-	Pregnancy	Adoption of two or more PPTCT strategies							1.613	

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
ing any PPTCT strategy										
Children of the mothers adopting ARV/ART for PPTCT	Pregnancy	Adoption of ARV/ART strategy in combination with other PPTCT strategies							1.642	
		Longer (>30 days) duration of ARV/ART during pregnancy	1.911		1.956					
Children of the mothers ever on ART	Child	Breastfeeding ever					1.649			
Children of alive mothers	Mother	Underweight (BMI <18.5)		1.968		1.552				
		Presence of vitamin/mineral deficiency						1.561		
		Presence of anaemia					2.129			
		Presence of acute morbidity							1.798	
		Composite nutrition indication of sickness								2.943
		Composite morbidity indication of sickness		1.707				2.639		

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
	Child	Male gender			1.612					
		HIV infection					7.889			
		Under-immunization of OPV	2.063							
Children of vitamin/mineral deficient mothers	Mother	Higher number (> 6) of deficient vitamins/minerals						1.89	1.91	
Children of morbid mothers	Mother	Presence of multiple acute morbidities						3.302	2.235	
Children of 'sick' mothers	Mother	HIV clinical stage 2 or more							2.765	
		Sickness indicated by nutrition criteria in combination with other criteria						2.556		
		Sickness indicated by morbidity criteria							2.881	
	Child	Under-immunization of any vaccine			4.59					
Ever-breastfed children	Child	Longer (≥29 weeks) duration of breastfeeding	1.875							

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
		Weaning at >6 months of age or for >2 weeks duration					1.98	2.592		
		Living without mother's care						10.528		
		Under-immunization of OPV	2.021							
0-2 year mix-fed children	Child	Death								169.808
Children ever on feeds other than breast mil-k (including the non-breastfed)	Child	Male gender			1.584					
		Mixed feeding ever	2.056		1.773	1.528				
0-2 yr children on feeds other than breast milk	Child	Death								40.498
0.5-2 yr childr-en on feeds	Child	Death								40.78

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
other than breast milk										
Children of age >9 months	Child	Immunization with measles vaccine						2.735		
Children of age >15 months	Child	Female gender		1.575						
		Presence of anaemia			2.086					
Vitamin/mineral deficient children	Child	Male gender				1.848				
		Higher number (>6) of deficient vitamins/minerals			2.309					
		Persistence of deficiency (≥50% of time)							3.966	
		Presence of anaemia			8.112					
Anaemic children	Family/HH	Lack of safe sanitation		1.923						
	Child	Male gender			1.778					
		Breastfeeding ever	1.872							
		Presence of moderate or severe anaemia	1.716		1.833					

Group/sub-group of children	Type of factors	Factors associated	Inadequate				Anaemia	Acute morbidity		HIV infection
			HFA	WFA	HCFA	MUACFA		Presence	Frequency ≥0.5/month	
Morbid children	Pregnancy	Nil ARV/ART coverage during pregnancy								5.345
	Child	Frequency of acute morbidity ≥0.5/month								4.66
3-5 yr children ever enrolled in school/anganwadi	Child	Presence of vitamin/mineral deficiency								8.082

The cells painted in yellow and red cells represent the most-proximal and direct relationships between the outcome indicators. The values mentioned are the ORs from the BLR.

Table 68. Summary of the factors associated with the outcome variables (by clustered associated factors).

Factors associated	The outcome in the child	Applicable to
Family/HH-related factors		
Underprivileged (SC/ST/OBC) caste	Inadequate HFA & HCFA, Presence of acute morbidity	All HIV-exposed children
Joint/three-generation family	Presence of acute morbidity	All HIV-exposed children
Nuclear family	Frequency of acute morbidity $\geq$0.5/month	All HIV-exposed children
Uneducated (non-schooled) father	Inadequate HFA & WFA	All HIV-exposed children
Poor socio-economic status / Poor (non-electrified/ kuccha/semi-pukka) housing	Inadequate HCFA	All HIV-exposed children
Lack of safe drinking water	Frequency of acute morbidity $\geq$0.5/month	All HIV-exposed children
Lack of safe sanitation	Inadequate WFA	Anaemic children
Presence of a socio-economic crisis	Presence of acute morbidity	All HIV-exposed children
Mother-related factors		
Younger (<25 years) age	Anaemia	All HIV-exposed children
Younger (<25 years) age at marriage	Inadequate HFA	All HIV-exposed children
Underweight (BMI <18.5)	Inadequate WFA & MUACFA	Children of alive mothers
Presence of vitamin/mineral deficiency	Presence of acute morbidity	Children of alive mothers
Higher number (> 6) of deficient vitamins/minerals	Presence and Frequency of acute morbidity $\geq$0.5/month	Children of vitamin/mineral deficient mothers

Factors associated	The outcome in the child	Applicable to
Presence of anaemia	Anaemia	Children of alive mothers
Presence of acute morbidity	Frequency of acute morbidity ≥0.5/month	Children of alive mothers
Presence of multiple acute morbidities	Presence and Frequency of acute morbidity ≥0.5/month	Children of morbid mothers
HIV clinical stage 2 or more	Presence of acute morbidity	All HIV-exposed children
	Frequency of acute morbidity ≥0.5/month	Children of 'sick' mothers
Initiation of ART	Anaemia	All HIV-exposed children
Composite nutrition indication of sickness	HIV infection	Children of alive mothers
Sickness indicated by nutri-tion criteria in combination with other criteria	Presence of acute morbidity	Children of 'sick' mothers
Composite morbidity indication of sickness	Inadequate WFA, Presence of acute morbidity	Children of alive mothers
Sickness indicated by morbidity criteria	Frequency of acute morbidity ≥0.5/month	Children of 'sick' mothers
Pregnancy-related factors (predictors)		
Partial or nil antenatal care	Inadequate WFA	All HIV-exposed children
Adoption of two or more PPTCT strategies	Frequency of acute morbidity ≥0.5/month	Children of the mothers adopting any PPTCT strategy
Adoption of ARV/ART strategy in combination with other PPTCT strategies	Frequency of acute morbidity ≥0.5/month	Children of the mothers adopting ARV/ART as a PPTCT strategy
Longer (>30 days) duration of ARV/ART during pregnancy	Inadequate HFA & HCFA	Children of the mothers adopting ARV/ART as a PPTCT strategy

Factors associated	The outcome in the child	Applicable to
Nil ARV/ART coverage during pregnancy	HIV infection	Morbid children
Partial or nil ARV/ART coverage during breastfeeding	HIV infection	All HIV-exposed children
Lower (<500) CD4 count near to delivery	HIV infection	All HIV-exposed children
Child-related		
Male gender	Inadequate HCFA	Children of alive mothers, Children ever on feeds other than breast milk (including the non-breastfed), Anaemic children
	Inadequate MUACFA	Vitamin/mineral deficient children
Female gender	Inadequate WFA	Children of age ≥15 months
LBW (<2.5 kg)	Inadequate WFA & MUACFA	All HIV-exposed children
Younger (<12 months) age	Inadequate HFA & HCFA, Frequency of acute morbidity ≥0.5/month	All HIV-exposed children
Breastfeeding ever	Inadequate WFA	All HIV-exposed children
	Anaemia	Children of the mothers ever initiated on ART
	Inadequate HFA	Anaemic children
Longer (≥29 weeks) duration of breastfeeding	Inadequate HFA	Ever-breastfed children
Mixed feeding ever	Inadequate HFA, HCFA & MUACFA	Children ever on feeds other than breast milk (including the non-breastfed)

Factors associated	The outcome in the child	Applicable to
Weaning at >6 months of age or for >2 weeks duration	Anaemia, Presence of acute morbidity	Ever-breastfed children
Non-initiation of CPT	HIV infection	All HIV-exposed children
Living without mother's care	Presence of acute morbidity	Ever-breastfed children
Inadequate HFA status	Anaemia	All HIV-exposed children
Inadequate MUACFA status	HIV infection	All HIV-exposed children
Presence of vitamin/mineral deficiency	Presence of acute morbidity	All HIV-exposed children
	HIV infection	3-5 year children ever enrol-led in a school/anganwadi
Higher number (>6) of deficient vitamins/minerals	Inadequate HCFA	Vitamin/mineral deficient children
Persistence (≥50% of time) of vitamin/mineral deficiency	Frequency of acute morbidity >0.5/month	Vitamin/mineral deficient children
Presence of vitamin A deficiency	Inadequate MUACFA, Frequency of acute morbidity ≥0.5/month, HIV infection	All HIV-exposed children
Presence of anaemia	Inadequate HFA & WFA, Presence of acute morbidity	All HIV-exposed children
	Inadequate HCFA	Children of age ≥15 months, Vitamin/mineral deficient children
Presence of moderate or severe Anaemia	Inadequate HFA & HCFA	Anaemic children
Presence of acute morbidity	Anaemia	All HIV-exposed children
Frequency of acute morbidity ≥0.5/month	HIV infection	Morbid children

Factors associated	The outcome in the child	Applicable to
HIV infection	Inadequate MUACFA, Frequency of acute morbidity ≥0.5/month	All HIV-exposed children
	Anaemia	Children of alive mothers
Immunization with DPT vaccine	Presence of acute morbidity	All HIV-exposed children
Immunization with measles vaccine	Presence of acute morbidity	Children of age ≥9 months
Under-immunization of any vaccine	Anaemia	All HIV-exposed children
	Inadequate HCFA	Children of 'sick' mothers
Under-immunization of OPV	Inadequate HFA	Children of alive mothers, Ever-breastfed children
Death	HIV infection	0-2 year children on feeds other than breast milk and/or mix-fed

The red-painted cells indicate a direct association between the outcome indicators.

Box 6. Summary of the factors associated with ever-inadequate anthropometric measurements for age, anaemia, morbidity, mortality, and HIV infection among the HIV-exposed children.

The presence of anaemia among the HIV-exposed children was significantly associated with the inadequate HFA and WFA and the presence of morbidity. Also, it was associated with the inadequate HCFA among the vitamin/mineral deficient children and the children >15 months of age. Among the anaemic children, moderate or severe anaemia was associated with inadequate HFA and HCFA. These inter-relationships between the growth and development (anthropometry) and morbidity factors tend to be modulated by the haemoglobin status of the HIV-exposed children; the anthropometric effects (on HFA, WFA, and HCFA) on one side, and the facilitation of acute morbidity on the other. On the

other hand, the HIV infection was associated with the inadequate MUACFA and the higher frequency of acute morbidity among the HIV-exposed children, and with the anaemia among the children of alive mothers. Most (97.6%) of the children in this study had their mothers alive, and hence the association of the HIV infection with anaemia among the children could be held the same for all the HIV-exposed children. Hence, the core inter-relationships between the outcome variables in this study could be drawn as in figure 83.

The HIV-exposed children ran a risk for the inadequate WFA when their HIV-infected mothers did not have adequate ANC during pregnancy. The adoption of more than one strategy (which also nearly-meant combining strategies of ARV/ART with breastfeeding as per guidelines) for PPTCT was associated with the increased frequency of acute morbidities among the children; this could be the other side of the same coin of an enthusiastic healthcare-seeking behaviour, if not due to limiting immunoglobulins from the breast milk. The longer (>30 days) duration of ARV/ART during pregnancy was associated with the inadequate HFA and HCFA among the children; whether this was due to the drugs or other reasons needed to be probed further. The lower CD4 count of the mother near to the delivery, and the partial or nil ARV/ART coverage of breastfeeding period predicted the HIV infection among the children. However, the link between the non-adoption of ARV/ART by the mother during pregnancy and the HIV infection in the child was evident only among the morbid children in the study, probably due to the near-universal coverage of the ARV/ART among the mothers of the study participants during pregnancy; hence, this (nil history of ARV/ART administration in HIV-infected mother during pregnancy, if the HIV-exposed child was presenting morbid) could help as a screening criteria to choose to test the HIV-exposed children for HIV infection, if required. Thus, in addition to the direct association with the HIV infection in the child, the ANC and HIV-related interventions adopted by the HIV-infected mother did influence the nutrition and morbidity outcomes in the child's life outside the uterus.

Among the HIV-exposed children, those ever-breastfed ran the risk of inadequate WFA in their life, probably due to the excess or longer reliance on breastfeeding for the child's nutrition (mean duration of breastfeeding was 46.6 weeks) or due to the poor feeds or

feeding practices (11.3% of the 0.5-2 year children received food with minimum recommended dietary diversity every time; 25.8% of them received food for minimum recommended frequency; and, 7.5% of them received minimum acceptable food every day). Anaemia among the children was associated with the initiation of the ART to the mothers (in general), and with the breastfeeding from such mothers (after delivery); this suggested the role of maternal ARV/ART drugs (in utero or via breast milk) as a reason of anaemia in their children. Also, the breastfeeding was associated with the inadequate HFA among the anaemic children, as seen in the association of the core indicators. As such, the longer ($\geq$29 weeks) duration of the breastfeeding was associated with the inadequate HFA among the ever-breastfed children. Thus, the breastfeeding practices and/or the ARV/ART in the breast milk (not the breast milk per se) tend to mediate the less growth and development in the child. It was also important that not-breastfeeding was not associated with the increased presence of acute morbidity in the HIV-exposed children.

Delayed (beyond 6 months of age) or longer (for >2 weeks duration) weaning of the ever-breastfed children was associated with the anaemia and the presence of acute morbidity. Among the children started on feeds other than the breast milk, the mixed feeding practice was associated with the inadequate HFA, HCFA, and MUACFA; and such male children had higher chances of the inadequate HCFA. This again could be due to the excess or longer reliance on breastfeeding, and through the anaemia resulting from the breastfeeding from the mothers on ARV/ART. The mixed feeding was so significant that among the 0-2 year mix-fed children (or more precisely, among the 0.5-2 year children started on feeds other than breast milk), there was a higher chance for death. As such, the deferred or extended weaning and associated mixed feeding did influence the life, morbidity, and nutritional aspects of the child. Moreover, as inferred above, it was the breastfeeding practices and/or the ARV/ART in the breast milk (not the breast milk per se) that tend to mediate the development of under-nutrition and under-development in the child.

The presence of vitamin/mineral deficiency among the HIV-exposed children was associated with the presence of acute morbidity in them, and the persistence of the deficiencies for more (than 50% of) time was associated with a higher frequency of acute

morbidities. The higher number of deficient vitamins/minerals in the child indicated a higher chance for inadequate HCFA in them. The presence of vitamin/mineral deficiency was higher among the 3-5 year HIV-EI children enrolled in school/anganwadi; this could help as a screening criterion in the routine school health programs to choose the child to test for HIV infection to identify the hidden HIV-EI children in the community. On the other hand, the presence of the (fat-soluble) vitamin A deficiency signs/symptoms were associated with the inadequate MUACFA, the higher frequency of acute morbidities, and the HIV infection in the child. As such, the vitamin/mineral deficiencies in the child retarded the growth and development and facilitated morbidity among the children.

Also, considering the whole cohort of HIV-exposed children:

- the male children who had alive mothers (which was near-equivalent to all male children) had inadequate HCFA, and the same trend was reflected (male preponderance) in the sub-groups of anaemic children and children who were started on feeds other than breast milk;
- the male vitamin/mineral deficient children had a higher chance of inadequate MUACFA compared to their female counterparts;
- there was a higher chance of the inadequate HFA and HCFA, and a higher frequency of acute morbidity during the infancy (compared to post-infancy life);
- above 15 months of age, the female children ran a higher risk of inadequate WFA;
- the LBW children had a higher chance of inadequate WFA and MUACFA;
- those ever-breastfed children who were subsequently out of mother's care in their life had a higher chance of the presence of acute morbidity.
- the non-initiation of CPT was associated with higher HIV infection among the HIV-exposed children; but this could rather be an early sign of adherence or defection of the family to the HIV-related treatment, care, and support services, as the co-trimoxazole does not have any demonstrated anti-retroviral action.

The younger age (<25 years) of the mother was associated with the anaemia among the HIV-exposed children, while the younger age (<25 years) of the mother at marriage was

associated with inadequate HFA. The underweight among the mothers predicted inadequate WFA and MUACFA among their children, and the presence of anaemia among the mothers predicted the anaemia among the children; both suggested that under-nutrition ran in the families. Similarly, the presence of acute morbidity among the mothers was associated with a higher frequency of acute morbidities among the children, while multiple morbidities among the mothers were associated with the higher presence and higher frequency of acute morbidities among their children; both suggested that acute morbidities co-existed in the mother-child pairs in the families. The presence of vitamin/mineral deficiency among the mothers predisposed to the presence of acute morbidities, while the indication of higher number (>6) of deficient vitamins/minerals among the mothers predisposed to both the higher presence and higher frequency of acute morbidity in their children; this suggested the link of nutrition level of the family with acute morbidities. The advanced clinical stages of HIV infection (which meant lower immunity and higher presence of opportunistic infections) among the mothers also predicted the higher presence of acute morbidity among their children, while the same also predicted higher frequencies of acute morbidity among the children of the mothers who were identified as sick. All these suggested the inter-relationships (co-existence and mutual synergy) between under-nutrition and acute morbidities in the HIV-infected mother-HIV-exposed child pairs. Further, the initiation of ART to the mothers was associated with anaemia among the children, even if it did not bear a direct relationship of chronology or causation.

The 'nutrition-related sickness' among the mothers (those with the signs/symptoms suggestive of at least two different vitamin/mineral deficiencies other than iron AND BMI <18.5 AND haemoglobin <12.0 g/dl) was associated with HIV infection among the children; upon satisfying more additional (morbidity, pregnancy, psychosocial) criteria of sickness by the nutritionally sick mothers, the higher the chances of acute morbidity among their children. The 'morbidity-related sickness' among the mothers (those with two acute or one chronic morbidity) was associated with inadequate WFA and higher presence of acute morbidity among the children; the children of mothers indicated as sick by morbidity criteria had higher frequencies of acute morbidity than those of the mothers indicated as sick by other criteria. As such, the composite indicator of sickness among the mothers

could help to predict the under-nutrition and acute morbidity among the children; this could also help as a screening tool to choose to test the HIV-exposed children for HIV infection, if required, in situations like resource-limited settings; however, the sensitivity and specificity of these criteria need to be validated.

Among the HIV-exposed children, the children belonging to the underprivileged castes (SC/ST/OBC) had a higher chance for inadequate HFA and HCFA and the presence of acute morbidity. While the children in the joint or three-generation families had a higher chance of presence of acute morbidity, those in the nuclear families had higher frequencies of acute morbidity. The children of uneducated (non-schooled) father (unlike the mothers, as routinely inferred in health research) ran a risk for inadequate HFA and WFA, while the children living in poorly-built (non-electrified or kuccha or semi-pukka) houses had a risk of inadequate HCFA; both these could represent the income of the family and hence the poor socio-economic status of the family. The lack of safe drinking water in the households tend to predispose to the higher frequency of the acute morbidities in children, while lack of safe sanitation predisposed to inadequate WFA among the anaemic children. The presence of a socio-economic crisis in the family tends to increase the presence of acute morbidities among the children. There were no significant family or household factors found to be associated with anaemia, inadequate MUACFA, and HIV infection among the children.

Under-immunization of any vaccine held good as a proxy indicator for the anaemia among all the HIV-exposed children; while the same could represent the inadequate HCFA among the children of sick mothers. Also, under-immunization with the OPV could serve as a proxy indicator of the inadequate HFA among the ever-breastfed children and children with alive mothers. On the other hand, the adequate status for immunization of the DPT and measles vaccines (among all children and those >9 months of age respectively) would have been achieved with the presence of morbidity among the children, and subsequent health care seeking (when immunizations were administered and updated for the age of the child; ‘opportunistic’ or ‘convenient’ vaccination).

As there were only a very few child deaths during the course of the study, verbal autopsies (HIV-EI=6, HIV-EU=23, HIV-E?=39; neonatal deaths=23, post-neonatal infant deaths=31, post-infancy deaths=14; total=68) were conducted into the child deaths 0-59 months of age that happened between 01 Jan 2011 and 30 Nov 2017. A bulk (59.0%) of the HIV-E? child deaths were due to the deaths happening in 0-41 days, as the first HIV test scheduled by NACO for EID was at 42 days. Majority of the dead children belonged to the Hindu religion, an underprivileged caste, and families with illiterate or less-educated father, people other than mothers taking decisions of health care needs, and BPL status. Nearly equal shares of the child deaths were found in nuclear and joint/three-generation families, and the mothers of age less than and more than 25 years. One-third of the parents of the dead children had a consanguineous marriage, and about one-tenth of the dead children had a sibling death before in the family. Majority of the dead children lived in the households from where the health care was accessible within 30 minutes, mostly by utilizing public transport. One-third of the dead children were born as the first child, half as the second or the third child, and the remaining were born in 4+ order. One-fifth of the dead children were born premature, and about half of them were not immunized for age at death. More than half of the children died at home (despite the majority having health care access), and another one-third at a health care facility and the mean age at death was 228.8 days. Compared to the male children, the dying female children were higher in the neonatal age group (male=26.5%, female=41.2%) and lesser in the post-infancy (male=26.5%, female=14.7%); they had shorter life (mean age of death: male=302.1, female=155.4 days); and they mostly died at home (male=47.1%, female=58.8%).

The causes for deaths were classified as immediate/most probable reasons (n=127) and associated/facilitating reasons (n=100). The various reasons under the immediate/most probable reasons were clustered as ADD (with/without vomiting, hypovolemia), ARI (including pneumonia, otitis media, asthmatic bronchitis), birth asphyxia (including respiratory distress syndrome, hypoxemia, hypothermia), septicemia, meconium aspiration, preventable reasons (including feed regurgitation/aspiration, choking, fall, and suspected insect/snake bite), other infections and fevers (including viral fever, infections, FUO, febrile fits), child neglect (including denial of feeds, unsuccessful feeding, delay in

treatment), post-surgical complications (including renal failure), TB and small intestinal intussusception (including intestinal obstruction, obstructive jaundice, drug-induced hepatitis). The most probable immediate reasons for:

- neonatal deaths were birth asphyxia (34.2%), septicemia (18.4%) and meconium aspiration (13.2%);
- post-neonatal infant deaths were ADD (26.3%), ARI (21.1%) and preventable reasons (12.3%);
- post infancy deaths were ADD (21.9%), other infections and fevers (15.6%) and child neglect (12.5%);
- male child deaths were ADD (30.3%), ARI (12.1%) and child neglect (10.6%);
- female child deaths were ARI (16.4%), birth asphyxia (16.4%), septicemia (14.8%) and preventable reasons (9.8%);
- HIV-EI child deaths were ADD (14.3%), ARI (14.3%), septicemia (14.3%), child neglect (14.3%), post-surgical complications (14.3%), TB (14.3%) and small intestinal intussusception (7.1%);
- HIV-EU child deaths were ADD (21.6%), ARI (11.8%), other infections and fevers (11.8%), child neglect (11.8%), birth asphyxia (9.8%) and septicemia (9.8%);
- HIV-E? child deaths were ADD (16.1%), ARI (16.1%), birth asphyxia (14.5%) and preventable reasons (11.3%); and,
- all (0-59 month) HIV-exposed child deaths were ADD (18.1%), ARI (14.2%) and birth asphyxia (11.0%).

All the child deaths happened under the wider umbrella of a few associated/facilitating reasons, namely malnutrition (including growth retardation, failure-to-thrive, anaemia, vitamin deficiencies; 51.0%), low birth weight (including premature child; 33.0%), congenital malformations (including cerebral palsy, quadriplegia, cleft lip/palate, mental retardation; 13.0%) and skin/mucous membrane conditions (including ulcers, scabies, impetigo, furuncle, infections etc.; 3.0%). As such, the immediate reasons differed by the age of the child, but not much by the gender or HIV status; and the malnutrition and low birth weight facilitated the immediate reasons to result in the majority of the child deaths.

CHAPTER 6

DISCUSSION AND CONCLUSION

This chapter includes:

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DISCUSSION AND CONCLUSION

6.1. Background of the study.

HIV infections were reported from different parts of India since 1987. The spread of the infection in the community was predominantly through the sexual mode of transmission among the adults and through mother-to-child transmission among children. The strategies of PPTCT, EID, and CST, were implemented to ensure infection-free children, and to prolong the life of PLHIV and CLHIV. In 2017, the burden and trends of the HIV infection showed the signs of control of the epidemic: a decline in the number of PLHIV/CLHIV and their share in the community; and, in the incidence, prevalence and mortality among the adults and children. Reciprocally, this has increased the ratio of the HIV-EU: HIV-EI children in the community, despite the reduction in the number of new HIV-exposed children over the years. However, cumulatively, the HIV-exposed children increased over the years. The child's exposure to the maternal HIV infection also implied their exposure to the health care interventions adopted by the mother for PPTCT, ART, etc. The ART had added to the life years of infected mothers and children; however, the quality of life years added was not adequately explored in the Indian background. Only a very few studies had taken up the concept of HIV exposure, mainly from the African sub-continent. Thus, the differentials of the life, health, and nutritional outcomes between the Indian HIV-EI and HIV-EU children were not known.

As such, a prospective community-based cohort study of the HIV-exposed children (<5 years) was undertaken between 1 December 2014 to 30 November 2017; it considered the maternal, pregnancy and child-related factors in addition to the HIV exposure, to study the nutrition, morbidity and mortality aspects in a single research framework. The objectives of the study were to study and analyze the real-time course and natural history of the HIV infection among the HIV-exposed children 0-5 years of age; and, to explore and compare the patterns, and identify the associated factors, of nutrition, growth and development, morbidity and mortality them, grossly and differentially by HIV infection. This research

tried to portray the vicious cycle of 'malnutrition-growth and development abnormalities-morbidity-malnutrition' (as influenced by the real-time environmental, socio-economic, maternal and child-related factors), and assess the magnitude and patterns of the problem among the HIV-exposed children, and identify the key factors associated with them. Additionally, the verbal and social autopsy inquiry was done on the deaths of HIV-exposed children to identify the associated factors and causes of deaths. The study included 660 HIV-exposed children (HIV-EI=5.3%, HIV-EI=94.7%; male=51.1%, female=48.9%) from 537 families in the Belgaum district.

6.2. Results and policy implications.

The existing care and support services for the HIV-exposed children (under NACP) were predominantly offered by the government HCFs; however, the services were mostly offered for the CLHIV who reached the HCFs for whom limited information (related to treatment) was maintained. The system neither kept a track nor maintained a record of the health status of the HIV-EU (other than that related to the EID implementation, till 18 months of age) and the CLHIV unregistered at ART centres. Even though new additions were lesser in the recent years, with cumulatively increasing registered CLHIV population over the years, the health care system tends to be skewed more and only towards providing ART to them; this tends to ignore the needs of the unregistered and the HIV-EU children. In the sections below, the policy implications were suggested against this background.

6.2.1. The natural course of HIV infection among HIV-exposed children.

Two-thirds of the HIV-EI children entered the study after testing positive, and two-thirds of these children were in HIV clinical stage 2 and on ART during the study. Near-half of the children had detected their HIV infection before 18 months (mean age of testing HIV positive=15.4 months); however, in >50% children, the delay in starting ART after detecting the infection was 90+ days (ART initiation: mean age=24.6 months, mean delay=196.8 days). 8.3% of children who were initiated on ART had dropped out, and were not on ART, during the study.

Policy implications: Hence, the existing CST program under the NACP need to be strengthened to initiate all the registered CLHIV on ART, as soon as they test positive (this is already initiated in 2017), and ensure the minimization of attrition.

6.2.2. The extent of ill-health among HIV-exposed children.

An inadequate anthropometric status for age, and/or presence of anaemia and/or acute morbidity and/or HIV infection was considered as ill-health among the HIV-exposed children. Among the HIV-exposed children of age 0-59 months, 73% had inadequate HFA, 62% had inadequate WFA, 24% had inadequate HCFA, 27% had inadequate MUACFA, 75% had anaemia, and 79% had acute morbidities ever in their life. The HIV-EI children had higher inadequate HFA (≥75%) and MUACFA (50-75%) and anaemia (≥75%) than the HIV-EU children, while the presence of inadequate WFA and HCFA and acute morbidity was similar among the HIV-EI and HIV-EU children. All these outcomes were near-equally present among the male and female HIV-exposed children.

The gravity of the ill-health among the HIV-exposed children becomes even more evident when the share of the children who always had ill-health was considered. Among the HIV-exposed children, 50-75% had inadequate HFA and anaemia, 25-50% had inadequate WFA and HCFA and acute morbidity, and <25% had inadequate MUACFA always in their life. A higher share of the HIV-EI children had always-inadequate (all) anthropometric and Hb status, while always-morbid status was similar among the HIV-EI and HIV-EU children; however, all the indicators denoting always-ill-health status were near-equally present among the male and the female children.

The ill-health was not homogenously present among the HIV-exposed children; it varied by the age, gender, and HIV status. Among all the HIV-exposed children, the inadequate HFA was mostly encountered in the age of 12-35 months, the inadequate WFA in 36+ months (except male children, for whom it was in <36 months), the inadequate HCFA in <12 months, the inadequate MUACFA in <12 and 36+ months (except female children, for whom it was only in <12 months) and the anaemia in <36 months (except HIV-EI children,

for whom it was <48 months), while the acute morbidity was present nearly equally in all ages. With the increase in age, improvement happened for the HFA, HCFA and multiple morbidity status among all the HIV-exposed children, for the WFA status among the male children, for the MUACFA status among the male and HIV-EU children, and for the anaemia status among the male, female and HIV-EU children; however, the inadequate WFA status among the female and the HIV-EI children, and the inadequate MUACFA status among the HIV-EI children worsened further. The presence of the inadequate WFA status among the HIV-EU children, the inadequate MUACFA status among the female children, and the anaemia among the HIV-EI children remained near-equal in all ages. Considering the changes of health status in the unique children over time, all the improvements and deterioration of all the health outcome indicators were in <25% of the children (except for the acute morbidity, where deterioration was of the order of 25-50%), near-equally by gender and HIV status (except among the HIV-EI children, for whom the deterioration of adequate MUACFA status and improvement of anaemia status was higher than the HIV-EU children); that is, once healthy, the deterioration, and once unhealthy, the improvement was minimal.

The ill-health also differed by the type and severity. Most (57%) of the anaemic children were moderately anaemic, while the HIV-EI children had a higher chance of moderate-severe anaemia and lowered mean Hb values compared to the HIV-EU children. ARI (60.2%), ADD (14.7%), FUO (13.6%), skin/mucosal conditions/infections (9.5%), worm infestation (1.3%) and tuberculosis (TB; 0.3%) formed the common acute morbidities among the HIV-exposed children (mean number of morbidities: morbid children=1.8, multi-morbid children=2.5, all children=0.6). With the increase in the age of the child, the events of ADD decreased, and the ARI and skin/mucosal conditions/infections increased, among all HIV-exposed children; however, the events of FUO remained nearly constant in all age groups. Reporting of TB was conspicuously higher among the HIV-EI children (than the HIV-EU children) at higher ages.

As such, ≥75% of all the HIV-exposed children were indicated to have ill-health by one or the other indicator during the span of the study (29 months; mean duration of child follow-

up=16.4 months), without much difference by age, gender or HIV status. Or in other words, a vast majority of the 0-59 month HIV-exposed children were having ill-health in terms of inadequate growth and development and/or anaemia and/or acute morbidity, irrespective of their age, gender HIV status. The only significant differences by age and gender were the higher chance of the inadequate HFA and HCFA status and higher frequency of acute morbidity for the infants compared to the elders, higher chance of the inadequate HCFA status for the male children, and higher risk of inadequate WFA for the female children >15 months of age. Moreover, once in ill-health, it persisted in the subsequent years of their life in a majority of children.

Policy implications: Ill-health was widely prevalent among the HIV-exposed children. An assessment of anaemia, acute morbidity, HFA, and WFA could pick up more than 50% of the HIV-exposed children with ill-health: all these could help in the 0-47 months of age, while anaemia alone could be of help in the 48-59 months of age. Hence, all the HIV-exposed children, irrespective of the HIV status, need to be monitored for the health indices, by the health care providers (of NACP). The current monitoring is limited to implementation of EID protocols (and hence HIV infection alone); this need to:

- be widened to cover the monitoring of growth and development (weight/height/HC/MUAC gain) and Hb status,
- include screening for acute morbidities:
    - a simple standard screening for ARI, ADD, dermatological conditions and FUO (this could detect $\geq$95% of acute morbidities),
    - screening for TB was important in the ages beyond 2 years, and,
    - the yield (acute morbidity detection) could be around one-in-three assessments.

The table 48 and figures 78-82 could be used as ready-reckoners for the health care staff to predict the chance of ill-health, by age, gender and HIV status, among the HIV-exposed children.

6.2.3. Factors contributing to ill-health among HIV-exposed children.

Tables 67 and 68 could be used by the care providers for identifying the (risk) factors that tend to lead to ill-health among the HIV-exposed children.

6.2.3.1. Pregnancy-related events/factors.

As all the pregnancy-related events/factors happened before the birth of the child chronologically, these could be considered as risk/predictors of the ill-health among the HIV-exposed children.

Three-fifths of the pregnant mothers received the full ANC, and around 85% delivered at the government HCFs; the missed ANC and delivery at private HCFs (where PPTCT strategies were not available) were higher among the mothers of the HIV-EI children. Even though the inadequate ANC was not linked to the HIV infection in children, the HIV-exposed children had significantly higher inadequate WFA status, when the mothers' ANC was inadequate.

More than 90% of the mothers had adopted the PPTCT strategy (most common was the ARV/ART), but only around half of them were effectively covered as per the PPTCT protocol (combination of ARV/ART and breastfeeding strategies for full duration); the partial adoption (one strategy only), nil/partial duration (less than duration of pregnancy and breastfeeding), and lesser (≤30 days) duration of ARV/ART during pregnancy were higher among the mothers of the HIV-EI children. However, in this study, only the nil or partial ARV/ART coverage of the breastfeeding period significantly predicted the HIV infection among all the HIV-exposed children. The significant link between the maternal non-adoption of ARV/ART during pregnancy and the HIV infection in the child was evident only among the morbid children, probably due to the near-universal coverage of the ARV/ART among the mothers in the study sample. Hence, this (nil history of maternal ARV/ART during pregnancy) could help as a screening criterion to choose to test the morbid HIV-exposed children for HIV infection, if any prioritization was required. On the

other hand, the adoption of more than one PPTCT strategy (which nearly-meant the combination of ARV/ART and breastfeeding strategies for full duration, as per the PPTCT guidelines) was significantly associated with the increased frequency of acute morbidities among the children. However, this could be the other side of the same coin of enthusiastic healthcare-seeking behaviour, if not due to limiting immunoglobulins from the breast milk (as the weaning was completed at 6 months of age). The longer (>30 days) duration of ARV/ART during pregnancy was significantly associated with the inadequate HFA and HCFA among the children; whether this was due to the drugs used or other reasons needed to be probed further.

Nearly two-fifths of the mothers had their CD4 count $\geq$500 near delivery (mean CD4 count=502), but more mothers of HIV-EI children had it <500. The lower CD4 count of the mother near to the delivery significantly predicted the HIV infection among the children.

Thus, for the HIV-exposed children, the inadequacy of ANC and longer duration of ARV/ART during pregnancy among the HIV-infected mothers predicted inadequate ill-health (inadequate WFA, HFA, and HCFA); non-coverage of full breastfeeding period with ARV/ART and low immunological status (CD4 count) of the mother resulted in the HIV infection; the adoption of full protocol of PPTCT risked higher frequency of acute morbidities; and, nil history of maternal ARV/ART during pregnancy suggested HIV infection among those morbid. In short, the ANC and HIV-related interventions adopted by the HIV-infected mother during pregnancy/breastfeeding did influence the growth and development, morbidity, and HIV infection outcomes in the child's life outside the uterus.

Policy implications: Hence:

- the existing health care systems need to:
    - be strengthened to:
        - provide full ARV/ART coverage during breastfeeding (as the primary objective is to limit the MTCT; which is already initiated by the NACP in 2016), and,

        - include and provide adequate ANC to all the HIV-infected pregnant mothers (to reduce ill-health among HIV-exposed children);
    - adopt systems (protocol and procedures) to:
        - ensure the HIV testing of the morbid HIV-exposed children, whose mothers did not have ARV/ART during pregnancy, on a priority basis (to enhance detection of hidden CLHIV in the community),
        - ensure the perinatal CD4 testing of HIV-infected mothers (as this could predict HIV infection among the children born; currently, the EID protocol mandates first HIV test for the HIV-exposed children at 6 weeks of age, and hence, based on the lower CD4 count of the mother, a cord blood HIV test could be undertaken on a priority to identify the in utero MTCT, which would help to initiate ART for the child at an earlier age), and,
        - complement and integrate the maternal ARV/ART provision with screening for ill-health (anthropometry, acute morbidities) among the children (given the chance for ARV/ART during pregnancy/ breastfeeding to induce the same; especially important, when the larger 'MTCT cohort' of HIV-infected children of the peak epidemic in the 1990s would be presenting as the 'long-duration-on-ART HIV-infected fathers and (pregnant) mothers' in the years to come); and,
- additional research is required to explore whether the inadequate HFA and HCFA among the children born to the mothers receiving ARV/ART for a longer duration were due to the drugs administered, or otherwise.

6.2.3.2. Breastfeeding related events/factors.

83% of the HIV-exposed (and all the HIV-EI) children had been ever-breastfed (mean duration: breastfeeding=46.6 weeks; exclusive breastfeeding=24.9 weeks). Nearly half of the HIV-exposed children had been breastfed for >29 weeks; a higher share of the HIV-EI children was breastfed longer (>52 weeks). The quality and quantity of the foods/feeds given to the HIV-exposed children were also grossly compromised for approximately 75%

of the 0.5-2 year children: only 11.3% of them were ensured minimum recommended diversity every time, 25.8% of them were ensured minimum recommended frequency every day; and thus, 7.5% of them received minimum acceptable food every day. Those ever-breastfed HIV-exposed children had a significantly higher risk of the inadequate WFA status in their life, probably due to the excess or longer reliance on the breastfeeding for the child's nutrition or due to the poor feeds or feeding practices. The longer (≥29 weeks) duration of the breastfeeding was significantly associated with the inadequate HFA among the ever-breastfed children.

Anaemia among the HIV-exposed children was significantly associated with the initiation of the ART to the mothers (in general), and with the breastfeeding from such mothers (after delivery); this suggested the role of maternal ARV/ART drugs (in utero or via breast milk) as a reason of anaemia in the children. Also, breastfeeding was significantly associated with inadequate HFA among the anaemic children. Thus, both the (longer) breastfeeding practices and the presence of ARV/ART drugs in the breast milk (not the breast milk per se) tend to mediate the inadequate growth and development in the child.

Only a quarter of the HIV-exposed children were weaned at or before 6 months and within 2 weeks. Delayed (beyond 6 months of age) or longer (for >2 weeks duration) weaning of the children was significantly associated with the anaemia and the presence of acute morbidity.

Two-fifths of the HIV-exposed children (or three-quarters of the breastfed children) were mix-fed (mean duration=29.5 weeks); a higher share of the HIV-EI children was mix-fed, and mix-fed longer (>6 months). Among the children started on feeds other than the breast milk, the mixed feeding was significantly associated with the inadequate HFA, HCFA, and MUACFA; and such male children had a significantly higher chance of the inadequate HCFA. This, again could be due to the excess or longer reliance on breastfeeding, and through the anaemia resulting from the breastfeeding from the mothers on ARV/ART. The mixed feeding was so significant that among the 0.5-2-year children started on feeds other than breast milk; there was a higher chance for death.

Thus, for the HIV-exposed children, on-ART status of the mothers (ever or during breastfeeding) was associated with anaemia; breastfeeding was associated with inadequate WFA status (all children) and inadequate HFA status (anaemic children); longer (>29 weeks) breastfeeding was associated with inadequate HFA status; delayed (beyond 6 months of age) or longer (for >2 weeks duration) weaning of the children was associated with the anaemia and the presence of acute morbidity; the mixed feeding was associated with the inadequate HFA, HCFA, and MUACFA (all children) and even death (0.5-2 year children). As such, the breastfeeding, breastfeeding duration, related practices like deferred and extended weaning, and the resultant mixed feeding did influence the life, morbidity, nutritional and growth and development aspects of the child.

Policy implications: As the (longer) breastfeeding and related practices and the presence of ARV/ART drugs in breast milk tend to mediate the ill-health among the HIV-exposed children:

- the existing health care systems (of NACP) need to:
    - be strengthened to facilitate weaning of HIV-exposed children at 6 months and within 2 weeks, and thereby reduce the wide-spread practice of mixed feeding,
    - adopt monitoring growth and development, Hb status, and screening for acute morbidities, to facilitate early detection of ill-health among all the breastfed children (especially if the mothers are on ART, as the anaemia tend to be the core mediator for the ill-health among children), and,
    - take extra care of the children during weaning and after stopping breastfeeding (till 2 years), by providing supplementary, complementary or therapeutic diet (as needed), to prevent deaths due to undernourishment (as the quality and quantity of the child food/feed in this age was grossly compromised); and,
- additional research is required to explore whether the anaemia the children receiving breastfeeding from on-ART mothers were due to the drugs administered, or otherwise.

6.2.3.3. Mother related situations/factors.

Three-fourths of the mothers were married before 20 years (mean age=18.4 years), and one-third of them were of the age <25 years at the start of the study (mean age=26.4 years). The younger age (<25 years) of the mother was significantly associated with the anaemia among the HIV-exposed children, while her younger age (<25 years) at marriage was significantly associated with inadequate HFA.

About four-fifths of the mothers were detected as HIV-infected before 25 years of age (mean age=22.8 years), 95% of those detected were initiated on ART (mean age=24.0 years), and 70% of them were in HIV clinical stage 2+. The initiation of ART to the mothers was significantly associated with the anaemia among the children. The advanced clinical stages (2+) of the HIV infection (which implied lower immunity and higher presence of opportunistic infections) among the mothers was significantly associated with the higher presence of acute morbidity among the children.

Half of the mothers were underweight (mean BMI=19.4 kg/m^2), and >90% were anaemic; underweight and anaemia (and severe anaemia) were higher among the mothers of the HIV-EI children. The mother's underweight was significantly associated with the inadequate WFA and MUACFA status among the children, and her anaemia was significantly associated with the anaemia among the children; both suggested that the under-nutrition ran in the families.

Around two-thirds of the mothers had vitamin/mineral deficiencies; higher indicated number (>6) of deficient vitamins/minerals were higher among the mothers of the HIV-EI children. Common vitamins indicated as deficient were vitamin B, C, D, and E; vitamin A deficiency signs were higher among the mothers of the HIV-EI children. The presence of vitamin/mineral deficiency among the mothers was significantly associated with the presence of acute morbidities in the children; the higher indicated number (>6) of deficient vitamins/minerals among the mothers was significantly associated with the higher presence

and frequency of acute morbidity in the children; this suggested the link between the nutrition and morbidity status in the family.

One-third of the mothers had acute morbidities, and this (and multiple acute morbidities) was higher among the mothers of HIV-EI children. The common acute morbidities among the mothers were the ARI, FUO, skin/mucosal conditions/infections and ADD. The presence of acute morbidity among the mothers was significantly associated with the higher frequency of acute morbidities among the children, while multiple maternal morbidities were significantly associated with the higher presence and frequency of acute morbidities among the children; both suggested that the acute morbidities co-existed in the mother-child pairs in the families.

There were more reasons for the mother to be sick, other than morbidity. The sickness of the mothers could compromise the childcare; hence, a composite indicator of sickness was defined and used. Half of the mothers satisfied the set criteria (identified as 'sick'), of which near-one-third each were sick by nutrition, pregnancy, and morbidity/psychosocial stress. Both the 'sickness' and the 'factors contributing to sickness' were higher among the mothers of HIV-EI children. The 'nutrition-related sickness' among the mothers (those with the signs/symptoms suggestive of at least two different vitamin/mineral deficiencies other than iron AND BMI <18.5 AND haemoglobin <12.0 g/dl) was significantly associated with the HIV infection among the children; upon satisfying more additional (morbidity, pregnancy, psychosocial) criteria of sickness by the nutritionally sick mothers, significantly higher was the chance of acute morbidity among the children. The 'morbidity-related sickness' among the mothers (those with two acute or one chronic morbidity) was significantly associated with inadequate WFA and higher presence of acute morbidity among the children; the children of mothers indicated as sick by the morbidity criteria had significantly higher frequencies of acute morbidity than those of the mothers indicated as sick by other criteria. As such, the composite indicator of sickness among the mothers could help to predict the under-nutrition and acute morbidity among the children; this could also help as a screening tool to choose to test the HIV-exposed children for HIV infection,

if required, in situations like resource-limited settings; however, the sensitivity and specificity of these criteria in the composite indicator need to be validated.

Thus, despite the higher share of the mothers of the HIV-EI children having under-nutrition and acute morbidities, it was not significantly associated with the HIV status of the child. However, the HIV-exposed children born to the younger mothers had a higher risk of anaemia and inadequate HFA status; those with mothers on ART or having anaemia had a higher risk of anaemia; those with mothers having advanced HIV infection or vitamin/mineral deficiency had a higher presence of acute morbidity; those with underweight mothers had inadequate WFA and MUACFA status; those with mothers having higher indicated number of deficient vitamins/minerals or multiple morbidities had higher presence and frequency of acute morbidity; those with morbid mothers had higher frequency of acute morbidities. All these suggested the co-existence and mutual synergy between under-nutrition and acute morbidities in the HIV-infected mother-HIV-exposed child pairs.

Policy implications: The health of mothers need to be ensured for having a healthy child. Given the association between the nutritional deficiencies and acute morbidities among the mothers and the children, and since the ill-health tend to run in families:

- the existing health care system:
    - need to improve maternal adherence to CST program,
    - need to consider the HIV-infected mother-HIV-exposed child pair as the unit for an integrated health and nutrition screening, so that ill-health in one could trigger the screening of the other,
    - need to establish protocols, undertake regular screening and offer care for acute morbidities for the mother and children (a simple standard screening for ARI, ADD, dermatological conditions and FUO could suffice),
    - need to establish protocols, undertake regular screening and offer care for vitamin/mineral deficiency signs/symptoms (including Hb status) for the mother and children (could use syndromic approach for the diagnosis of deficiencies),

    - need to establish protocols to take extra care of the nutrition and morbidity, if both the mother and child were found to be under-nourished or morbid, by providing nutrition/food preparation training for the mothers, and/or supplementary food and/or vitamins/mineral medications to both (as the vicious cycle of under-nutrition and morbidity tend to run in the families, and as the types of the acute morbidities were similar among the mothers and children),
    - could use the composite indicator of maternal sickness used in this study to prioritize the services in the initial stages of establishing the protocols and services (as this could help to identify most of the 'sick' mothers and the children in ill-health), and,
    - need to take up health and nutrition screening of the children of the HIV-infected mothers in the clinical stage of 2or more; and,
- additional research is required to ascertain the feasibility of using the composite indicator of sickness among HIV-infected mothers, and the sensitivity and specificity of the criteria used in it, to develop and use it as screening tool to choose to test the HIV-exposed children for HIV infection, based on the maternal 'sickness' status, if required, in situations like resource-limited settings or the field.

6.2.3.4. Child-related situations/factors.

One-fifth of the HIV-exposed children were born with LBW (mean birth weight=2.7 kg); LBW was significantly associated with the inadequate WFA and MUACFA status in them.

Around one-fifth of the children were single or double orphans, and around one-tenth of them lived without mother's care. There was a higher share of the HIV-EI children who were orphans, and a higher share of the HIV-EU children who were separated from the mothers. However, only those ever-breastfed children who were subsequently out of mother's care in their life had a significantly higher presence of acute morbidity.

Near two-thirds of the HIV-exposed children were immunized for age; a higher share of the male and HIV-EU children were under-immunized. The coverage was near-90% or more for BCG, Hepatitis B, and measles vaccines, while it was a >75% for OPV, DPT and MMR vaccines. Vitamin A supplementation reached only one-third of the children. Under-immunization of any vaccine held good as a significant proxy indicator for the anaemia among all the HIV-exposed children; while the same significantly represented the inadequate HCFA status among the children of sick mothers. Also, under-immunization with the OPV could significantly serve as a proxy indicator of the inadequate HFA among the ever-breastfed children and children with alive mothers. On the other hand, the adequate (for age) status for immunization of the DPT and measles vaccines, which was found to be significantly associated with a higher presence of acute morbidity, would have been achieved due to the healthcare seeking subsequent to morbidity ('opportunistic' or 'convenient' vaccination).

The delay in psychomotor/social (0.6%) and language (1.1%) development and chronic diseases (1.2%) were present in a very few HIV-exposed children, and most of them presented together in unique children. The common chronic morbidities present were the birth injury/congenital anomaly/cerebral palsy, cleft lip/palate, epilepsy, ichthyosis, and bronchial asthma.

Nearly half (44.7%) of the HIV-exposed children had vitamin/mineral deficiency signs/ symptoms, and these persisted for more than half the follow-up time in 20% of the deficient children; the presence of signs/symptoms, and the extent and spectrum of the deficient vitamins, and persistence was higher among the HIV-EI children. The signs/ symptoms among the HIV-exposed children indicated deficiency of the vitamins B (B6, B7, B2, and B3), C and E commonly; the HIV-EI children tend to have a deficiency of vitamins A and D and iron, also. The presence of vitamin/mineral deficiency among the HIV-exposed children was significantly associated with the higher presence of acute morbidity; the higher indicated number of deficient vitamins/minerals in the child was significantly associated with the higher chance for inadequate HCFA; and, the persistence of the deficiencies for more (than 50% of the) time was significantly associated with higher

frequency of acute morbidities. The male vitamin/mineral deficient children had a significantly higher chance of the inadequate MUACFA status. The presence of vitamin/mineral deficiency was significantly higher among the 3-5 year HIV-EI children enrolled in school/anganwadi; this could help as a screening criterion in the routine school health programs to choose the child to test for HIV infection to identify the hidden HIV-EI children in the community. On the other hand, the presence of the (fat-soluble) vitamin A deficiency signs/symptoms were significantly associated with the inadequate MUACFA, the higher frequency of acute morbidities and the HIV infection in the child. As such, the vitamin/mineral deficiencies in the child retarded the growth and development and facilitated morbidity among the children.

The non-initiation of CPT was significantly associated with the HIV infection among the HIV-exposed children; but this could rather be deemed as an early sign of adherence or defection of the family to the HIV-related CST services, as the co-trimoxazole did not have any demonstrated anti-retroviral action.

Thus, among the HIV-exposed children, LBW was significantly associated with the inadequate WFA and MUACFA; living without mother's care was significantly associated with the higher presence of acute morbidity (ever-breastfed children); vitamin/mineral deficiency with the higher presence of acute morbidity (all children), higher chance of the inadequate MUACFA status (male children) and HIV infection (3-5 year children enrolled in school/ anganwadi); the higher indicated number of deficient vitamins/minerals with the higher chance for inadequate HCFA; the persistence of the deficiencies with the higher frequency of acute morbidities; the presence of the vitamin A deficiency signs/symptoms with the inadequate MUACFA, higher frequency of acute morbidities and the HIV infection in the child. As such, the LBW, lack of mother's care and vitamin/mineral deficiencies were associated with the inadequate growth and development and acute morbidities in the children; the MUACFA seem to be a better indicator of nutrition-related ill-health in the child.

Policy implications: Hence, the existing health care system:

- need to ensure that the antenatal steps to prevent LBW (as per protocols) were rolled out for HIV-infected mothers,
- need to include the element of 'need for parental care for the health of the children' during counseling of the HIV-infected mothers (to reduce the chance of child's separation from the mother),
- need to improve the vitamin A supplementation to the children through the primary health care system and school health programs,
- need to undertake regular health and nutrition screening of all the HIV-exposed children and offer care for those in need as described in chapter 6, section 2.3.3,
- need to note and take appropriate action upon the possibility of the vitamin/nutrient deficiency in the food prepared at home, if any, by providing nutrition/food preparation training for the mothers, and/or fortified food and/or supplementary food and/or vitamins/mineral medications to both (as both the mother and child presented with similar deficient vitamins (B, C, E, D and A) and minerals (iron)), and,
- could undertake the HIV testing of the (3-5 year) children having vitamin/mineral deficiencies during the anganwadi/school health programs (to detect the hidden CLHIV in the community),

6.2.3.5. Household/family level situations/factors.

Majority for the children were from the underprivileged castes of Hindu religion and poor socio-economic status, born to uneducated parents, and lacked safe water, food, sanitation and hygiene in their households. The food security was compromised in about one-in-eight households, and only about two-fifths of 36-59 month children were utilizing the nutritional support available from the school/anganwadi regularly. Among the HIV-exposed children, those belonging to the underprivileged castes (SC/ST/OBC) had a significantly higher chance for inadequate HFA and HCFA and presence of acute morbidity; those in the joint or three-generation families had a significantly higher chance of presence of acute morbidity; those in the nuclear families had significantly higher

frequencies of acute morbidity. The children of uneducated (non-schooled) father (unlike the routine results of health research, where the education of the mother was inferred as important) had significantly higher risk for inadequate HFA and WFA, while the children living in the poorly-built (non-electrified or kuccha or semi-pukka) houses had a significantly higher risk for inadequate HCFA; both these could represent the poor socio-economic status of the family. The lack of safe drinking water in the households tend to significantly predispose to the higher frequency of the acute morbidities in the children, while the lack of safe sanitation significantly predisposed to inadequate WFA among the anaemic children. The presence of a socio-economic crisis in the family tends to increase the presence of acute morbidities among the children significantly. However, there were no significant family or household factors found to be associated with anaemia, inadequate MUACFA, and HIV infection among the children.

Policy implications: The existing:

- health care system needs to involve and convince the (uneducated) father, and try to identify the presence of a socio-economic crisis in the family (if any), during counseling sessions or otherwise, to improve the health and nutrition status of the child; and,
- welfare services need to cover the existing deficiencies of safe water and sanitation, and the government need to continue to put in efforts to improve the socio-economic status of the underprivileged HIV affected families.

6.2.4. Interlinked growth and development, nutrition and morbidity outcomes, and HIV infection among the HIV-exposed children.

The core inter-relationships between the ill-health outcomes in this study is given in figure 83. Among the HIV-exposed children, the presence of anaemia was significantly associated with the inadequate HFA and WFA status and the presence of morbidity (all children), and the inadequate HCFA status (vitamin/mineral deficient children and the children >15 months of age). Among the anaemic children, moderate or severe anaemia was associated with inadequate HFA and HCFA. These inter-relationships between the growth and

development (anthropometry) and morbidity factors tend to be mediated through the haemoglobin status of the HIV-exposed children; the anthropometric effects (on HFA, WFA, and HCFA) on one side, and the facilitation of acute morbidity on the other. On the other hand, the HIV infection was associated with the inadequate MUACFA and the higher frequency of acute morbidity among the HIV-exposed children, and with the anaemia among the children of alive mothers. Most (97.6%) of the children in this study had the mothers alive, and hence the association of the HIV infection with anaemia among the children could be held the same for all the HIV-exposed children. As such, all the ill-health indicators were interlinked; however, the HIV infection was directly associated only with anaemia, frequency of acute morbidity, and inadequate MUACFA status.

Policy implication: The systems of offering care and support to the HIV-exposed children need to be integrated to offer combined adequate services to address all the ill-health indicators in its totality, dimensions, and inter-relations. Also, the health care system needs to consider and offer services to the HIV-exposed children, and not only to the smaller group of CLHIV.

6.2.5. Deaths and its causes.

As there were only a very few child deaths (0.9%) during the course of the study, the verbal autopsies were conducted for the 0-59 month child deaths (HIV-EI=6, HIV-EU=23, HIV-E?=39; neonatal deaths=23, post-neonatal infant deaths=31, post-infancy deaths=14; total=68) that happened between 01 January 2011 and 30 November 2017. A bulk (59.0%) of the HIV-E? child deaths were those happening in the 0-41 days of age (before the first HIV test schedule for the EID on 42 days). Majority of the dead children belonged to an underprivileged caste of the Hindu religion, BPL status, and families with illiterate or less-educated father, or in which the people other than the mothers took decisions on the health care needs. Nearly equal shares of the child deaths were found in nuclear and joint/three-generation families, and among those with mothers of age less than and more than 25 years. One-third of the parents of the dead children had a consanguineous marriage, and about one-tenth of the dead children had a sibling death before in the family. Majority of the dead

children lived in the households from where the health care was accessible within 30 minutes, mostly by utilizing public transport. One-third of the dead children were born as the first child, half as the second or the third child, and the remaining were born in the 4+ order. One-fifth of the dead children were born premature, and about half of them were not immunized for age at death. More than half of the children died at home (despite the majority having health care access), and another one-third at an HCF and the mean age at death was 228.8 days. Compared to those among the male children, the female child deaths were higher in the neonatal age and lesser in the post-infancy; the female children had shorter life (mean age of death: male=302.1, female=155.4 days) and mostly died at home.

The common causes of death (immediate/most probable reasons=127, associated/ facilitating factors=100) is given in table 69. The most common causes of deaths were the ADD, ARI and birth asphyxia, in the common background of malnutrition and LBW; these differed mostly by age, but not much by gender and HIV status. Around 43% of the reasons were infective, and another 15% of deaths were preventable in the field. Considering the types and patterns of acute morbidity and reasons for death, with the increase in the age, there was a tendency for the ADD to be increasingly fatal, despite its decreasing prevalence; and the TB emerged as an important opportunistic infection and killer among the HIV-EI children.

Policy implications:

- Primordial, primary and secondary levels of prevention (health promotion, specific protection, and early diagnosis and treatment) could be undertaken by the health care and other social welfare systems to prevent about 58% of the deaths happening among the HIV-exposed children.
- Higher incidence of neonatal deaths with a higher share of ‘other preventable reasons’ among the female children needs to be explored further to ascertain the possibility of female infanticide.
- Given the higher HIV-untested child deaths, rescheduling the first test using cord blood sample at birth could be considered by the NACP, but purely for academic and research interests.

Table 69. Common causes of death among HIV-exposed children.

Cause of death	HIV-EI	HIV-EU	HIV-E?	Male	Female	Neonatal	Post-neonatal	Post-infancy	Total
Most probable/immediate reasons									
ADD	√	√	√	√			√	√	√
ARI	√	√	√	√	√		√		√
Birth asphyxia		√	√		√	√			√
Septicemia	√	√			√	√			
Child neglect	√	√		√				√	
Other infections, fevers		√						√	
Other preventable reasons/accidents			√		√		√		
Meconium aspiration						√			
Surgical abdomen, post-surgery complications, drug-induced hepatitis	√								
TB	√								
Associated/facilitating factors									
Malnutrition									√
LBW, premature child									√
Congenital disorders									√
Skin/mucosa diseases/conditions									√

6.3. Conclusion.

The ill-health (inadequate WFA and HFA for age, anaemia, and acute morbidity) was prevalent among ≥50% of HIV-exposed children, most of which was mediated by and through the anaemia in them, without much age and gender differential. Most of the ill-health (morbidity, vitamin deficiency, anaemia, and underweight) in the children could be linked to the mothers'. The HIV infection in the children could directly be linked only to a

smaller subset of ill-health (inadequate MUACFA status, higher frequency of acute morbidities, and presence of vitamin deficiency signs) indices. Moreover, more than 50% of the deaths among these children were preventable. Hence, it was important to consider the HIV exposure as the backbone (instead of HIV infection), and plan and execute integrated health and nutritional screening programs, adopting the mother-child pair as a unit for delivery of services. The task would be to break the 'anaemia-inadequate growth and development' and 'anaemia-acute morbidity' synergy, with focused interventions to reduce the anaemia. The interventions need to focus on enhancing the nutritional status, strengthening the existing health care systems (by widening the scope of services, increasing the target population by adopting a conceptual shift from the 'HIV infection' to 'HIV exposure', and improving inclusion), and community level activities (to improve parenting).

6.4. Strengths of the study.

The real magnitude of the ill-health due to the maternal HIV exposure among the children was often underestimated because it depended on the health care system (program data) reports of those who have sought health care. This had inherent issues related to the coverage of services and inclusion, 'linkage loss' (chapter 1, section 5.4) and retaining limited information only on mainstreamed activities and on HIV-infected people. Even though limited additional information (of the HIV tests and infection) on the children was available (from the EID reports), this was available only till the age of 18 months of age. This research study had undertaken steps to overcome these deficiencies by piggy-backing on the co-existing ICMR pediatric HIV study, whose line list on HIV-exposed children were drawn from all the government and private HCFs (with an HIV testing facility) in the whole Belgaum district. As such, this research study included all the known (included in program data and reports) and the hidden (not included in the program data, but identified during the parent ICMR study) HIV-exposed children from a sequential sample accrued between 2011 and 2017, and hence the study background was near-similar to the real-world scenario. Both the orphan and non-orphan children were included in the study.

This community-based cohort study had identified the unique HIV-infected mother-HIV-exposed child pairs and had followed them up through a calendar of 29 months, enabling multiple assessments, and hence, the capture of changes in the health/ill-health status. This had minimized duplications, and hence, over-reporting of the results was avoided; additionally, it included the children unlinked to the HCFs. By adopting the unit of mother-child pair, it had helped to cover the major source of the HIV infection among the children (MTCT) and hence most of the CLHIV and HIV-EU children; this also helped to link the maternal and pregnancy-related information to the health and nutrition status of the HIV-exposed child. This also would be of help to plan systematic service delivery, if any, planned in the future.

In addition to including the mothers and children, all the patterns and key associated factors of the inter-related outcomes of growth and development, nutrition, morbidity, mortality, and HIV infection were considered in this single study design, rather than studying them in isolation. All the outcome variables were considered as covariates for the rest of the outcome variables during the analysis. This had helped to portray a more 'totalistic' view of a real-time real-life scenario of the health and nutrition status among the HIV-exposed children, and its inter-linkages.

The composite indicator of sickness among the mothers adopted in this study seems to be promising to identify and prioritize the people in need. However, more research is indicated for the customization and standardization of the criteria used in the same, elsewhere.

The quality of the data and database had been ensured with multiple layers of checking and cross-checking (chapter 2, section 3.6).

The study had come up with simple ready-reckoners (bar charts on the patterns of ill-health, figures 78-83; and matrix of associated factors, tables 48, 67 and 68) of the results, which could be easily interpreted and used by the non-technical field-level health workers in the community for the easy identification and prediction of the chance for ill-health among the HIV-exposed children.

6.5. Limitations of the study.

However, the study also has its limitations. Even though this was a community-based cohort study, the lead data on the index pregnant HIV positive mothers came from the HCFs. A community-based search for the children of HIV-infected mothers was not undertaken for their inclusion. As such, there could be HIV-exposed children of the HIV untested mothers in the community, who were not included in the study. However, drawing the study sample from a line list of HIV-infected mothers spread for more than 5 years (2011-2017), when >95% of maternal HIV testing happened during pregnancy, could have minimized the chance for this exclusion.

The factors of chronic morbidity, vitamin deficiency and mortality, which were originally proposed to be included as outcomes in this study, could not be completed satisfactorily as only fewer numbers of events happened in the cohort during the study period. However, these were included as covariates for the other outcome indicators explored in this study. Also, a compensatory methodology was adopted to characterize the deaths among the HIV-exposed children and analyze the causes of death.

The study had happened during a period which harboured changes in the various protocols related to the HIV prophylaxis and treatment in the country (chapter 1, section 3; chapter 2, section 3.2; annexure 7, sl. No. l). As such, there were some extramural limitations for the study.

Even though superimposing this research study on an existing ICMR study had fetched many advantages, it has also resulted in some limitations. For example, those who had not consented for the ICMR study were also not included in this research study. As such, there could be some HIV-exposed children missed from inclusion in this study, but minimal.

The major reason for non-recruitment in this study had been identified, analyzed, and presented in tables 12 and 13. The reasons were mostly permanent (permanent migration, death, and refusal), and the representativeness of the sample included in the study worked

out to be 88.0% for the eligible households and 80.7% for the eligible children. Thus, there was the exclusion of eligible participants to the tune of 19%, but for valid reasons. Non-inclusion in the outcome analysis after the recruitment (annexure 9) was present, but <1%.

Also, the social issues of migration, re-marriage of the mothers, etc., and health-care seeking behaviour (chapter 5, box 6; convenience testing, convenience immunization, etc.) could have influenced the results.

The study had not attempted to elicit and analyze the dietary information of the children >24 months of age. As such, inference on the contribution of the quality and quantity of child foods/feeds to the outcome indicators were made only for the 6-<24-month children.

The number of the HIV-EI children included in the study were small; hence the comparison of the sub-groups (by age and gender) within this group and that with the HIV-EU group of children was limited.

This study design has not provided for a comparison of the ill-health status between the HIV-exposed and HIV unexposed children.

No information was available for a ‘no-death’ control group to do a factor analysis to find the predictors of mortality; hence only characterization and cause of death analysis done in this study. Also, this study had come across more number of the HIV-E? child deaths; as such, it was not possible to deduce the factors and causes associated with mortality, among the HIV-EI and HIV-EU children satisfactorily.

LIST OF TABLES

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LIST OF ABBREVIATIONS USED

ABT	Antibody Test
ADD	Acute Diarrhoeal Diseases
AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal Care
APL	Above Poverty Line
ARI	Acute Respiratory Infections
ART	Anti-Retroviral Treatment
ARV	Anti-Retro Viral prophylaxis
BLR	Binomial Logistic Regression
BMI	Body Mass Index
BPL	Below Poverty Line
CDC	Centers for Disease Control and Prevention
CLHIV	Children Living with HIV/AIDS
CPT	Co-trimoxazole Prophylactic Therapy
CST	Care, Support and Treatment (program)
DAPCU	District AIDS Prevention Control Unit (Belgaum)
DBS	Dried Blood Spot
DNA	Deoxy-ribo Nucleic Acid
DOI	Digital Object Identifier
EID	Early Infant Diagnosis (protocol)
FSW	Female Sex Workers
FUO	Fever of Unknown Origin
g/dl	grams per decilitre
HAART	Highly Active Anti-Retroviral Therapy
HAZ	Height for age z-score
Hb	Haemoglobin
HC	Head circumference

HCAZ	Head circumference for age z-score
HCFA	Head circumference for age
HCFs	Health Care Facilities
HFA	Height for age
HHs	Households
HIV	Human Immunodeficiency Virus
HIV-E?	HIV-exposed-but-infection status not known
HIV-EI	HIV-exposed and infected
HIV-EU	HIV-exposed-but-uninfected
HRGs	High-Risk Groups
HSS	HIV Sentinel Surveillance
ICMR	Indian Council of Medical Research
ICTC	Integrated Counselling and Testing Centre
ID	Identity (number)
IDU	Injection Drug Users
IEC	Information, Education and Communication
IFA	Iron and Folic Acid (tablets)
JNU	Jawaharlal Nehru University
KHPT	Karnataka Health Promotion Trust, Bangalore
KSAPS	Karnataka State AIDS Prevention Society
LBW	Low Birth Weight
LEST	Language Evaluation Scale Trivandrum
LFU	Lost to Follow-Up
MCAZ	Mid upper arm circumference for age z-score
MMWR	Morbidity and Mortality Weekly Report
MSM	Men who have Sex with Men
MTCT	Mother-To-Child Transmission
MUAC	Mid upper arm circumference
MUACFA	Mid upper arm circumference for age

NACO	National AIDS Control Organization
NACP	National AIDS Control Program
NFHS	National Family Health Survey
NVP	Nevirapine
OBC	Other Backward Caste
OR	Odds Ratio
PCR	Polymerase Chain Reaction
Ph.D.	Doctor of Philosophy
PLHIV	People Living with HIV/AIDS
PMTCT	Prevention of Mother-To-Child Transmission
PPTCT	Prevention of Parent-To-Child Transmission
RDA	Recommended Dietary Allowance
SC	Scheduled Caste
SD	Standard Deviation
sdNVP	Single Dose Nevirapine
SJRI	St. John's Research Institute, Bangalore
ST	Scheduled Tribe
STI	Sexually Transmitted Illnesses
TB	Tuberculosis
TDSC	Trivandrum Development Screening Chart
TI	Targeted Intervention (project)
TT	Tetanus Toxoid
UNAIDS	Joint United Nations Programme on HIV/AIDS
VSA	Verbal and Social Autopsy
WAZ	Weight for age z-score
WFA	Weight for age
WHO	World Health Organization
wrt	with respect to
<	Less than

≤	Equal to or less than
>	More than
≥	Equal to or more than

REFERENCES

1 Zhu T, Korber BT, Nahmias AJ, Hooper E, Sharp PM, Ho DD. An African HIV-1 sequence from 1959 and implications for the origin of the epidemic [letter]. *Nature* 1998;*391*:594–7. Available from: *ftp://statgen.ncsu.edu/pub/thorne/viralreadings/zhu.pdf*, accessed on January 4, 2019.

2 Centers for Disease Control and Prevention (CDC). Pneumocystis pneumonia – Los Angeles. *MMWR Morb Mortal Wkly Rep* 1981;*30*:250-2. Available from: *https://stacks.cdc.gov/view/cdc/50022*, accessed on January 4, 2019.

3 Centers for Disease Control and Prevention (CDC). Kaposi's sarcoma and pneumocystis pneumonia among homosexual men – News York city and California. *MMWR Morb Mortal Wkly Rep* 1981;*30*:305-8. Available from: *https://history.nih.gov/nihinownwords/assets/media/pdf/publications/MMWRJuly31981.pdf*, accessed on January 4, 2019.

4 Gottlieb MS, Schroff R, Schanker HM, Weisman JD, Fan PT, Wolf RA, *et al.* Pneumocystis carinii pneumonia and mucosal candidiasis in previously healthy homosexual men: evidence of a new acquired cellular immunodeficiency [Abstract]. *N Engl J Med* 1981;*305*:1425-31. Available from: *https://www.nejm.org/doi/full/10.1056/NEJM198112103052401*, accessed on January 4, 2019.

5 Centro Operativo AIDS (COA). Italian data about HIV infection and AIDS cases, 1982-2010 [Supplement printed in English prepared for the 6th IAS conference, Rome 2011]. National AIDS Unit, Department of Infectious, Parasitic and Immune-mediated Diseases, Istituto Superiore di Sanità, Rome. *Not Ist Super Sanità* 2011;*24*(5 Suppl 1):i-iv. Available from: *https://www.epicentro.iss.it/aids/pdf/Coa2011_INSERTO.pdf*, accessed on January 4, 2019.

6 Abadía-Barrero CE. The cultural politics of the Brazilian AIDS social movement: A local and global revolution [Document prepared for the meeting]. Pittsburgh (PA): University of Pittsburgh, Latin American Studies Association. *Proceedings of the meeting on March 27–29, 2003, Dallas, Texas.* p. 3. Available from: *http://lasa.international.pitt.edu/Lasa2003/AbadiaCesar.pdf*, accessed on September 13, 2018.

7 Public Health Agency of Canada (PHAC) [Archived page on the Internet]. At a glance-HIV and AIDS in Canada: surveillance report to December 31, 2012. Ottawa, Ontario: PHAC, Government of Canada [updated November 29, 2013]. Available from: *https://www.canada.ca/en/public-health/services/hiv-aids/publications/at-glance-hiv-aids-canada-surveillance-report-december-31-2012.html*, accessed January 4, 2019.

8 Solomon PJ, Wilson SR. Accommodating change due to treatment in the method of back projection for estimating HIV infection incidence. *Biometrics* 1990;*46*:1165-70. Available from: *https://www.jstor.org/stable/2532456*, accessed on January 4, 2019.

9 del Rio C, Sepúlveda J. AIDS in Mexico: lessons learned and implications for developing countries. *AIDS* 2002;*16*:1445–57. Available from: *http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.500.8753&rep=rep1&type=pdf*, accessed on January 4, 2019.

10 Jia Z, Wang L, Chen RY, Li D, Wang L, Qin Q *et al*. Tracking the evolution of HIV/AIDS in China from 1989–2009 to inform future prevention and control efforts. *PLoS One* 2011;*6*:e25671. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3187780/pdf/pone.0025671.pdf*, accessed on January 4, 2019.

11 National AIDS Control Organization (NACO). Guidelines on HIV testing. Ministry of Health and Family Welfare, Government of India; 2007 March. p. 1. Available from: *https://www.who.int/hiv/pub/guidelines/india_art.pdf*, accessed on January 4, 2019.

12 Lakhashe S, Thakar M, Godbole S, Tripathy S, Paranjape R. HIV infection in India: epidemiology, molecular epidemiology and pathogenesis. *J Biosci* 2008;*33:*515-25. Available from: *https://www.ias.ac.in/article/fulltext/jbsc/033/04/0515-0525*, accessed on January 4, 2019.

13 Karnataka State AIDS Prevention Society (KSAPS) [Website on the Internet]. About-Karnataka State AIDS Prevention Society. Bengaluru: Department of Health and Family Welfare, Government of Karnataka; ©2015. Available from: *https://ksaps.gov.in/about.html*, accessed on January 4, 2019.

14 Karnataka State AIDS Prevention Society (KSAPS). Annual action plan 2011-2012. Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/annual_actionplan2011_12.pdf*, accessed on April 1, 2014.

15 Mann J. Control Strategies. *AIDS Action* 1987;*(1)*:4-5. Available from: *https://aidsaction.net/pdf/aa01.pdf*, accessed on January 4, 2019.

16 Patel P, Borkowf CB, Brooks JT, Lasry A, Lansky A, Mermin J. Estimating per-act HIV transmission risk: a systematic review. *AIDS* 2014;*28*:1509-19. DOI:10.1097/QAD.0000000000000298. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6195215/pdf/nihms867478.pdf*, accessed on January 4, 2019.

17 Murray W (Science and Technology Division). Heterosexual AIDS. Library of Parliament, Parliamentary Research Branch, Government of Canada; 1996 March. p. 1-2. Catalogue No. YM32-2/411-1996E-PDF. Background Paper No. BP-411E. Available from: *http://publications.gc.ca/collections/collection_2008/lop-bdp/bp/bp411-e.pdf*, accessed on January 4, 2019.

18 National Institute of Health and Family Welfare (NIHFW), National AIDS Control Organization (NACO). Annual HIV sentinel surveillance report 2008-09. Government of India; ©2011. Available from: *http://naco.gov.in/sites/default/files/HIV%20Sentinel%20Surveillance%20India%20Country%20Report%2C%202008-09.pdf*, accessed on January 4, 2019. p. iii.

19 Joint United Nations Programme on HIV/AIDS (UNAIDS). Global Report-UNAIDS report on the global AIDS epidemic 2013. Publication No. UNAIDS/JC2502/1/E; 2013 November. ISBN: 978-92-9253-032-7. NLM classification: WC 503.6. Available from: *http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/UNAIDS_GlobalReport_2013_en.pdf*, accessed December 15, 2013.

20 National AIDS Control Organization (NACO), National Institute of Medical Statistics (NIMS). India HIV estimations-2015 [Technical Report]. Ministry of Health and Family Welfare, Government of India. Available from: *http://naco.gov.in/sites/default/files/India%20HIV%20Estimations%202015.pdf*, accessed January 4, 2019.

21 National AIDS Control Organization (NACO). Annual report 2016-17. Ministry of Health and Family Welfare, Government of India. Available from: *http://www.naco.gov.in/sites/default/files/NACO%20ANNUAL%20REPORT%202016-17.pdf*, accessed January 4, 2019.

22 World Health Organisation (WHO). Taking stock-HIV in children. ©WHO 2006. Available from: *https://www.who.int/hiv/toronto2006/Children2_eng.pdf*, accessed on January 4, 2019. p. 2.

23 Oxtoby MJ. Vertically acquired HIV infection in the United States. In: Pizzo PA, Wilfert CM, editors. *Pediatric AIDS: The challenge of HIV infection in infants, children, and adolescents*, 2nd edition. Baltimore: Williams and Wilkins; 1994. p. 3-20.

24 National AIDS Control Organization (NACO). Towards HIV-free newborn. National guidelines for Prevention of Parent-to-Child Transmission (PPTCT) of HIV. Ministry of Health and Family Welfare, Government of India.

25 Potty RS, Sinha A, Sethumadhavan R, Isac S, Washington R. Incidence, prevalence and associated factors of mother-to-child transmission of HIV, among children exposed to maternal HIV, in Belgaum district, Karnataka, India. *BMC Public Health* 2019;*19*. [Online, open access, 10 pages]. Available from: *https://link.springer.com/content/pdf/10.1186%2Fs12889-019-6707-3.pdf*, accessed on June 4, 2019.

26 Indian Council of Medical Research (ICMR). Estimating the burden of pediatric HIV in a 'A' category district in India: Cohort study of children (0-14 years) exposed to maternal HIV (Phase II). Report of research study. New Delhi; 2018. p. xiii.

27 Shahmanesh M, Shahmanesh M, Miller, R. AIDS and globalisation. *Sex Transmit Infect* 2000;*76*:154-5. DOI: 10.1136/sti.76.3.154. Available from: *https://sti.bmj.com/content/sextrans/76/3/154.full.pdf*, accessed on March 11, 2019.

28 Mertens TE, Low-Beer D. HIV and AIDS: where is the epidemic going? *B World Health Organ* 1996;*74*:121-9. Available from: *https://apps.who.int/iris/bitstream/handle/10665/53890/bulletin_1996_74%282%29_121-129.pdf?sequence=1&isAllowed=y*, accessed on January 4, 2019.

29 National AIDS Control Organization (NACO) [Website on the Internet]. National AIDS Control Program IV. New Delhi: Ministry of Health and Family Welfare, Government of India. Updated October 26, 2016. Available from: *http://naco.gov.in/nacp*, accessed on March 15, 2019.

30 National AIDS Control Organization (NACO). DBS sample collection for Early Infant Diagnosis (EID) by PCR. Ministry of Health and Family Welfare, Government of India. Available from: *http://www.naco.gov.in/sites/default/files/DBS_Sample_Collection_for_EID_Module_Read_Only.pdf*, accessed on March 15, 2019.

31 Directorate of Health and Family Welfare Services (DoHFW). Annual Report 2014-15. Government of Karnataka. p. 8-11. Available from: *https://www.karnataka.gov.in/hfwsecretariat/Annual%20Report/Annual%20Report%202014-15%20English.pdf*, accessed on March 15, 2019.

32 Directorate of Health and Family Welfare Services (DoHFW). Annual Report 2015-16. Government of Karnataka. p. 7-10. Available from: *https://www.karnataka.gov.in/hfw/kannada/Documents/Annual%20Report%20of%20HFWS%20-2015-16-English%20.pdf*, accessed on March 15, 2019.

33 Directorate of Health and Family Welfare Services (DoHFW). Annual Report 2016-17. Government of Karnataka. p. 9-13. Available from: *https://www.karnataka.gov.in/hfw/kannada/Documents/English%20Annual%20Report%20of%202016-17.pdf*, accessed on March 15, 2019.

34 Directorate of Health and Family Welfare Services (DoHFW). Annual Report 2017-18. Government of Karnataka. p. 15-20. Available from: *https://www.karnataka.gov.in/hfw/kannada/Documents/English%20annual%20report%202017-18.pdf*, accessed on March 15, 2019.

35 District AIDS Prevention and Control Unit (DAPCU), Belgaum. Monthly report. Government of Karnataka; 2018 June.

36 Karnataka Health Promotion Trust (KHPT) [Website on the Internet]. How it all began. Bangalore. Available from: *http://www.khpt.org/about/our-story/history/*, accessed on March 15, 2019.

37 The World Bank. Data. [database on the Internet]. Washington DC: World Bank Group © 2019. Available from: *https://data.worldbank.org/indicator*, accessed on February 13, 2019.

38 DataGov.in, Open Government Data Platform India [database on the Internet]. New Delhi: National Informatics Centre, Government of India © 2012-2015. Available at: *https://data.gov.in/resources*, accessed on February 17, 2019.

39 AIDSinfo [database on the Internet]. UNAIDS, 2018. Available from: *aidsinfo.unaids.org*, accessed on August 12, 2018.

40 Brown T, Bao L, Raftery AE, Salomon JA, Baggaley RF, Stover J, *et al*. Modelling HIV epidemics in the antiretroviral era: the UNAIDS Estimation and Projection package 2009. *Sex Transmit Infect* 2010;*86*(Suppl 2):ii3-10. DOI:10.1136/sti.2010.044784. Available from: *https://sti.bmj.com/content/sextrans/86/Suppl_2/ii3.full.pdf*, accessed on March 13, 2019.

41 National Institute of Medical Statistics (NIMS), National AIDS Control Organization (NACO). India HIV estimates-2012 [Technical Report]. Ministry of Health and Family Welfare, Government of India. Available from: *http://naco.gov.in/sites/default/files/Technical%20Report%20-%20India%20HIV%20Estimates%202012%281%29.pdf*, accessed on January 4, 2019.

42 National AIDS Control Organization (NACO). Sankalak. Status of National AIDS response. Ministry of Health and Family Welfare, Government of India; 2017 December. Available from: *http://naco.gov.in/sites/default/files/Sankalak-Final_20_12_2017.pdf*, accessed on January 4, 2019.

43 National AIDS Control Organization (NACO). State Epidemiological Fact Sheets, Volume II. West and South regions. Ministry of Health and Family Welfare, Government of India; 2017 September. Available from: *http://naco.gov.in/sites/default/files/Western%20Region%20-%20Vol%202%20revised.pdf*, accessed on January 4, 2019.

44 Schneider E, Whitmore S, Glynn MK, Dominguez K, Mitsch A, McKenna MT. Revised surveillance case definitions for HIV infections among adults, adolescents and children aged <18 months, and for HIV infection and AIDS among children aged

18 months to <13 years - United States, 2008. *MMWR Morb Mortal Wkly Rep* 2008;*57*(RR10);1-8. [Online]. Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention, Centers for Disease Control and Prevention. Available from: *https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5710a1.htm*, accessed on March 13, 2019.

45 World Health Organisation (WHO). Guidelines of Co-trimoxazole prophylaxis for HIV-related infections among children, adolescents and adults in resource-limited settings, Recommendations for a public health approach. HIV/AIDS programme, Strengthening health services to fight HIV/AIDS. © World Health Organization; 2006. p. 5. [footnote]. Available from: *https://www.who.int/hiv/pub/guidelines/WHO%20CTX.pdf*, accessed on March 13, 2019.

46 Richter L. An introduction to family-centred services for children affected by HIV and AIDS. *J Int AIDS Soc* 2010;*13*(Suppl 2):S1. Available from: *https://jiasociety.biomedcentral.com/articles/10.1186/1758-2652-13-S2-S1*, accessed on March 13, 2019.

47 Karnataka State AIDS Prevention Society (KSAPS). Annual report for the year 2006-2007. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/Annual%20Report%2006%20-%2007.pdf*, accessed on March 13, 2019.

48 Karnataka State AIDS Prevention Society (KSAPS). Annual report 2007-2008. Ministry of Health and Family Welfare, Government of Karnataka; 2008 May. Available from: *https://ksaps.gov.in/pdfs/Annual%20Report-07-08.pdf*, accessed on March 13, 2019.

49 Karnataka State AIDS Prevention Society (KSAPS). Annual report 2008-2009. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/Annual%20Report-08-09.pdf***,** accessed on March 13, 2019.

50 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2007-2008. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka7-8.pdf***,** accessed on March 13, 2019.

51 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2008-2009. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka8-9.pdf*, accessed on March 13, 2019.

52 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2009-2010. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka9-10.pdf*, accessed on March 13, 2019.

53 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2010-2011. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka10-11.pdf*, accessed on March 13, 2019.

54 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2011-2012. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka11-12.pdf*, accessed on March 13, 2019.

55 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2012-2013. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20data%20Karnataka12-13.pdf*, accessed on March 13, 2019.

56 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2013-2014. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20Positive%20Case%20-%20April%202013%20-%20March%202014.docx*, accessed on March 13, 2019.

57 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2014-2015. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20Positive%20Case%20-%20April%202014%20-%20March%202015.docx*, accessed on March 13, 2019.

58 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2015-2016. Ministry of Health and Family Welfare, Government of Karnataka.

Available from: *https://ksaps.gov.in/pdfs/HIV%20Positive%20Case%20-%20April%202015%20-%20March%202016.docx*, accessed on March 13, 2019.

59 Karnataka State AIDS Prevention Society (KSAPS). HIV data Karnataka for the year 2016-2017. Ministry of Health and Family Welfare, Government of Karnataka. Available from: *https://ksaps.gov.in/pdfs/HIV%20Positive%20Case%20-%20April%202016%20-%20March%202017.docx*, accessed on March 13, 2019.

60 National AIDS Control Organization (NACO). HIV Sentinel Surveillance 2016-17. Technical Brief. Ministry of Health and Family Welfare, Government of India; 2017 December. No. GoI/NACO/MES/HSS 2016-17/011217. Available from: *http://naco.gov.in/sites/default/files/HIV%20SENTINEL%20SURVEILLANCE06_12_2017_0.pdf*, accessed on March 13, 2019. p. 71.

61 Indian Council of Medical Research (ICMR). Estimating the burden of pediatric HIV in a 'A' category district in India. Report of the ICMR task force research study. New Delhi; 2016.

62 Ghys PD, Williams BG, Over M, Hallett TB, Godfrey-Faussett P. Epidemiological metrics and benchmarks for a transition in the HIV epidemic. *PLoS Medicine* 2018;*15*:e1002678. DOI:10.1371/journal.pmed.1002678. Available from: *https://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.1002678&type=printable*, accessed on March 13, 2019.

63 Kimani-Murage EW, Norris SA, Pettifor JM, Tollman SM, Klipstein-Grobusch K, Gómez-Olivé XF, *et al*. Nutritional status and HIV in rural South African children. *BMC Pediatrics* 2011;*11*. [Online, open access, 13 pages]. DOI: 10.1186/1471-2431-11-23. Available from: *https://bmcpediatr.biomedcentral.com/track/pdf/10.1186/1471-2431-11-23*, accessed on August 19, 2018.

64 McHugh G, Rylance J, Mujuru H, Nathoo K, Chonzi P, Dauya E, *et al*. Chronic morbidity among older children and adolescents at diagnosis of HIV infection. *J Acquir Immune Defic Syndr* 2016;*73*:275-81. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5065928/pdf/qai-73-275.pdf*, accessed on August 19, 2018.

65 Berhane R, Bagenda D, Marum L, Aceng E, Ndugwa C, Bosch RJ, *et al*. Growth failure as a prognostic indicator of mortality in pediatric HIV infection. *Pediatrics* 1997;*100*. [Electronic article]. © 1997 American Academy of Pediatrics. Available from: *http://pediatrics.aappublications.org/content/pediatrics/100/1/e7.full.pdf*, accessed on August 19, 2018.

66 Souza DT, Rondó PHC, Reis LC. The nutritional status of children and adolescents with HIV/AIDS on antiretroviral therapy. *J Trop Pediatr* 2011;*57*:65-8. DOI: 10.1093/tropej/fmq035. Available [for download] from: *https://academic.oup.com/tropej/article/57/1/65/1723851*, accessed on August 19, 2018.

67 Sweta GK, Hemalatha R, Prasad UV, Murali V, Damayanti V, Bhaskar V. Health and nutritional status of HIV-infected children in Hyderabad, India. *Indian J Med Res* 2015;*141*:46-54. Available from: *http://www.ijmr.org.in/temp/IndianJMedRes141146-3269101_090451.pdf*, accessed on August 19, 2018.

68 Ambey R, Sahu S, Sharma A, Gupta R, Goyal B. Assessment of nutritional status of HIV positive children in ART centre a study from central India. *International Journal of Pediatric Research and Practice* 2015;*1*:7-11. Available from: *http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.909.1261&rep=rep1&type=pdf*, accessed on August 19, 2018.

69 Padmapriyadarsini C, Pooranagangadevi N, Chandrasekaran K, Subramanyan S, Thiruvalluvan C, Bhavani PK, *et al*. Prevalence of Underweight, Stunting, and Wasting among Children Infected with Human Immunodeficiency Virus in South India. *Int J Pediatr* 2009;*2009*. DOI: 10.1155/2009/837627. Available from: *http://www.hindawi.com/journals/ijpedi/2009/837627/*, accessed on August 19, 2018.

70 Shah SR, Tullu MS, Kamat, JR. Clinical profile of pediatric HIV infection from India. *Arch Med Res* 2005;*36*:24–31. DOI: 10.1016/j.arcmed.2004.09.002. Available from: *http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.600.1757&rep=rep1&type=pdf*, accessed on August 19, 2018.

71 Daga SR, Verma B, Gosavi DV. HIV infection in children: Indian experience. *Indian Pediatr* 1999;*36*:1250–53. [Online]. Available from: *https://www.indianpediatrics.net/dec-99/99-dec-7.htm*, accessed on August 19, 2018.

72 World Health Organisation (WHO). Nutrient requirement for people living with HIV/AIDS. Report of a technical consultation. ©WHO 2003. World Health Organization, Geneva. p. 4.

73 Rollins NC, van den Broeck J, Kindra G, Pent M, Kasambira T, Bennish ML. The effect of nutritional support on weight gain of HIV-infected children with prolonged diarrhoea [Abstract]. *Acta Paediatr* 2007;*96*;62-8. Available from: *https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1651-2227.2006.00013.x*, accessed on August 19, 2018.

74 Kapavarapu PK, Bari O, Perumpil M, Duggan C, Dinakar C, Krishnamurthy S, *et al*. Growth patterns and anaemia status of HIV-infected children living in an institutional facility in India. *Trop Med Int Health* 2012;*17*:962–71. DOI:10.1111/j.1365-3156.2012.03022.x. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3733082/pdf/nihms405723.pdf*, accessed on August 19, 2018.

75 Swaminathan S, Padmapriyadarsini C, Yoojin L, Sukumar B, Iliayas S, Karthipriya J, *et al.* Nutritional supplementation in HIV-infected individuals in south India: A prospective interventional study. *Clinic Infect Dis* 2010;*51*:51-7. Available [for download] from: *https://academic.oup.com/cid/article/51/1/ 51/298593*, accessed on August 19, 2018.

76 de Pee S, Semba RD. Role of nutrition in HIV infection: Review of evidence for more effective programming in resource-limited settings. *Food Nutr Bull* 2010;*31*:S313-43. © 2010, The United Nations University. Available from: *https://journals.sagepub.com/doi/pdf/10.1177/15648265100314S403*, accessed on August 19, 2018.

77 Arpadi SM. Growth failure in HIV-infected children. Consultation on Nutrition and HIV/AIDS in Africa: Evidence, lessons and recommendations for action. Durban, South Africa. Department of Nutrition for Health and Development, World Health Organization. © WHO 2005. Available from: *www.who.int/nutrition/topics/*

Paper%20Number%204%20-%20Growth%20failure.pdf, accessed on December 15, 2018.

78 Bailey RC, Kamenga MC, Nsuami MJ, Nieburg P, St Louis ME. Growth of children according to maternal and child HIV, immunological and disease characteristics: a prospective cohort study in Kinshasa, Democratic Republic of Congo. *Int J Epidemiol* 1999;*28*:532–40. Available from: *https://pdfs.semanticscholar.org/9df9/5017df028d93b268b68e38bd4b1a00a30d28.pdf*, accessed on December 15, 2018.

79 Patel D, Bland R, Coovadia H, Rollins N, Coutsoudis A, Newell, ML. Breastfeeding, HIV status and weights in South African children: A comparison of HIV-exposed and unexposed children. *AIDS* 2010;*24*:437–45. Available from: *https://pdfs.semanticscholar.org/4acd/c0a3caebfa0f983aa77048d8741b355db238.pdf*, accessed on December 15, 2018.

80 El Beitune P, Duarte G, Machado AA, Quintana SM, Figueiró-Filho, EA, Abduch R. Effect of antiretroviral drugs on maternal CD4 lymphocyte counts, HIV-1 RNA levels, and anthropometric parameters of their neonates. *Clinics* 2005;*60*:207-12. Available from: *http://www.scielo.br/pdf/clin/v60n3/24457.pdf*, accessed on August 19, 2018.

81 The European Collaborative Study. Height, weight, and growth in children born to mothers with HIV-1 infection in Europe. *Pediatrics* 2003;*111*:e52–60. Available from: *https://pediatrics.aappublications.org/content/pediatrics/111/1/ e52.full.pdf*, accessed on March 13, 2019.

82 Seth A, Malhotra RK, Gupta R, Chandra J, Kumar P, Singh S, *et al*. Effect of antiretroviral therapy on growth parameters of children with HIV infection [Abstract]. *Pediatr Infect Dis J* 2018;*37*:85-9. Available from: *https://journals.lww.com/pidj/Abstract/2018/01000/Effect_of_Antiretroviral_Therapy_on_Growth.13.aspx*, accessed on March 13, 2019.

83 Gillespie S, Greener R, Whiteside A, Whitworth J. Investigating the empirical evidence for understanding vulnerability and the associations between poverty, HIV infection and AIDS impact. *AIDS* 2007;*21*(Suppl 7):S1-4. ISSN 0269-9370. ©2007 Wolters Kluwer Health, Lippincott Williams & Wilkins. Available [for download]

from: *https://journals.lww.com/aidsonline/fulltext/2007/11007/Investigating_the_empirical_evidence_for.1.aspx#pdf-link*, accessed on March 13, 2019.

84 Kawo G, Karlsson K, Lyamuya E, Kalokola F, Fataki M, Kazimoto T, *et al*. Prevalence of HIV type 1 infection, associated clinical features and mortality among hospitalized children in Dar es Salaam, Tanzania [Abstract]. *Scand J Infect Dis* 2000;*32*:357-63. Available from: *https://www.ncbi.nlm.nih.gov/ pubmed/10959642*, accessed on March 13, 2019.

85 Fergusson P, Chinkhumba J, Grijalva-Eternod C, Bandat T, Mkangama C, Tomkins A. Nutritional recovery in HIV-infected and HIV-uninfected children with severe acute malnutrition. *Arch Dis Child* 2009;*94*:512-6. DOI:10.1136/adc.2008.142646. Available from: *https://www.researchgate.net/publication/23445321_Nutritional_recovery_in_HIV-infected_and_HIV-uninfected_children_with_severe_acute_malnutrition/link/0c96051d5aec72ecad000000/download*, accessed on March 13, 2019.

86 Bobat R. Coovadia H, Moodley D, Coutsoudis A, Gouws E. Growth in early childhood in a cohort of children born to HIV-1-infected women from Durban, South Africa [Abstract]. *Ann Trop Pediatr* 2001;*21*:203–10. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/11579858*, accessed on March 13, 2019.

87 Venkatesh KK, Lurie MN, Triche EW, de Bruyn G, Harwell JI, McGarvey ST, *et al.* Growth of infants born to HIV-infected women in South Africa according to maternal and infant characteristics. *Trop Med Int Health* 2010;*15*:1364-74. Available from: *https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1365-3156.2010.02634.x*, accessed on March 13, 2019.

88 Webb AL, Manji K, Fawzi WW, Villamor E. Time-independent maternal and infant factors and time-dependent infant morbidities including HIV infection, contribute to infant growth faltering during the first 2 years of life. *J Trop Pediatr* 2009;*55*:83-90. Available [for download] from: *https://academic.oup.com/tropej/article/55/2/83/1645431*, accessed on March 13, 2019.

89 Shaw GM, Harper ME, Hahn BH, Epstein LG, Gadjusek DC, Price RW *et al* [Abstract]. HTLVIII infection in brains of children and adults with AIDS

encephalopathy. *Science* 1985;*227*:177-82. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/2981429*, accessed on March 13, 2019.

90 Davis LE, Hjelle BL, Miller VE, Palmer DL, Llewellyn AL, Merlin TL, *et al* [Abstract]. Early viral brain invasion in iatrogenic human immunodeficiency virus infection. *Neurology* 1992;*42*:1736-39. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/1513462*, accessed on March 13, 2019.

91 Bisiacchi PS, Suppiej A, Laverda A. Neuropsychological evaluation of neurologically asymptomatic HIV-infected children [Abstract]. *Brain and Cognition* 2000;*43*:49-52. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/10857661*, accessed on March 13, 2019.

92 Nichols S, Mahoney EM, Sirois PA, Bordeaux JD, Stehbens JA, Loveland KA, *et al.* HIV-associated changes in adaptive, emotional, and behavioural functioning in children and adolescents with hemophilia: Results from the Hemophilia Growth and Development Study. *J Pediatr Psychol* 2000;*25*:545-56. Available [for download] from: *https://academic.oup.com/jpepsy/article/25/8/545/914720*, accessed on March 13, 2019.

93 Knight WG, Mellins CA, Levenson, RL Jr., Arpadi SM, Kairam R. Effects of pediatric HIV infection on mental and psychomotor development. Brief report. *J of Pediatr Psychol* 2000;*25*:583-7. Available [for download] from: *https://academic.oup.com/jpepsy/article/25/8/583/914726*, accessed on March 13, 2019.

94 Vahia VN, Bhojraj T, Creado DA. Neurocognitive deficits in HIV-positive patients-two case reports: Revising current AANTF guidelines in view of recent revelation of new neurocognitive symptoms. *Indian J Psychiatry* 2006;48:193-5. Available from: *http://www.indianjpsychiatry.org/temp/IndianJPsychiatry483193-4156176_113241.pdf*, accessed on March 13, 2019.

95 Belman AL, Muenz LR, Marcus JC, Goedert JJ, Landesman S, Rubinstein A, *et al*. Neurologic status of human immunodeficiency virus 1-infected infants and their controls: a prospective study from birth to 2 years. Mothers and Infants Cohort Study [Abstract]. *Pediatrics* 1996;98:1109-18. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/8951261*, accessed on March 13, 2019.

96 Boivin MJ, Maliwichi-Senganimalunje L, Ogwang LW, Kawalazira R, Sikorskii A, Familiar-Lopez I, *et al*. Neurodevelopmental effects of ante-partum and post-partum antiretroviral exposure in HIV-exposed and uninfected children versus HIV-unexposed and uninfected children in Uganda and Malawi: a prospective cohort study [Online]. *Lancet HIV* 2019. © 2019 Elsevier Ltd. DOI: 10.1016/S2352-3018(19)30083-9. Available from: *https://www.thelancet.com/action/showPdf?pii=S2352-3018%2819%2930083-9*, accessed on June 1, 2019.

97 Chaudhury S, Williams PL, Mayondi GK, Leidner J, Holding P, Tepper V, *et al.* Neurodevelopment of HIV-exposed and HIV-unexposed uninfected children at 24 months. *Pediatrics* 2017;*140*:e20170988. Available from: *https://pediatrics.aappublications.org/content/pediatrics/140/4/e20170988.full.pdf*, accessed on March 13, 2019.

98 Shanbhag MC, Rutstein RM, Zaoutis T, Zhao H, Chao D, Radcliffe J. (). Neurocognitive functioning in pediatric human immunodeficiency virus infection: effects of combined therapy. *Arch Pediatr Adolesc Med* 2005;*159*:651-6. Available [for download] from: *https://jamanetwork.com/journals/jamapediatrics/fullarticle/486065*, accessed on March 13, 2019.

99 Lindsey JC, Malee KM, Brouwers P, Hughes MD. (). Neurodevelopmental functioning in HIV-infected infants and young children before and after the introduction of protease inhibitor-based highly active antiretroviral therapy [Abstract]. *Pediatrics* 2007;*119*:e681-93. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/17296781*, accessed on March 13, 2019.

100 Ferrand RA, Leuthy R, Bwakura F, Mujuru H, Miller RF, Corbett, EL. HIV infection presenting in older children and adolescents: a case series from Harare, Zimbabwe. *Clin Infect Dis* 2007;*44*:874-8. Available from: *https://pdfs.semanticscholar.org/82fd/c59f74e1830b11c5c9efdb62f8187b2ee7cc.pdf?_ga=2.269323191.790307280.1563125132-1751893362.1563125132*, accessed on August 19, 2018.

101 Moreira-Silva SF, Zandonade E, Frauches DO, Machado EA, Lopes LI, Duque LL, *et al.* Comorbidities in children and adolescents with AIDS acquired by HIV vertical transmission in Vitória, Brazil. *PLoS One* 2013;*8*:e82027. Available from:

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0082027, accessed on August 19, 2018.

102 Taha TE, Graham SM, Kumwenda NI, Broadhead RL, Hoover DR, Markakis D, *et al.* Morbidity among Human Immunodeficiency Virus-1-infected and uninfected African children. *Pediatrics* 2000;*106*:e77. Available from: *https://pediatrics.aappublications.org/content/pediatrics/106/6/e77.full.pdf*, accessed on August 18, 2018.

103 Pierre RB, Fulford TA, Lewis K, Palmer P, Walters C, Christie CDC. Infectious disease morbidity and growth among young HIV-exposed uninfected children in Jamaica. *Rev Panam Salud Publica* 2016;*40*:401–9. Available from: *https://www.scielosp.org/article/ssm/content/raw/?resource_ssm_path=/media/assets/rpsp/v40n6/1020-4989-RPSP-40-06-401.pdf*, accessed on August 18, 2018.

104 Folquet AM, Dainguy ME, Kangouté M, Kouakou C, Kouadio E, Zobo Konan N, *et al.* HIV morbidity and mortality in pediatric population of Cote d'Ivoire. *Clin Mother Child Health* 2014;*11*:1000162. Available from: *https://www. longdom.org/open-access/hiv-morbidity-and-mortality-in-the-pediatric-population-of-cte-divoire-2090-7214.1000162.pdf*, accessed on August 18, 2018.

105 Walenda C, Kouakoussui A, Rouet F, Wemin L, Anaky MF, Msellati P. Morbidity in HIV-1-infected children treated or not treated with highly active anti-retroviral therapy, Adidjan, Cote d'Ivoire, 2000-2004. *J Trop Pediatr* 2009;*55*:170-6. Available [for download] from: *https://academic.oup.com/ tropej/article/55/3/170/1658200*, accessed on August 18, 2018.

106 World Health Organisation (WHO). Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings. Geneva: © WHO 2011. Available from: *https://apps.who.int/iris/bitstream/handle/10665/44472/9789241500708_eng.pdf;jsessionid=8DBC84E9113B97BC6C5FFCC555FDB64E?sequence=1*, accessed on August 18, 2018. p. 5.

107 Sharma SK, Mohan A, Kadhiravan T. HIV-TB co-infection: Epidemiology, diagnosis & management. *Indian J Med Res* 2005;121:550-67. Available from: *http://repository.ias.ac.in/69223/1/148-pub.pdf*, accessed on August 18, 2018.

108 Venturini E, Turkova A, Chiappini E, Galli L, de Martino M, Thorne C. Tuberculosis and HIV co-infection in children. *BMC Infect Dis* 2014;*14*(Suppl 1):S5. Available from: *https://apps.who.int/iris/bitstream/handle/10665/44472/ 9789241500708_eng.pdf;jsessionid=8DBC84E9113B97BC6C5FFCC555FDB64E?sequence=1*, accessed on August 18, 2018. p. v.

109 Newell ML, Coovadia H, Cortina-Borja M, Rollins N, Gaillard P, Dabis F. Mortality of infected and uninfected infants born to HIV-infected mothers in Africa: A pooled analysis. *Lancet* 2004;*364*:1236-43. Available from: *https://www.thelancet.com/action/showPdf?pii=S0140-6736%2804%2917140-7*, accessed on August 18, 2018.

110 Marinda E, Humphrey JH, Iliff PJ, Mutasa K, Nathoo KJ, Piwoz EG, *et al.*; Zvitambo Study Group. Child mortality according to maternal and infant HIV status in Zimbabwe [Abstract]. *Pediatr Infect Dis J* 2007;*26*:519-26. Available from: *https://www.ncbi.nlm.nih.gov/pubmed/17529870*, accessed on August 18, 2018.

111 Kabue MM, Buck WC, Wanless SR, Cox CM, McCollum ED, Caviness C, *et al*. Mortality and clinical outcomes in HIV-infected children on antiretroviral therapy in Malawi, Lesotho, and Swaziland. *Pediatrics* 2012;*130*:e591-9. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3962849/pdf/peds.2011-1187.pdf*, accessed on August 18, 2018.

112 Lumbiganon P, Kariminia A, Aurbipul L, Hansudewechakul R, Puthanakit T, Kurniati N, *et al*. Survival of HIV-infected children: a cohort study from Asia-Pacific region. *J Acquir Immune Defic Syndr* 2011;*56*:365–71. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3072816/pdf/nihms-260179.pdf*, accessed on August 18, 2018.

113 Brady MT, Oleske JM, Williams PL, Elgie C, Mofenson LM, Dankner WM, *et al*; The Pediatric Aids Clinical Trials Group219/219C Team. Declines in mortality rates and changes in cause of death in HIV-1-infected children during the HAART era. *J Acquir Immune Defic Syndr* 2010;*53*:86-94. Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2801894/pdf/nihms-152961.pdf*, accessed on August 18, 2018.

114 Traisathit P, Delory T, Ngo-Giang-Huong N, Somsamai R, Techakunokorn P, Theansavettrakul S, *et al*. (2018). AIDS-defining events and deaths in HIV-infected children and adolescents on anti-retrovirals: a 14-year study in Thailand. *J Acquir Immune Defic Syndr* 2018;*77*:17-22. Available from: *https://www. ncbi.nlm.nih.gov/pmc/articles/PMC6047734/pdf/emss-78122.pdf*, accessed on March 19, 2019.

115 National Family Health Survey (NFHS-4). Ministry of Health and Family Welfare, Government of India; 2015-2016. Available from: *http://rchiips. org/NFHS/NFHS-4Reports/India.pdf*, accessed on August 18, 2018.

116 National AIDS Control Organisation (NACO). Data sharing guidelines. Ministry of Health and Family Welfare, Government of India; 2015 July. No. GOI/NACO/SIMU/DAT-SHR/090715. Available from: *http://naco.gov.in/sites/default/files/Data%20Sharing%20Guidelines_%2013%20July%202015.pdf*, accessed on August 18, 2018.

117 The WHO Anthro Software. Child Growth Standards, © 2019 WHO. Available (for download) from: *https://www.who.int/childgrowth/software/en/*, accessed on September 13, 2018.

118 Government of Karnataka. Citizen's charter. Department of Food, Civil Supplies and Consumer Affairs, Government of Karnataka. Available from: *https://ahara.kar.nic.in/images/citizen_charter_english.pdf*, accessed on September 13, 2018.

119 Government of India. Report of the expert group to review the methodology for measurement of poverty. Planning Commission, Government of India; 2014 June. p. 64. Available from: *http://planningcommission.nic.in/reports/genrep/pov_rep 0707.pdf*, accessed on September 13, 2018.

120 Pandey A, Ploubidis GB, Clarke L, Dandona L. Trends in catastrophic health expenditure in India: 1993 to 2014. *B World Health Organ* 2017. [Forthcoming]. Available from: *https://www.who.int/bulletin/online_first/BLT.17.191759.pdf*, accessed on September 13, 2018.

121 World Health Organisation (WHO) [Website on the Internet]. Monitoring drinking water. Water sanitation hygiene, © 2019 WHO. Available from: *https://www.who.*

int/water_sanitation_health/monitoring/coverage/monitoring-dwater/en/, accessed on September 13, 2018.

122 World Health Organisation (WHO) [Website on the Internet]. Monitoring sanitation. Water sanitation hygiene, © 2019 WHO. Available from: *https://www.who.int/water_sanitation_health/monitoring/coverage/monitoring-sanitation/en/*, accessed on September 13, 2018.

123 Vitamin and Mineral Nutrition Information System (VMNIS). Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Department of Nutrition for Health and Development, WHO. WHO/NMH/NHD/MNM/11.1. Available from: *https://www.who.int/vmnis/indicators/haemoglobin.pdf*, accessed on September 13, 2018.

124 The International Perinatal HIV Group. The mode of delivery and the risk of vertical transmission of human immunodeficiency virus type 1 – a meta-analysis of 15 prospective cohort studies. *N Engl J Med* 1999;*340*:977–87. Available from: *https://www.nejm.org/doi/pdf/10.1056/NEJM199904013401301?articleTools=true*, accessed on September 13, 2018.

125 World Health Organisation (WHO). WHO recommendation: Elective C-section should not be routinely recommended to women living with HIV. Policy Brief. Sexual and reproductive health and rights of women living with HIV. Department of Reproductive Health and Research, © World Health Organisation 2018. Available from: *https://apps.who.int/iris/bitstream/handle/10665/272454/WHO-RHR-18.08-eng.pdf?ua=1*, accessed on September 13, 2018.

126 World Health Organisation (WHO). Indicators for assessing the infant and young child feeding practices. Part 2, Measurement. © World Health Organisation; 2010. Available from: *https://apps.who.int/iris/bitstream/handle/10665/44306/9789241599290_eng.pdf?ua=1*, accessed on September 13, 2018.

127 United Nations Children's Fund (UNICEF) [Website on the Internet]. HIV and infant feeding. UNICEF. Updated 13 Jan 2005. Available from: *https://www.unicef.org/nutrition/index_24827.html*, accessed on September 13, 2018.

128 Nair MKC, George B, Philip E, Lekshmi MA, Haran JC, Sathy N. Trivandrum Development Screening Chart. *Indian Pediatr* 1991;*28*:869-72. Available from: *httpss://www.indianpediatrics.net/aug1991/869.pdf*, accessed on September 13, 2018.

129 WHO Multicentre Growth Reference Study Group. WHO Motor Development Study: Windows of achievement for six gross motor development milestones. *Acta Pædiatrica* 2006;(Suppl 450):86-95. Available from: *https://www.who.int/childgrowth/standards/Windows.pdf*, accessed on September 13, 2018.

130 Nair MKC, Nair GSH, Mini AO, Indulekha S, Letha S, Russel PS. Development and validation of Langauge Evaluation Scale Trivandrum for children aged 0-3 years - lest (0-3). *Indian Pediatr* 2013;*50*:463-7. Available from: *https://www.indianpediatrics.net/may2013/463.pdf*, accessed on September 13, 2018.

131 Nair MKC, Nair GSH, George B, Mini AO. Language Evaluation Scale Trivandrum (LEST 3-6 years) - Development and validation. *Indian Pediatr* 2016;*53*:257-8. Available from: *https://www.indianpediatrics.net/mar2016/257.pdf*, accessed on September 13, 2018.

132 World Health Organisation (WHO). Training course of child growth assessment. WHO child growth standards. B. Measuring a child's growth. Department of Nutrition for Health and Development, © WHO 2008. Available from: *https://www.who.int/childgrowth/training/module_b_measuring_growth.pdf*, accessed on September 13, 2018.

133 Centers for Disease Control and Prevention (CDC). Measuring head circumference. CDC's response to Zika, US Department of Health and Human Services; 2016 Sep. Available from: *https://www.cdc.gov/zika/pdfs/microcephaly_measuring.pdf*, accessed September 13, 2018.

ANNEXURES

LIST OF ANNEXURES

Annexure 1: HIV data: World, India and Karnataka, 1990-2017[20,31-34,37-39,41-43,47-59].

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
1	Total Population (All ages)[37,38]	1.a.	Global	N	5288103214	5375488619	5459753865	5544873088	5628791176	5713794372	5796632117
		1.b.	Asia and the Pacific	N*	2927691143	2978424018	3027662574	3076165259	3124742086	3172976114	3220664984
				% wrt 1.a.	55.36	55.41	55.45	55.48	55.51	55.53	55.56
		1.c.	India	N	870133480	888054875	906021106	924057817	942204249	960482795	978893217
				% wrt 1.a.	16.45	16.52	16.59	16.67	16.74	16.81	16.89
				% wrt 1.b.	29.72	29.82	29.92	30.04	30.15	30.27	30.39
		1.d.	Karnataka	N#	44123744	44977201	45708624	46451941	47207346	47975035	48755208
				% wrt 1.c.	5.07	5.06	5.04	5.03	5.01	4.99	4.98
		1.e.	Belgaum	N#	3518166	3583606	3642192	3701737	3762254	3823761	3886274
				% wrt 1.c.	0.40	0.40	0.40	0.40	0.40	0.40	0.40
				% wrt 1.d.	7.97	7.97	7.97	7.97	7.97	7.97	7.97
2	Child Population (0-14 years)[37,38]	2.a.	Global	N	1739205478	1761735791	1779007153	1793603673	1806420089	1818613770	1825092381
				% wrt 1.a.	32.89	32.77	32.58	32.35	32.09	31.83	31.49
		2.b.	Asia and the Pacific	N*	977569732	989976673	998852788	1005545759	1011635398	1017427487	1018040668
				% wrt 1.b.	33.39	33.24	32.99	32.69	32.38	32.07	31.61
		2.c.	India	N	330035881	335068163	339847574	344302685	348305135	351812243	355436705
				% wrt 1.c.	37.93	37.73	37.51	37.26	36.97	36.63	36.31
				% wrt 2.a.	18.98	19.02	19.10	19.20	19.28	19.35	19.47
				% wrt 2.b.	33.76	33.85	34.02	34.24	34.43	34.58	34.91
		2.d.	Karnataka	N#	16040107	16198943	16262476	16326258	16390290	16454573	16519108
				% wrt 2.c.	4.86	4.83	4.79	4.74	4.71	4.68	4.65
		2.e.	Belgaum	N#	1284841	1299624	1311132	1322741	1334453	1346269	1358190
				% wrt 2.c.	0.39	0.39	0.39	0.38	0.38	0.38	0.38
				% wrt 2.d.	8.01	8.02	8.06	8.10	8.14	8.18	8.22
3	PLHIV (All ages)[20,39,42]	3.a.	Global	N	8300000	10100000	12100000	14300000	16700000	19100000	21300000
				% wrt 1.a.	0.16	0.19	0.22	0.26	0.30	0.33	0.37
		3.b.	Asia and the Pacific	N	550000	910000	1300000	1800000	2500000	3200000	3800000
				% wrt 1.b.	0.02	0.03	0.04	0.06	0.08	0.10	0.12
				% wrt 3.a.	6.63	9.01	10.74	12.59	14.97	16.75	17.84
		3.c.	India	N	260000	450000	730000	1100000	1600000	2100000	2500000
				% wrt 1.c.	0.03	0.05	0.08	0.12	0.17	0.22	0.26
				% wrt 3.a.	3.13	4.46	6.03	7.69	9.58	10.99	11.74
				% wrt 3.b.	47.27	49.45	56.15	61.11	64.00	65.63	65.79
		3.d.	Karnataka	N							
				% wrt 1.d.							
				% wrt 3.c.							
4	PLHIV (Adults, 15+	4.a.	Global	N	8000000	9700000	11600000	13700000	15900000	18200000	20200000
				% wrt 3.a.	96.14	95.94	95.79	95.59	95.45	95.29	95.31
		4.b.		N	550000	900000	1300000	1800000	2500000	3100000	3700000

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
	years)[39, 41,43]		Asia and the Pacific	% wrt 3.b.	99.20	99.11	98.92	98.83	98.72	98.59	98.47
				% wrt 4.a.	6.88	9.28	11.21	13.14	15.72	17.03	18.32
		4.c.	India	N	260000	450000	720000	1100000	1500000	2000000	2500000
				% wrt 3.c.	98.69	98.64	98.63	98.55	98.44	98.33	98.16
				% wrt 4.a.	3.25	4.64	6.21	8.03	9.43	10.99	12.38
				% wrt 4.b.	47.27	50.00	55.38	61.11	60.00	64.52	67.57
		4.d.	Karnataka	N[$]							
				% wrt 3.d.							
				% wrt 4.c.							
5	PLHIV (Male adults, 15+ years)[39]	5.a.	Global	N	4400000	5300000	6200000	7200000	8300000	9400000	10400000
				% wrt 4.a.	55.00	54.64	53.45	52.55	52.20	51.65	51.49
		5.b.	Asia and the Pacific	N	430000	690000	990000	1300000	1700000	2100000	2500000
				% wrt 4.b.	78.18	76.67	76.15	72.22	68.00	67.74	67.57
		5.c.	India	N	180000	300000	480000	710000	1000000	1300000	1600000
				% wrt 4.c.	69.23	66.67	66.67	64.55	66.67	65.00	64.00
6	PLHIV (Female adults, 15+ years)[39]	6.a.	Global	N	3600000	4400000	5400000	6500000	7600000	8800000	9900000
				% wrt 4.a.	45.00	45.36	46.55	47.45	47.80	48.35	48.51
		6.b.	Asia and the Pacific	N	110000	210000	340000	500000	740000	990000	1200000
				% wrt 4.b.	21.82	23.33	23.85	27.78	32.00	32.26	32.43
		6.c.	India	N	79000	140000	240000	360000	540000	730000	910000
				% wrt 4.c.	30.77	33.33	33.33	35.45	33.33	35.00	36.00
7	CLHIV (<15 years)[39, 41-43]	7.a.	Global	N	320000	410000	510000	630000	760000	900000	1000000
				% wrt 2.a.	0.02	0.02	0.03	0.04	0.04	0.05	0.05
				% wrt 3.a.	3.86	4.06	4.21	4.41	4.55	4.71	4.69
		7.b.	Asia and the Pacific	N	4400	8100	14000	21000	32000	45000	58000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.01
				% wrt 3.b.	0.80	0.89	1.08	1.17	1.28	1.41	1.53
				% wrt 7.a.	1.38	1.98	2.75	3.33	4.21	5.00	5.80
		7.c.	India	N	3400	6100	10000	16000	25000	35000	46000
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.01	0.01	0.01
				% wrt 3.c.	1.31	1.36	1.37	1.45	1.56	1.67	1.84
				% wrt 7.a.	1.06	1.49	1.96	2.54	3.29	3.89	4.60
				% wrt 7.b.	77.27	75.31	71.43	76.19	78.13	77.78	79.31
		7.d.	Karnataka	N[$]							
				% wrt 2.d.							
				% wrt 3.d.							
				% wrt 7.c.							
8		8.a.	Global	N	1000000	1300000	1800000	2300000	2900000	3600000	4400000
		8.b.		N	13000	22000	37000	62000	100000	160000	250000

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
	AIDS orphans [39]		Asia and the Pacific	% wrt 8.a.	1.30	1.69	2.06	2.70	3.45	4.44	5.68
		8.c.	India	N	6800	12000	21000	35000	59000	95000	150000
				% wrt 8.a.	0.68	0.92	1.17	1.52	2.03	2.64	3.41
				% wrt 8.b.	52.31	54.55	56.76	56.45	59.00	59.38	60.00
9	HIV prevalence (Adults, 15-49 years) [20, 39,42]	9.a.	Global	%	0.30	0.30	0.40	0.50	0.50	0.60	0.60
		9.b.	Asia and the Pacific	%	0.05	0.05	0.05	0.10	0.10	0.20	0.20
		9.c.	India	%	0.05	0.05	0.10	0.20	0.30	0.40	0.40
		9.d.	Karnataka	%							
10	HIV prevalence (Male adults, 15-49 years) [39]	10.a.	Global	%	0.30	0.40	0.40	0.50	0.50	0.60	0.60
		10.b.	Asia and the Pacific	%	0.05	0.05	0.10	0.20	0.20	0.20	0.30
		10.c.	India	%	0.05	0.10	0.20	0.30	0.40	0.50	0.50
11	HIV prevalence (Female adults, 15-49 years) [39]	11.a.	Global	%	0.30	0.30	0.40	0.50	0.50	0.60	0.60
		11.b.	Asia and the Pacific	%	0.05	0.05	0.05	0.05	0.05	0.10	0.10
		11.c.	India	%	0.05	0.05	0.05	0.10	0.20	0.30	0.30
12	New HIV infections (All ages) [39, 43]	12.a.	Global	N	1900000	2300000	2600000	2900000	3200000	3400000	3400000
				% wrt 1.a.	0.04	0.04	0.05	0.05	0.06	0.06	0.06
				% wrt 3.a.	22.89	22.77	21.49	20.28	19.16	17.80	15.96
		12.b.	Asia and the Pacific	N	290000	370000	470000	550000	730000	770000	720000
				% wrt 1.b.	0.01	0.01	0.02	0.02	0.02	0.02	0.02
				% wrt 3.b.	52.73	40.66	36.15	30.56	29.20	24.06	18.95
				% wrt 12.a.	15.26	16.09	18.08	18.97	22.81	22.65	21.18
		12.c.	India	N	130000	190000	280000	380000	500000	550000	510000
				% wrt 1.c.	0.01	0.02	0.03	0.04	0.05	0.06	0.05
				% wrt 3.c.	50.00	42.22	38.36	34.55	31.25	26.19	20.40
				% wrt 12.a.	6.84	8.26	10.77	13.10	15.63	16.18	15.00
				% wrt 12.b.	44.83	51.35	59.57	69.09	68.49	71.43	70.83
		12.d.	Karnataka	N[1]							
				% wrt 1.d.							
				% wrt 3.d.							
				% wrt 12.c.							
13		13.a.	Global	N	1800000	2100000	2300000	2600000	2900000	3000000	3000000

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
	New HIV infections (Adults, 15+ years)[20, 39,42]			% wrt 4.a.	22.50	21.65	19.83	18.98	18.24	16.48	14.85
				% wrt 12.a.	92.11	92.17	91.54	91.03	90.63	90.29	89.41
		13.b.	Asia and the Pacific	N	290000	370000	460000	540000	720000	740000	690000
				% wrt 4.b.	52.73	41.11	35.38	30.00	28.80	23.87	18.65
				% wrt 12.b.	98.83	98.38	97.98	97.45	97.40	96.88	96.11
				% wrt 13.a.	16.11	17.62	20.00	20.77	24.83	24.67	23.00
		13.c.	India	N	130000	190000	280000	380000	500000	550000	510000
				% wrt 4.c.	50.00	42.22	38.89	34.55	33.33	27.50	20.40
				% wrt 12.c.	98.08	97.68	97.46	97.11	97.00	96.55	95.49
				% wrt 13.a.	7.22	9.05	12.17	14.62	17.24	18.33	17.00
				% wrt 13.b.	44.83	51.35	60.87	70.37	69.44	74.32	73.91
		13.d.	Karnataka	N							
				% wrt 4.d.							
				% wrt 12.d.							
				% wrt 13.c.							
14	New HIV infection (Male adults, 15+ years)[39]	14.a.	Global	N	960000	1100000	1200000	1300000	1500000	1500000	1500000
				% wrt 13.a.	53.33	52.38	52.17	50.00	51.72	50.00	50.00
		14.b.	Asia and the Pacific	N	230000	270000	330000	360000	470000	470000	430000
				% wrt 13.b.	79.31	72.97	71.74	66.67	65.28	63.51	62.32
		14.c.	India	N	90000	130000	190000	240000	310000	340000	310000
				% wrt 13.c.	69.23	68.42	67.86	63.16	62.00	61.82	60.78
15	New HIV infections (Female adults, 15+ years)[39]	15.a.	Global	N	840000	990000	1100000	1300000	1400000	1500000	1500000
				% wrt 13.a.	46.67	47.62	47.83	50.00	48.28	50.00	50.00
		15.b.	Asia and the Pacific	N	61000	95000	140000	180000	250000	270000	260000
				% wrt 13.b.	20.69	27.03	28.26	33.33	34.72	36.49	37.68
		15.c.	India	N	43000	65000	97000	140000	190000	210000	200000
				% wrt 13.c.	30.77	31.58	32.14	36.84	38.00	38.18	39.22
16	New HIV infections (Children, <15 years)[39]	16.a.	Global	N	150000	180000	220000	260000	300000	330000	360000
				% wrt 2.a.	0.01	0.01	0.01	0.01	0.02	0.02	0.02
				% wrt 7.a.	46.88	43.90	43.14	41.27	39.47	36.67	36.00
				% wrt 12.a.	7.89	7.83	8.46	8.97	9.38	9.71	10.59
		16.b.	Asia and the Pacific	N	3400	6000	9500	14000	19000	24000	28000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	77.27	74.07	67.86	66.67	59.38	53.33	48.28
				% wrt 12.b.	1.17	1.62	2.02	2.55	2.60	3.12	3.89
				% wrt 16.a.	2.27	3.33	4.32	5.38	6.33	7.27	7.78
		16.c.	India	N	2500	4400	7100	11000	15000	19000	23000
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.01	0.01
				% wrt 7.c.	73.53	72.13	71.00	68.75	60.00	54.29	50.00

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
				% wrt 12.c.	1.92	2.32	2.54	2.89	3.00	3.45	4.51
				% wrt 16.a.	1.67	2.44	3.23	4.23	5.00	5.76	6.39
				% wrt 16.b.	73.53	73.33	74.74	78.57	78.95	79.17	82.14
		16.d.	Karnataka	N[!]							
				% wrt 2.d.							
				% wrt 7.d.							
				% wrt 12.d.							
				% wrt 16.c.							
17	HIV incidence per 1000 population (All ages)[39]	17.a.	Global	%	0.49	0.45	0.50	0.55	0.61	0.63	0.62
		17.b.	Asia and the Pacific	%	0.17	0.14	0.17	0.19	0.25	0.26	0.24
		17.c.	India	%	0.24	0.34	0.45	0.59	0.64	0.58	0.46
18	HIV incidence per 1000 population (Adults, 15-49 years)[39]	18.a.	Global	%	0.85	0.77	0.85	0.92	1.01	1.03	1.00
		18.b.	Asia and the Pacific	%	0.31	0.25	0.29	0.33	0.43	0.43	0.39
		18.c.	India	%	0.40	0.56	0.74	0.96	1.03	0.93	0.73
19	Change in new HIV infections, 2010-2017[39]	19.a.	Global	%							
		19.b.	Asia and the Pacific	%							
		19.c.	India	%							
20	Incidence-Prevalence ratio[39]	20.a.	Global		0.23	0.22	0.21	0.20	0.19	0.18	0.16
		20.b.	Asia and the Pacific		0.54	0.41	0.35	0.30	0.29	0.24	0.19
		20.c.	India		0.52	0.44	0.40	0.36	0.33	0.27	0.21
21	AIDS-related deaths (All ages)[20, 39,42]	21.a.	Global	N	290000	360000	460000	560000	690000	820000	950000
				% wrt 1.a.	0.01	0.01	0.01	0.01	0.01	0.01	0.02
				% wrt 3.a.	3.49	3.56	3.80	3.92	4.13	4.29	4.46
		21.b.	Asia and the Pacific	N	6400	12000	20000	32000	50000	74000	100000
				% wrt 1.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 3.b.	1.16	1.32	1.54	1.78	2.00	2.31	2.63
				% wrt 21.a.	2.21	3.33	4.35	5.71	7.25	9.02	10.53

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
		21.c.	India	N	3500	6300	11000	18000	29000	45000	64000
				% wrt 1.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.01
				% wrt 3.c.	1.35	1.40	1.51	1.64	1.81	2.14	2.56
				% wrt 21.a.	1.21	1.75	2.39	3.21	4.20	5.49	6.74
				% wrt 21.b.	54.69	52.50	55.00	56.25	58.00	60.81	64.00
		21.d.	Karnataka	N							
				% wrt 1.d.							
				% wrt 3.d.							
				% wrt 21.c.							
22	AIDS-related deaths (Adults, 15+ years)[39]	22.a.	Global	N	210000	280000	350000	440000	530000	650000	760000
				% wrt 4.a.	2.63	2.89	3.02	3.21	3.33	3.57	3.76
				% wrt 21.a.	75.52	75.56	76.09	76.79	78.26	78.05	78.95
		22.b.	Asia and the Pacific	N	5300	9700	16000	27000	42000	64000	91000
				% wrt 4.b.	0.96	1.08	1.23	1.50	1.68	2.06	2.46
				% wrt 21.b.	82.81	82.50	82.00	83.13	84.40	86.49	87.00
				% wrt 22.a.	2.52	3.46	4.57	6.14	7.92	9.85	11.97
		22.c.	India	N	2600	4800	8400	14000	23000	37000	54000
				% wrt 4.c.	1.00	1.07	1.17	1.27	1.53	1.85	2.16
				% wrt 21.c.	85.71	76.19	76.36	77.78	80.00	82.22	84.38
				% wrt 22.a.	1.24	1.71	2.40	3.18	4.34	5.69	7.11
				% wrt 22.b.	49.06	49.48	52.50	51.85	54.76	57.81	59.34
23	AIDS-related deaths (Male adults, 15+ years)[39]	23.a.	Global	N	130000	170000	210000	260000	310000	370000	420000
				% wrt 22.a.	61.90	60.71	60.00	59.09	58.49	56.92	55.26
		23.b.	Asia and the Pacific	N	4200	7600	13000	21000	32000	47000	66000
				% wrt 22.b.	79.25	78.35	81.25	77.78	76.19	73.44	72.53
		23.c.	India	N	1900	3400	5900	9900	16000	25000	36000
				% wrt 22.c.	73.08	70.83	70.24	70.71	69.57	67.57	66.67
24	AIDS-related deaths (Female adults, 15+ years)[39]	24.a.	Global	N	81000	110000	140000	180000	230000	280000	340000
				% wrt 22.a.	38.10	39.29	40.00	40.91	41.51	43.08	44.74
		24.b.	Asia and the Pacific	N	1100	2000	3600	6300	11000	17000	26000
				% wrt 22.b.	20.75	21.65	18.75	22.22	23.81	26.56	27.47
		24.c.	India	N	500	1400	2500	4500	7600	12000	19000
				% wrt 22.c.	26.92	29.17	29.76	29.29	30.43	32.43	33.33
25	AIDS-related deaths (Children, <15 years)[39]	25.a.	Global	N	71000	88000	110000	130000	150000	180000	200000
				% wrt 2.a.	0.00	0.00	0.01	0.01	0.01	0.01	0.01
				% wrt 7.a.	22.19	21.46	21.57	20.63	19.74	20.00	20.00
				% wrt 21.a.	24.48	24.44	23.91	23.21	21.74	21.95	21.05
		25.b.	Asia and the Pacific	N	1100	2100	3600	5400	7800	10000	13000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	25.00	25.93	25.71	25.71	24.38	22.22	22.41

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
				% wrt 21.b.	17.19	17.50	18.00	16.88	15.60	13.51	13.00
				% wrt 25.a.	1.55	2.39	3.27	4.15	5.20	5.56	6.50
		25.c.	India	N	500	1500	2600	4000	5800	8000	10000
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	14.71	24.59	26.00	25.00	23.20	22.86	21.74
				% wrt 21.c.	14.29	23.81	23.64	22.22	20.00	17.78	15.63
				% wrt 25.a.	0.70	1.70	2.36	3.08	3.87	4.44	5.00
				% wrt 25.b.	45.45	71.43	72.22	74.07	74.36	80.00	76.92
26	Change in AIDS-related deaths, 2010-2017[39]	26.a.	Global	%							
		26.b.	Asia and the Pacific	%							
		26.c.	India	%							
27	Incidence-Mortality ratio[39]	27.a.	Global		5.61	5.11	4.67	4.26	3.95	3.48	3.02
		27.b.	Asia and the Pacific		32.23	23.14	17.48	13.05	11.49	8.31	5.70
		27.c.	India		24.25	20.07	17.41	14.63	12.52	9.42	6.37
28	PLHIV receiving ART (All ages)[31-34,37,39,47-59]	28.a.	Global	N^							
				% wrt 3.a.							
		28.b.	Asia and the Pacific	N^							
				% wrt 3.b.							
				% wrt 28.a.							
		28.c.	India	N^							
				% wrt 3.c.							
				% wrt 28.a.							
				% wrt 28.b.							
		28.d.	Karnataka	N							
				% wrt 3.d.							
				% wrt 28.c.							
		28.e.	Belgaum	N							
				% wrt 28.d.							
29	PLHIV receiving ART (Adults, 15+ years)[39,41]	29.a.	Global	N^							
				% wrt 4.a.							
				% wrt 28.a.							
		29.b.	Asia and the Pacific	N							
				% wrt 4.b.							
				% wrt 28.b.							
				% wrt 29.a.							
		29.c.	India	N^							

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
				% wrt 4.c.							
				% wrt 28.c.							
				% wrt 29.a.							
				% wrt 29.b.							
30	PLHIV receiving ART (Male adults, 15+ years)[37,39]	30.a.	Global	N^							
				% wrt 29.a.							
		30.b.	Asia and the Pacific	N							
				% wrt 29.b.							
		30.c.	India	N^							
				% wrt 29.c.							
31	PLHIV receiving ART (Female adults, 15+ years)[39]	31.a.	Global	N^							
				% wrt 29.a.							
		31.b.	Asia and the Pacific	N							
				% wrt 29.b.							
		31.c.	India	N^							
				% wrt 29.c.							
32	CLHIV receiving ART (<15 years)[31-34,39,41,42,47-59]	32.a.	Global	N							
				% wrt 7.a.							
				% wrt 28.a.							
		32.b.	Asia and the Pacific	N							
				% wrt 7.b.							
				% wrt 28.b.							
				% wrt 32.a.							
		32.c.	India	N							
				% wrt 7.c.							
				% wrt 28.c.							
				% wrt 32.a.							
				% wrt 32.b.							
		32.d.	Karnataka	N!							
				% wrt 7.d.							
				% wrt 28.d.							
				% wrt 32.c.							
		32.e.	Belgaum	N							
				% wrt 32.d.							
33	Deaths averted by ART (All ages)[39]	33.a.	Global	N							
				% wrt 3.a.							
				% wrt 28.a.							
		33.b.		N							
				% wrt 3.b.							

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
			Asia and the Pacific	% wrt 28.b.							
				% wrt 33.a.							
		33.c.	India	N							
				% wrt 3.c.							
				% wrt 28.c.							
				% wrt 33.a.							
				% wrt 33.b.							
34	Pregnant women needing ARV for PMTCT [39,41]	34.a.	Global	N	440000	550000	660000	770000	900000	1000000	1100000
				% wrt 1.a. (per million)	83	102	121	139	160	175	190
				% wrt 3.a.	5.30	5.45	5.45	5.38	5.39	5.24	5.16
				% wrt 4.a.	5.50	5.67	5.69	5.62	5.66	5.49	5.45
				% wrt 6.a.	12.22	12.50	12.22	11.85	11.84	11.36	11.11
		34.b.	Asia and the Pacific	N	8600	16000	26000	39000	54000	71000	85000
				% wrt 1.b. (per million)	2.94	5.37	8.59	12.68	17.28	22.38	26.39
				% wrt 3.b.	1.56	1.76	2.00	2.17	2.16	2.22	2.24
				% wrt 4.b.	1.56	1.78	2.00	2.17	2.16	2.29	2.30
				% wrt 6.b.	7.82	7.62	7.65	7.80	7.30	7.17	7.08
				% wrt 34.a.	1.95	2.91	3.94	5.06	6.00	7.10	7.73
		34.c.	India	N							
				% wrt 1.c. (per million)							
				% wrt 3.c.							
				% wrt 4.c.							
				% wrt 6.c.							
				% wrt 34.a.							
				% wrt 34.b.							
		34.d.	Karnataka	N							
				% wrt 1.d. (per million)							
				% wrt 3.d.							
				% wrt 4.d.							
				% wrt 34.c.							
35	Pregnant women who received ARV for	35.a.	Global	N							
				% wrt 34.a.							
		35.b.	Asia and the Pacific	N							
				% wrt 34.b.							
				% wrt 35.a.							
		35.c.	India	N							
				% wrt 34.c.							

S. No.	Criteria	Sub-S. No.	Region	Description	1990	1991	1992	1993	1994	1995	1996
	PMTCT[39,41,42]			% wrt 35.a.							
				% wrt 35.b.							
		35.d.	Karnataka	N							
				% wrt 34.d.							
				% wrt 35.c.							
36	HIV-exposed-but-uninfected children[39]	36.a.	Global	N	1100000	1400000	1800000	2200000	2700000	3300000	4000000
		36.b.	Asia and the Pacific	N	12000	21000	37000	60000	93000	140000	190000
				% wrt 36.a.	1.09	1.50	2.06	2.73	3.44	4.24	4.75
		36.c.	India	N	7800	14000	25000	41000	65000	97000	140000
				% wrt 36.a.	0.71	1.00	1.39	1.86	2.41	2.94	3.50
				% wrt 36.b.	65.00	66.67	67.57	68.33	69.89	69.29	73.68
37	New HIV infections averted by PMTCT[39]	37.a.	Global	N		68	77	1338	1348	1349	1513
				% wrt 34.a.		0.01	0.01	0.17	0.15	0.13	0.14
				% wrt 35.a.							
		37.b.	Asia and the Pacific	N				12	13	14	14
				% wrt 34.b.				0.03	0.02	0.02	0.02
				% wrt 35.b.							
				% wrt 37.a.				0.91	0.94	1.00	0.92
		37.c.	India	N							
				% wrt 34.c.							
				% wrt 35.c.							
				% wrt 37.a.							
				% wrt 37.b.							
38	Exposed children having a virological HIV test for EID within 2 months of age[39]	38.a.	Global	%							
		38.b.	Asia and the Pacific	%							
		38.c.	India	%							

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
1	Total Population (All ages)[37,38]	1.a.	Global	N	5879433900	5961166037	6041818586	6121682736	6201340258	6280530065	6359899296
		1.b.	Asia and the Pacific	N*	3267969963	3314420934	3359524855	3403766649	3447390147	3490114421	3531940592
				% wrt 1.a.	55.58	55.60	55.60	55.60	55.59	55.57	55.53
		1.c.	India	N	997405318	1015974042	1034539214	1053050912	1071477855	1089807112	1108027848

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
				% wrt 1.a.	16.96	17.04	17.12	17.20	17.28	17.35	17.42
				% wrt 1.b.	30.52	30.65	30.79	30.94	31.08	31.23	31.37
		1.d.	Karnataka	N#	49548069	50353824	51172681	52004855	52850562	53622299	54405304
				% wrt 1.c.	4.97	4.96	4.95	4.94	4.93	4.92	4.91
		1.e.	Belgaum	N#	3949809	4014382	4080011	4146713	4214505	4214505	4267874
				% wrt 1.c.	0.40	0.40	0.39	0.39	0.39	0.39	0.39
				% wrt 1.d.	7.97	7.97	7.97	7.97	7.97	7.86	7.84
2	Child Population (0-14 years)[37,38]	2.a.	Global	N	1833068567	1840215426	1843705787	1842731618	1843386087	1840136097	1834662745
				% wrt 1.a.	31.18	30.87	30.52	30.10	29.73	29.30	28.85
		2.b.	Asia and the Pacific	N*	1020570723	1022828618	1021942903	1017115711	1013356101	1006079887	996593926
				% wrt 1.b.	31.23	30.86	30.42	29.88	29.39	28.83	28.22
		2.c.	India	N	358612537	361355075	363723543	365773765	368339237	370455776	372221586
				% wrt 1.c.	35.95	35.57	35.16	34.73	34.38	33.99	33.59
				% wrt 2.a.	19.56	19.64	19.73	19.85	19.98	20.13	20.29
				% wrt 2.b.	35.14	35.33	35.59	35.96	36.35	36.82	37.35
		2.d.	Karnataka	N#	16583896	16648939	16714237	16779790	16845601	17091585	17341160
				% wrt 2.c.	4.62	4.61	4.60	4.59	4.57	4.61	4.66
		2.e.	Belgaum	N#	1370216	1382349	1394589	1406937	1419395	1437369	1455571
				% wrt 2.c.	0.38	0.38	0.38	0.38	0.39	0.39	0.39
				% wrt 2.d.	8.26	8.30	8.34	8.38	8.43	8.41	8.39
3	PLHIV (All ages)[20,39,42]	3.a.	Global	N	23300000	25000000	26300000	27400000	28300000	28900000	29400000
				% wrt 1.a.	0.40	0.42	0.44	0.45	0.46	0.46	0.46
		3.b.	Asia and the Pacific	N	4200000	4500000	4700000	4900000	4900000	5000000	5000000
				% wrt 1.b.	0.13	0.14	0.14	0.14	0.14	0.14	0.14
				% wrt 3.a.	18.03	18.00	17.87	17.88	17.31	17.30	17.01
		3.c.	India	N	2800000	3000000	3100000	3100000	3100000	3100000	3000000
				% wrt 1.c.	0.28	0.30	0.30	0.29	0.29	0.28	0.27
				% wrt 3.a.	12.02	12.00	11.79	11.31	10.95	10.73	10.20
				% wrt 3.b.	66.67	66.67	65.96	63.27	63.27	62.00	60.00
		3.d.	Karnataka	N							
				% wrt 1.d.							
				% wrt 3.c.							
4	PLHIV (Adults, 15+ years)[39,41,43]	4.a.	Global	N	22100000	23600000	24800000	25800000	26500000	27100000	27500000
				% wrt 3.a.	94.85	94.80	94.30	94.16	93.99	93.77	93.54
		4.b.	Asia and the Pacific	N	4100000	4400000	4600000	4800000	4800000	4900000	4900000
				% wrt 3.b.	98.29	98.13	97.96	97.76	97.76	97.60	97.40
				% wrt 4.a.	18.55	18.64	18.55	18.60	18.11	18.08	17.82
		4.c.	India	N	2800000	2900000	3000000	3100000	3000000	3000000	2900000
				% wrt 3.c.	97.96	97.77	97.55	97.32	97.13	96.94	96.70
				% wrt 4.a.	12.67	12.29	12.10	12.02	11.32	11.07	10.55
				% wrt 4.b.	68.29	65.91	65.22	64.58	62.50	61.22	59.18

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
		4.d.	Karnataka	N[$]							
				% wrt 3.d.							
				% wrt 4.c.							
5	PLHIV (Male adults, 15+ years)[39]	5.a.	Global	N	11200000	11900000	12400000	12800000	13100000	13400000	13500000
				% wrt 4.a.	50.68	50.42	50.00	49.61	49.43	49.45	49.09
		5.b.	Asia and the Pacific	N	2700000	2900000	3000000	3100000	3100000	3100000	3100000
				% wrt 4.b.	65.85	65.91	65.22	64.58	64.58	63.27	63.27
		5.c.	India	N	1700000	1800000	1900000	1900000	1800000	1800000	1700000
				% wrt 4.c.	60.71	62.07	63.33	61.29	60.00	60.00	58.62
6	PLHIV (Female adults, 15+ years)[39]	6.a.	Global	N	10900000	11700000	12400000	13000000	13400000	13700000	13900000
				% wrt 4.a.	49.32	49.58	50.00	50.39	50.57	50.55	50.91
		6.b.	Asia and the Pacific	N	1400000	1500000	1600000	1700000	1700000	1700000	1700000
				% wrt 4.b.	34.15	34.09	34.78	35.42	35.42	36.73	36.73
		6.c.	India	N	1000000	1100000	1200000	1200000	1200000	1200000	1100000
				% wrt 4.c.	39.29	37.93	36.67	38.71	40.00	40.00	41.38
7	CLHIV (<15 years)[39, 41-43]	7.a.	Global	N	1200000	1300000	1500000	1600000	1700000	1800000	1900000
				% wrt 2.a.	0.07	0.07	0.08	0.09	0.09	0.10	0.10
				% wrt 3.a.	5.15	5.20	5.70	5.84	6.01	6.23	6.46
		7.b.	Asia and the Pacific	N	72000	84000	96000	110000	110000	120000	130000
				% wrt 2.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	1.71	1.87	2.04	2.24	2.24	2.40	2.60
				% wrt 7.a.	6.00	6.46	6.40	6.88	6.47	6.67	6.84
		7.c.	India	N	57000	67000	76000	83000	89000	95000	99000
				% wrt 2.c.	0.02	0.02	0.02	0.02	0.02	0.03	0.03
				% wrt 3.c.	2.04	2.23	2.45	2.68	2.87	3.06	3.30
				% wrt 7.a.	4.75	5.15	5.07	5.19	5.24	5.28	5.21
				% wrt 7.b.	79.17	79.76	79.17	75.45	80.91	79.17	76.15
		7.d.	Karnataka	N[$]							
				% wrt 2.d.							
				% wrt 3.d.							
				% wrt 7.c.							
8	AIDS orphans[39]	8.a.	Global	N	5300000	6300000	7400000	8500000	9700000	10800000	12000000
		8.b.	Asia and the Pacific	N	360000	510000	690000	890000	1100000	1400000	1600000
				% wrt 8.a.	6.79	8.10	9.32	10.47	11.34	12.96	13.33
		8.c.	India	N	220000	310000	430000	560000	700000	850000	1000000
				% wrt 8.a.	4.15	4.92	5.81	6.59	7.22	7.87	8.33
				% wrt 8.b.	61.11	60.78	62.32	62.92	63.64	60.71	62.50
9		9.a.	Global	%	0.70	0.70	0.70	0.80	0.80	0.80	0.80

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
	HIV prevalence (Adults, 15-49 years)[20, 39,42]	9.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		9.c.	India	%	0.50	0.50	0.50	0.50	0.50	0.50	0.40
		9.d.	Karnataka	%							
10	HIV pr-evalence (Male adults, 15-49 years)[39]	10.a.	Global	%	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		10.b.	Asia and the Pacific	%	0.30	0.30	0.30	0.30	0.30	0.30	0.30
		10.c.	India	%	0.60	0.60	0.60	0.60	0.60	0.50	0.50
11	HIV prevalence (Female adults, 15-49 years)[39]	11.a.	Global	%	0.70	0.70	0.80	0.80	0.80	0.80	0.80
		11.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		11.c.	India	%	0.40	0.40	0.40	0.40	0.40	0.40	0.40
12	New HIV infections (All ages)[39, 43]	12.a.	Global	N	3200000	3100000	2900000	2800000	2700000	2600000	2600000
				% wrt 1.a.	0.05	0.05	0.05	0.05	0.04	0.04	0.04
				% wrt 3.a.	13.73	12.40	11.03	10.22	9.54	9.00	8.84
		12.b.	Asia and the Pacific	N	610000	530000	470000	430000	410000	390000	380000
				% wrt 1.b.	0.02	0.02	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	14.52	11.78	10.00	8.78	8.37	7.80	7.60
				% wrt 12.a.	19.06	17.10	16.21	15.36	15.19	15.00	14.62
		12.c.	India	N	400000	310000	250000	200000	170000	150000	130000
				% wrt 1.c.	0.04	0.03	0.02	0.02	0.02	0.01	0.01
				% wrt 3.c.	14.29	10.33	8.06	6.45	5.48	4.84	4.33
				% wrt 12.a.	12.50	10.00	8.62	7.14	6.30	5.77	5.00
				% wrt 12.b.	65.57	58.49	53.19	46.51	41.46	38.46	34.21
		12.d.	Karnataka	N[!]							
				% wrt 1.d.							
				% wrt 3.d.							
				% wrt 12.c.							
13	New HIV infections (Adults, 15+	13.a.	Global	N	2900000	2700000	2500000	2400000	2300000	2200000	2100000
				% wrt 4.a.	13.12	11.44	10.08	9.30	8.68	8.12	7.64
				% wrt 12.a.	87.81	86.77	85.52	85.00	84.44	83.85	84.23
		13.b.	Asia and the Pacific	N	580000	490000	440000	400000	380000	370000	350000
				% wrt 4.b.	14.15	11.14	9.57	8.33	7.92	7.55	7.14
				% wrt 12.b.	95.08	94.34	93.62	93.49	93.41	93.59	93.68
				% wrt 13.a.	20.00	18.15	17.60	16.67	16.52	16.82	16.67

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
	years)[20, 39,42]	13.c.	India	N	400000	310000	250000	200000	170000	150000	130000
				% wrt 4.c.	14.29	10.69	8.33	6.45	5.67	5.00	4.48
				% wrt 12.c.	94.00	92.26	90.80	89.50	88.24	88.00	87.69
				% wrt 13.a.	13.79	11.48	10.00	8.33	7.39	6.82	6.19
				% wrt 13.b.	68.97	63.27	56.82	50.00	44.74	40.54	37.14
		13.d.	Karnataka	N							
				% wrt 4.d.							
				% wrt 12.d.							
				% wrt 13.c.							
14	New HIV infection (Male adults, 15+ years)[39]	14.a.	Global	N	1400000	1300000	1200000	1200000	1100000	1100000	1100000
				% wrt 13.a.	48.28	48.15	48.00	50.00	47.83	50.00	52.38
		14.b.	Asia and the Pacific	N	360000	310000	280000	260000	240000	240000	230000
				% wrt 13.b.	62.07	63.27	63.64	65.00	63.16	64.86	65.71
		14.c.	India	N	240000	180000	140000	120000	100000	88000	80000
				% wrt 13.c.	60.00	58.06	56.00	60.00	58.82	58.67	61.54
15	New HIV infections (Female adults, 15+ years)[39]	15.a.	Global	N	1500000	1400000	1300000	1200000	1200000	1100000	1100000
				% wrt 13.a.	51.72	51.85	52.00	50.00	52.17	50.00	47.62
		15.b.	Asia and the Pacific	N	220000	190000	160000	150000	140000	130000	120000
				% wrt 13.b.	37.93	36.73	36.36	35.00	36.84	35.14	34.29
		15.c.	India	N	160000	130000	100000	85000	72000	62000	55000
				% wrt 13.c.	40.00	41.94	44.00	40.00	41.18	41.33	38.46
16	New HIV infections (Children, <15 years)[39]	16.a.	Global	N	390000	410000	420000	420000	420000	420000	410000
				% wrt 2.a.	0.02	0.02	0.02	0.02	0.02	0.02	0.02
				% wrt 7.a.	32.50	31.54	28.00	26.25	24.71	23.33	21.58
				% wrt 12.a.	12.19	13.23	14.48	15.00	15.56	16.15	15.77
		16.b.	Asia and the Pacific	N	30000	30000	30000	28000	27000	25000	24000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	41.67	35.71	31.25	25.45	24.55	20.83	18.46
				% wrt 12.b.	4.92	5.66	6.38	6.51	6.59	6.41	6.32
				% wrt 16.a.	7.69	7.32	7.14	6.67	6.43	5.95	5.85
		16.c.	India	N	24000	24000	23000	21000	20000	18000	16000
				% wrt 2.c.	0.01	0.01	0.01	0.01	0.01	0.00	0.00
				% wrt 7.c.	42.11	35.82	30.26	25.30	22.47	18.95	16.16
				% wrt 12.c.	6.00	7.74	9.20	10.50	11.76	12.00	12.31
				% wrt 16.a.	6.15	5.85	5.48	5.00	4.76	4.29	3.90
				% wrt 16.b.	80.00	80.00	76.67	75.00	74.07	72.00	66.67
		16.d.	Karnataka	N[!]							
				% wrt 2.d.							
				% wrt 7.d.							

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
				% wrt 12.d.							
				% wrt 16.c.							
17	HIV incidence per 1000 population (All ages)[39]	17.a.	Global	%	0.59	0.55	0.52	0.49	0.46	0.44	0.43
		17.b.	Asia and the Pacific	%	0.20	0.17	0.15	0.13	0.13	0.12	0.11
		17.c.	India	%	0.35	0.28	0.23	0.19	0.17	0.15	0.13
18	HIV incidence per 1000 population (Adults, 15-49 years)[39]	18.a.	Global	%	0.94	0.87	0.81	0.75	0.70	0.67	0.64
		18.b.	Asia and the Pacific	%	0.32	0.27	0.24	0.22	0.20	0.19	0.18
		18.c.	India	%	0.54	0.43	0.34	0.29	0.24	0.21	0.19
19	Change in new HIV infections, 2010-2017[39]	19.a.	Global	%							
		19.b.	Asia and the Pacific	%							
		19.c.	India	%							
20	Incidence-Prevalence ratio[39]	20.a.	Global		0.14	0.12	0.11	0.10	0.10	0.09	0.09
		20.b.	Asia and the Pacific		0.15	0.12	0.10	0.09	0.08	0.08	0.08
		20.c.	India		0.15	0.11	0.09	0.07	0.06	0.06	0.05
21	AIDS-related deaths (All ages)[20, 39,42]	21.a.	Global	N	1100000	1200000	1400000	1500000	1700000	1800000	1900000
				% wrt 1.a.	0.02	0.02	0.02	0.02	0.03	0.03	0.03
				% wrt 3.a.	4.72	4.80	5.32	5.47	6.01	6.23	6.46
		21.b.	Asia and the Pacific	N	140000	180000	220000	260000	290000	320000	340000
				% wrt 1.b.	0.00	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	3.33	4.00	4.68	5.31	5.92	6.40	6.80
				% wrt 21.a.	12.73	15.00	15.71	17.33	17.06	17.78	17.89
		21.c.	India	N	88000	110000	140000	160000	190000	210000	220000
				% wrt 1.c.	0.01	0.01	0.01	0.02	0.02	0.02	0.02
				% wrt 3.c.	3.14	3.67	4.52	5.16	6.13	6.77	7.33
				% wrt 21.a.	8.00	9.17	10.00	10.67	11.18	11.67	11.58
				% wrt 21.b.	62.86	61.11	63.64	61.54	65.52	65.63	64.71
		21.d.		N							

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
			Karnataka	% wrt 1.d.							
				% wrt 3.d.							
				% wrt 21.c.							
22	AIDS-related deaths (Adults, 15+ years)[39]	22.a.	Global	N	860000	990000	1100000	1300000	1400000	1500000	1600000
				% wrt 4.a.	3.89	4.19	4.44	5.04	5.28	5.54	5.82
				% wrt 21.a.	80.00	80.00	82.14	82.67	84.12	84.44	85.26
		22.b.	Asia and the Pacific	N	120000	160000	200000	240000	270000	310000	330000
				% wrt 4.b.	2.93	3.64	4.35	5.00	5.63	6.33	6.73
				% wrt 21.b.	89.29	91.11	92.27	93.46	94.14	94.69	95.00
				% wrt 22.a.	13.95	16.16	18.18	18.46	19.29	20.67	20.63
		22.c.	India	N	76000	100000	130000	150000	180000	200000	210000
				% wrt 4.c.	2.71	3.45	4.33	4.84	6.00	6.67	7.24
				% wrt 21.c.	86.36	88.18	90.71	91.88	93.16	93.81	94.55
				% wrt 22.a.	8.84	10.10	11.82	11.54	12.86	13.33	13.13
				% wrt 22.b.	63.33	62.50	65.00	62.50	66.67	64.52	63.64
23	AIDS-related deaths (Male adults, 15+ years)[39]	23.a.	Global	N	460000	520000	590000	650000	710000	760000	810000
				% wrt 22.a.	53.49	52.53	53.64	50.00	50.71	50.67	50.63
		23.b.	Asia and the Pacific	N	88000	110000	140000	160000	180000	200000	220000
				% wrt 22.b.	73.33	68.75	70.00	66.67	66.67	64.52	66.67
		23.c.	India	N	49000	65000	80000	96000	110000	120000	130000
				% wrt 22.c.	64.47	65.00	61.54	64.00	61.11	60.00	61.90
24	AIDS-related deaths (Female adults, 15+ years)[39]	24.a.	Global	N	400000	460000	540000	610000	680000	740000	790000
				% wrt 22.a.	46.51	47.47	46.36	50.00	49.29	49.33	49.38
		24.b.	Asia and the Pacific	N	36000	49000	63000	77000	91000	100000	110000
				% wrt 22.b.	26.67	31.25	30.00	33.33	33.33	35.48	33.33
		24.c.	India	N	27000	36000	46000	56000	66000	74000	81000
				% wrt 22.c.	35.53	35.00	38.46	36.00	38.89	40.00	38.10
25	AIDS-related deaths (Children, <15 years)[39]	25.a.	Global	N	220000	240000	250000	260000	270000	280000	280000
				% wrt 2.a.	0.01	0.01	0.01	0.01	0.01	0.02	0.02
				% wrt 7.a.	18.33	18.46	16.67	16.25	15.88	15.56	14.74
				% wrt 21.a.	20.00	20.00	17.86	17.33	15.88	15.56	14.74
		25.b.	Asia and the Pacific	N	15000	16000	17000	17000	17000	17000	17000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	20.83	19.05	17.71	15.45	15.45	14.17	13.08
				% wrt 21.b.	10.71	8.89	7.73	6.54	5.86	5.31	5.00
				% wrt 25.a.	6.82	6.67	6.80	6.54	6.30	6.07	6.07
		25.c.	India	N	12000	13000	13000	13000	13000	13000	12000
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	21.05	19.40	17.11	15.66	14.61	13.68	12.12
				% wrt 21.c.	13.64	11.82	9.29	8.13	6.84	6.19	5.45

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
				% wrt 25.a.	5.45	5.42	5.20	5.00	4.81	4.64	4.29
				% wrt 25.b.	80.00	81.25	76.47	76.47	76.47	76.47	70.59
26	Change in AIDS-related deaths, 2010-2017[39]	26.a.	Global	%							
		26.b.	Asia and the Pacific	%							
		26.c.	India	%							
27	Incidence-Mortality ratio[39]	27.a.	Global		2.60	2.20	1.88	1.64	1.46	1.33	1.23
		27.b.	Asia and the Pacific		3.74	2.57	1.91	1.51	1.27	1.12	1.02
		27.c.	India		3.91	2.43	1.65	1.19	0.91	0.73	0.62
28	PLHIV receiving ART (All ages)[31-34,37,39,47-59]	28.a.	Global	N^				548000	566000	867000	1176000
				% wrt 3.a.				2.00	2.00	3.00	4.00
		28.b.	Asia and the Pacific	N^				274400	316050	342500	392500
				% wrt 3.b.				5.60	6.45	6.85	7.85
				% wrt 28.a.				50.07	55.84	39.50	33.38
		28.c.	India	N^							
				% wrt 3.c.							
				% wrt 28.a.							
				% wrt 28.b.							
		28.d.	Karnataka	N							
				% wrt 3.d.							
				% wrt 28.c.							
		28.e.	Belgaum	N							
				% wrt 28.d.							
29	PLHIV receiving ART (Adults, 15+ years)[39,41]	29.a.	Global	N^							
				% wrt 4.a.							
				% wrt 28.a.							
		29.b.	Asia and the Pacific	N							
				% wrt 4.b.							
				% wrt 28.b.							
				% wrt 29.a.							
		29.c.	India	N^							
				% wrt 4.c.							
				% wrt 28.c.							
				% wrt 29.a.							
				% wrt 29.b.							
30	PLHIV receivin	30.a.	Global	N^							
				% wrt 29.a.							

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
	g ART (Male adults, 15+ years)[37, 39]	30.b.	Asia and the Pacific	N							
				% wrt 29.b.							
		30.c.	India	N^							
				% wrt 29.c.							
31	PLHIV receiving ART (Female adults, 15+ years)[39]	31.a.	Global	N^							
				% wrt 29.a.							
		31.b.	Asia and the Pacific	N							
				% wrt 29.b.							
		31.c.	India	N^							
				% wrt 29.c.							
32	CLHIV receiving ART (<15 years)[31-34,39,41,42,47-59]	32.a.	Global	N							
				% wrt 7.a.							
				% wrt 28.a.							
		32.b.	Asia and the Pacific	N							
				% wrt 7.b.							
				% wrt 28.b.							
				% wrt 32.a.							
		32.c.	India	N							
				% wrt 7.c.							
				% wrt 28.c.							
				% wrt 32.a.							
				% wrt 32.b.							
		32.d.	Karnataka	N[!]							
				% wrt 7.d.							
				% wrt 28.d.							
				% wrt 32.c.							
		32.e.	Belgaum	N							
				% wrt 32.d.							
33	Deaths averted by ART (All ages)[39]	33.a.	Global	N				51959	60041	68830	81134
				% wrt 3.a.				0.19	0.21	0.24	0.28
				% wrt 28.a.				9.48	10.61	7.94	6.90
		33.b.	Asia and the Pacific	N				1342	1760	3271	7091
				% wrt 3.b.				0.03	0.04	0.07	0.14
				% wrt 28.b.				0.49	0.56	0.96	1.81
				% wrt 33.a.				2.58	2.93	4.75	8.74
		33.c.	India	N							
				% wrt 3.c.							
				% wrt 28.c.							
				% wrt 33.a.							

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
				% wrt 33.b.							
34	Pregnant women needing ARV for PMTCT [39,41]	34.a.	Global	N	1200000	1300000	1300000	1400000	1400000	1400000	1300000
				% wrt 1.a. (per million)	204	218	215	229	226	223	204
				% wrt 3.a.	5.15	5.20	4.94	5.11	4.95	4.84	4.42
				% wrt 4.a.	5.43	5.51	5.24	5.43	5.28	5.17	4.73
				% wrt 6.a.	11.01	11.11	10.48	10.77	10.45	10.22	9.35
		34.b.	Asia and the Pacific	N	93000	96000	95000	91000	87000	83000	78000
				% wrt 1.b. (per million)	28.46	28.96	28.28	26.74	25.24	23.78	22.08
				% wrt 3.b.	2.21	2.13	2.02	1.86	1.78	1.66	1.56
				% wrt 4.b.	2.27	2.18	2.07	1.90	1.81	1.69	1.59
				% wrt 6.b.	6.64	6.40	5.94	5.35	5.12	4.88	4.59
				% wrt 34.a.	7.75	7.38	7.31	6.50	6.21	5.93	6.00
		34.c.	India	N							
				% wrt 1.c. (per million)							
				% wrt 3.c.							
				% wrt 4.c.							
				% wrt 6.c.							
				% wrt 34.a.							
				% wrt 34.b.							
		34.d.	Karnataka	N							
				% wrt 1.d. (per million)							
				% wrt 3.d.							
				% wrt 4.d.							
				% wrt 34.c.							
35	Pregnant women who received ARV for PMTCT [39,41,42]	35.a.	Global	N							
				% wrt 34.a.							
		35.b.	Asia and the Pacific	N							
				% wrt 34.b.							
				% wrt 35.a.							
		35.c.	India	N							
				% wrt 34.c.							
				% wrt 35.a.							
				% wrt 35.b.							
		35.d.	Karnataka	N							
				% wrt 34.d.							
				% wrt 35.c.							
36	HIV-exposed	36.a.	Global	N	4700000	5500000	6200000	7000000	7800000	8500000	9200000
		36.b.		N	250000	310000	370000	430000	490000	540000	600000

S. No.	Criteria	Sub-S. No.	Region	Description	1997	1998	1999	2000	2001	2002	2003
	-but-uninfected children[39]		Asia and the Pacific	% wrt 36.a.	5.32	5.64	5.97	6.14	6.28	6.35	6.52
		36.c.	India	N	180000	230000	270000	320000	350000	390000	420000
				% wrt 36.a.	3.83	4.18	4.35	4.57	4.49	4.59	4.57
				% wrt 36.b.	72.00	74.19	72.97	74.42	71.43	72.22	70.00
37	New HIV infections averted by PMTCT[39]	37.a.	Global	N	1603	1710	1813	2684	6279	7246	11246
				% wrt 34.a.	0.13	0.13	0.14	0.19	0.45	0.52	0.87
				% wrt 35.a.							
		37.b.	Asia and the Pacific	N	15	23	26	551	628	882	1332
				% wrt 34.b.	0.02	0.02	0.03	0.61	0.72	1.06	1.71
				% wrt 35.b.							
				% wrt 37.a.	0.94	1.35	1.45	20.52	10.00	12.17	11.84
		37.c.	India	N							
				% wrt 34.c.							
				% wrt 35.c.							
				% wrt 37.a.							
				% wrt 37.b.							
38	Exposed children having a virological HIV test for EID within 2 months of age[39]	38.a.	Global	%							
		38.b.	Asia and the Pacific	%							
		38.c.	India	%							

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
1	Total Population (All ages)[37, 38]	1.a.	Global	N	6439825381	6520298763	6601476541	6683223772	6766296679	6849569339	6932869743
		1.b.	Asia and the Pacific	N*	3572867262	3613239726	3653026722	3691809197	3730531539	3768656942	3806475181
				% wrt 1.a.	55.48	55.42	55.34	55.24	55.13	55.02	54.90
		1.c.	India	N	1126135777	1144118674	1161977719	1179681239	1197146906	1214270132	1230980691
				% wrt 1.a.	17.49	17.55	17.60	17.65	17.69	17.73	17.76
				% wrt 1.b.	31.52	31.66	31.81	31.95	32.09	32.22	32.34
		1.d.	Karnataka	N#	55199744	56005784	56823594	57653345	58495213	59349375	60216008
				% wrt 1.c.	4.90	4.90	4.89	4.89	4.89	4.89	4.89
		1.e.	Belgaum	N#	4321920	4376649	4432072	4488196	4545031	4602586	4660870
				% wrt 1.c.	0.38	0.38	0.38	0.38	0.38	0.38	0.38

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
				% wrt 1.d.	7.83	7.81	7.80	7.78	7.77	7.76	7.74
2	Child Population (0-14 years)[37, 38]	2.a.	Global	N	1829974600	1827797554	1830765544	1835230367	1841732884	1849826529	1859169393
				% wrt 1.a.	28.42	28.03	27.73	27.46	27.22	27.01	26.82
		2.b.	Asia and the Pacific	N*	987379871	979885745	975146322	971291417	968733548	967072656	966070312
				% wrt 1.b.	27.64	27.12	26.69	26.31	25.97	25.66	25.38
		2.c.	India	N	373755592	375114219	376811884	378289367	379470915	380174492	380274337
				% wrt 1.c.	33.19	32.79	32.43	32.07	31.70	31.31	30.89
				% wrt 2.a.	20.42	20.52	20.58	20.61	20.60	20.55	20.45
				% wrt 2.b.	37.85	38.28	38.64	38.95	39.17	39.31	39.36
		2.d.	Karnataka	N#	17594380	17851297	18111966	18376441	18644779	18917034	19193265
				% wrt 2.c.	4.71	4.76	4.81	4.86	4.91	4.98	5.05
		2.e.	Belgaum	N#	1474003	1492669	1511571	1530712	1550096	1569725	1589603
				% wrt 2.c.	0.39	0.40	0.40	0.40	0.41	0.41	0.42
				% wrt 2.d.	8.38	8.36	8.35	8.33	8.31	8.30	8.28
3	PLHIV (All ages)[20, 39,42]	3.a.	Global	N	29800000	30100000	30400000	30800000	31300000	31900000	32400000
				% wrt 1.a.	0.46	0.46	0.46	0.46	0.46	0.47	0.47
		3.b.	Asia and the Pacific	N	5000000	5000000	4900000	4900000	4900000	4900000	4900000
				% wrt 1.b.	0.14	0.14	0.13	0.13	0.13	0.13	0.13
				% wrt 3.a.	16.78	16.61	16.12	15.91	15.65	15.36	15.12
		3.c.	India	N	2900000	2800000	2600000	2500000	2400000	2400000	2300000
				% wrt 1.c.	0.26	0.24	0.22	0.21	0.20	0.20	0.19
				% wrt 3.a.	9.73	9.30	8.55	8.12	7.67	7.52	7.10
				% wrt 3.b.	58.00	56.00	53.06	51.02	48.98	48.98	46.94
		3.d.	Karnataka	N				244500	234191	225665	218944
				% wrt 1.d.				0.42	0.40	0.38	0.36
				% wrt 3.c.				9.78	9.76	9.40	9.52
4	PLHIV (Adults, 15+ years)[39, 41,43]	4.a.	Global	N	27800000	28000000	28300000	28700000	29200000	29800000	30300000
				% wrt 3.a.	93.29	93.02	93.09	93.18	93.29	93.42	93.52
		4.b.	Asia and the Pacific	N	4800000	4800000	4800000	4800000	4800000	4800000	4800000
				% wrt 3.b.	97.40	97.20	97.14	97.14	97.14	97.14	97.35
				% wrt 4.a.	17.27	17.14	16.96	16.72	16.44	16.11	15.84
		4.c.	India	N	2800000	2600000	2500000	2400000	2300000	2300000	2200000
				% wrt 3.c.	96.55	96.43	96.15	96.00	95.96	96.13	96.17
				% wrt 4.a.	10.07	9.29	8.83	8.36	7.88	7.72	7.26
				% wrt 4.b.	58.33	54.17	52.08	50.00	47.92	47.92	45.83
		4.d.	Karnataka	N$				230547	220204	211688	203705
				% wrt 3.d.				94.29	94.03	93.81	93.04
				% wrt 4.c.				9.61	9.57	9.20	9.26
5	PLHIV (Male adults,	5.a.	Global	N	13700000	13800000	13900000	14100000	14300000	14500000	14800000
				% wrt 4.a.	49.28	49.29	49.12	49.13	48.97	48.66	48.84
		5.b.		N	3100000	3100000	3100000	3100000	3000000	3000000	3000000

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	15+ years)[39]		Asia and the Pacific	% wrt 4.b.	64.58	64.58	64.58	64.58	62.50	62.50	62.50
		5.c.	India	N	1700000	1600000	1500000	1500000	1400000	1400000	1300000
				% wrt 4.c.	60.71	61.54	60.00	62.50	60.87	60.87	59.09
6	PLHIV (Female adults, 15+ years)[39]	6.a.	Global	N	14100000	14300000	14500000	14700000	14900000	15200000	15500000
				% wrt 4.a.	50.72	50.71	50.88	50.87	51.03	51.34	51.16
		6.b.	Asia and the Pacific	N	1700000	1700000	1700000	1700000	1700000	1700000	1700000
				% wrt 4.b.	35.42	35.42	35.42	35.42	37.50	37.50	37.50
		6.c.	India	N	1100000	1100000	1000000	970000	940000	920000	900000
				% wrt 4.c.	39.29	38.46	40.00	37.50	39.13	39.13	40.91
7	CLHIV (<15 years)[39, 41-43]	7.a.	Global	N	2000000	2100000	2100000	2100000	2100000	2100000	2100000
				% wrt 2.a.	0.11	0.11	0.11	0.11	0.11	0.11	0.11
				% wrt 3.a.	6.71	6.98	6.91	6.82	6.71	6.58	6.48
		7.b.	Asia and the Pacific	N	130000	140000	140000	140000	140000	140000	130000
				% wrt 2.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	2.60	2.80	2.86	2.86	2.86	2.86	2.65
				% wrt 7.a.	6.50	6.67	6.67	6.67	6.67	6.67	6.19
		7.c.	India	N	100000	100000	100000	100000	97000	93000	88000
				% wrt 2.c.	0.03	0.03	0.03	0.03	0.03	0.02	0.02
				% wrt 3.c.	3.45	3.57	3.85	4.00	4.04	3.88	3.83
				% wrt 7.a.	5.00	4.76	4.76	4.76	4.62	4.43	4.19
				% wrt 7.b.	76.92	71.43	71.43	71.43	69.29	66.43	67.69
		7.d.	Karnataka	N[$]				13953	13986	13977	15239
				% wrt 2.d.				0.08	0.08	0.07	0.08
				% wrt 3.d.				5.71	5.97	6.19	6.96
				% wrt 7.c.				13.95	14.42	15.03	17.32
8	AIDS orphans[39]	8.a.	Global	N	13000000	14000000	14700000	15200000	15500000	15500000	15300000
		8.b.	Asia and the Pacific	N	1800000	2000000	2100000	2200000	2300000	2300000	2300000
				% wrt 8.a.	13.85	14.29	14.29	14.47	14.84	14.84	15.03
		8.c.	India	N	1100000	1300000	1400000	1400000	1500000	1500000	1400000
				% wrt 8.a.	8.46	9.29	9.52	9.21	9.68	9.68	9.15
				% wrt 8.b.	61.11	65.00	66.67	63.64	65.22	65.22	60.87
9	HIV prevalence (Adults, 15-49 years)[20, 39,42]	9.a.	Global	%	0.80	0.80	0.80	0.70	0.70	0.70	0.70
		9.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		9.c.	India	%	0.40	0.40	0.40	0.30	0.30	0.30	0.30
		9.d.	Karnataka	%				0.68	0.64	0.59	0.56

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
10	HIV pr-evalence (Male adults, 15-49 years)[39]	10.a.	Global	%	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		10.b.	Asia and the Pacific	%	0.30	0.30	0.30	0.30	0.30	0.30	0.30
		10.c.	India	%	0.50	0.40	0.40	0.40	0.40	0.30	0.30
11	HIV prevalence (Female adults, 15-49 years)[39]	11.a.	Global	%	0.80	0.80	0.80	0.80	0.80	0.80	0.80
		11.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		11.c.	India	%	0.30	0.30	0.30	0.30	0.30	0.20	0.20
12	New HIV infections (All ages)[39, 43]	12.a.	Global	N	2500000	2500000	2400000	2400000	2300000	2300000	2200000
				% wrt 1.a.	0.04	0.04	0.04	0.04	0.03	0.03	0.03
				% wrt 3.a.	8.39	8.31	7.89	7.79	7.35	7.21	6.79
		12.b.	Asia and the Pacific	N	370000	360000	350000	340000	330000	320000	320000
				% wrt 1.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	7.40	7.20	7.14	6.94	6.73	6.53	6.53
				% wrt 12.a.	14.80	14.40	14.58	14.17	14.35	13.91	14.55
		12.c.	India	N	130000	120000	110000	110000	110000	110000	110000
				% wrt 1.c.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.c.	4.48	4.29	4.23	4.40	4.58	4.58	4.78
				% wrt 12.a.	5.20	4.80	4.58	4.58	4.78	4.78	5.00
				% wrt 12.b.	35.14	33.33	31.43	32.35	33.33	34.38	34.38
		12.d.	Karnataka	N[!]				7508	6338	5038	4524
				% wrt 1.d.				0.01	0.01	0.01	0.01
				% wrt 3.d.				3.07	2.71	2.23	2.07
				% wrt 12.c.				6.83	5.76	4.58	4.11
13	New HIV infections (Adults, 15+ years)[20, 39,42]	13.a.	Global	N	2100000	2100000	2000000	2000000	2000000	2000000	1900000
				% wrt 4.a.	7.55	7.50	7.07	6.97	6.85	6.71	6.27
				% wrt 12.a.	84.00	84.80	85.00	85.83	86.09	86.96	87.73
		13.b.	Asia and the Pacific	N	340000	340000	330000	320000	310000	310000	310000
				% wrt 4.b.	7.08	7.08	6.88	6.67	6.46	6.46	6.46
				% wrt 12.b.	94.05	94.44	94.57	95.00	95.15	95.31	95.31
				% wrt 13.a.	16.19	16.19	16.50	16.00	15.50	15.50	16.32
		13.c.	India	N	130000	120000	110000	110000	110000	110000	110000
				% wrt 4.c.	4.64	4.62	4.40	4.58	4.78	4.78	5.00
				% wrt 12.c.	88.46	89.17	89.09	91.00	92.09	92.64	93.00
				% wrt 13.a.	6.19	5.71	5.50	5.50	5.50	5.50	5.79
				% wrt 13.b.	38.24	35.29	33.33	34.38	35.48	35.48	35.48
		13.d.		N				5815	4950	3860	3495

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
			Karnataka	% wrt 4.d.				2.52	2.25	1.82	1.72
				% wrt 12.d.				77.45	78.10	76.62	77.25
				% wrt 13.c.				5.29	4.50	3.51	3.18
14	New HIV infection (Male adults, 15+ years)[39]	14.a.	Global	N	1000000	1000000	1000000	1000000	990000	990000	970000
				% wrt 13.a.	47.62	47.62	50.00	50.00	49.50	49.50	51.05
		14.b.	Asia and the Pacific	N	230000	220000	220000	210000	200000	200000	200000
				% wrt 13.b.	67.65	64.71	66.67	65.63	64.52	64.52	64.52
		14.c.	India	N	74000	71000	68000	67000	65000	66000	67000
				% wrt 13.c.	56.92	59.17	61.82	60.91	59.09	60.00	60.91
15	New HIV infections (Female adults, 15+ years)[39]	15.a.	Global	N	1100000	1000000	1000000	1000000	1000000	980000	950000
				% wrt 13.a.	52.38	52.38	50.00	50.00	50.50	50.50	48.95
		15.b.	Asia and the Pacific	N	120000	120000	110000	110000	110000	110000	110000
				% wrt 13.b.	32.35	35.29	33.33	34.38	35.48	35.48	35.48
		15.c.	India	N	51000	48000	46000	45000	43000	44000	45000
				% wrt 13.c.	43.08	40.83	38.18	39.09	40.91	40.00	39.09
16	New HIV infections (Children, <15 years)[39]	16.a.	Global	N	400000	380000	360000	340000	320000	300000	270000
				% wrt 2.a.	0.02	0.02	0.02	0.02	0.02	0.02	0.01
				% wrt 7.a.	20.00	18.10	17.14	16.19	15.24	14.29	12.86
				% wrt 12.a.	16.00	15.20	15.00	14.17	13.91	13.04	12.27
		16.b.	Asia and the Pacific	N	22000	20000	19000	17000	16000	15000	15000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	16.92	14.29	13.57	12.14	11.43	10.71	11.54
				% wrt 12.b.	5.95	5.56	5.43	5.00	4.85	4.69	4.69
				% wrt 16.a.	5.50	5.26	5.28	5.00	5.00	5.00	5.56
		16.c.	India	N	15000	13000	12000	9900	8700	8100	7700
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	15.00	13.00	12.00	9.90	8.97	8.71	8.75
				% wrt 12.c.	11.54	10.83	10.91	9.00	7.91	7.36	7.00
				% wrt 16.a.	3.75	3.42	3.33	2.91	2.72	2.70	2.85
				% wrt 16.b.	68.18	65.00	63.16	58.24	54.38	54.00	51.33
		16.d.	Karnataka	N[!]				1693	1388	1178	1028
				% wrt 2.d.				0.01	0.01	0.01	0.01
				% wrt 7.d.				12.13	9.92	8.43	6.75
				% wrt 12.d.				22.55	21.90	23.38	22.72
				% wrt 16.c.				17.10	15.95	14.54	13.35
17	HIV incidence per 1000	17.a.	Global	%	0.41	0.40	0.38	0.37	0.36	0.35	0.33
		17.b.	Asia and the Pacific	%	0.11	0.11	0.10	0.10	0.09	0.09	0.09

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	population (All ages)[39]	17.c.	India	%	0.12	0.12	0.11	0.10	0.10	0.10	0.10
18	HIV incidence per 1000 population (Adults, 15-49 years)[39]	18.a.	Global	%	0.62	0.60	0.58	0.57	0.55	0.54	0.52
		18.b.	Asia and the Pacific	%	0.17	0.17	0.16	0.16	0.15	0.14	0.14
		18.c.	India	%	0.18	0.17	0.16	0.15	0.15	0.15	0.14
19	Change in new HIV infections, 2010-2017[39]	19.a.	Global	%							
		19.b.	Asia and the Pacific	%							
		19.c.	India	%							
20	Incidence-Prevalence ratio[39]	20.a.	Global		0.08	0.08	0.08	0.08	0.07	0.07	0.07
		20.b.	Asia and the Pacific		0.07	0.07	0.07	0.07	0.07	0.07	0.07
		20.c.	India		0.05	0.05	0.05	0.05	0.05	0.05	0.05
21	AIDS-related deaths (All ages)[20, 39,42]	21.a.	Global	N	1900000	1900000	1900000	1800000	1700000	1500000	1400000
				% wrt 1.a.	0.03	0.03	0.03	0.03	0.03	0.02	0.02
				% wrt 3.a.	6.38	6.31	6.25	5.84	5.43	4.70	4.32
		21.b.	Asia and the Pacific	N	360000	360000	350000	340000	320000	300000	280000
				% wrt 1.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	7.20	7.20	7.14	6.94	6.53	6.12	5.71
				% wrt 21.a.	18.95	18.95	18.42	18.89	18.82	20.00	20.00
		21.c.	India	N	230000	240000	230000	220000	200000	180000	160000
				% wrt 1.c.	0.02	0.02	0.02	0.02	0.02	0.01	0.01
				% wrt 3.c.	7.93	8.57	8.85	8.80	8.33	7.50	6.96
				% wrt 21.a.	12.11	12.63	12.11	12.22	11.76	12.00	11.43
				% wrt 21.b.	63.89	66.67	65.71	64.71	62.50	60.00	57.14
		21.d.	Karnataka	N				18370	16621	13668	11317
				% wrt 1.d.				0.03	0.03	0.02	0.02
				% wrt 3.d.				7.51	7.10	6.06	5.17
				% wrt 21.c.				8.35	8.31	7.59	7.07
22	AIDS-related deaths	22.a.	Global	N	1700000	1700000	1600000	1500000	1400000	1300000	1200000
				% wrt 4.a.	6.12	6.07	5.65	5.23	4.79	4.36	3.96
				% wrt 21.a.	85.26	85.26	85.79	86.11	86.47	86.00	85.71

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	(Adults, 15+ years)[39]	22.b.	Asia and the Pacific	N	330000	350000	340000	320000	310000	290000	270000
				% wrt 4.b.	6.88	7.29	7.08	6.67	6.46	6.04	5.63
				% wrt 21.b.	95.56	95.56	95.71	95.88	95.94	96.00	96.07
				% wrt 22.a.	19.41	20.59	21.25	21.33	22.14	22.31	22.50
		22.c.	India	N	220000	220000	220000	210000	190000	170000	150000
				% wrt 4.c.	7.86	8.46	8.80	8.75	8.26	7.39	6.82
				% wrt 21.c.	94.78	95.42	95.65	95.68	95.70	95.78	95.75
				% wrt 22.a.	12.94	12.94	13.75	14.00	13.57	13.08	12.50
				% wrt 22.b.	66.67	62.86	64.71	65.63	61.29	58.62	55.56
23	AIDS-related deaths (Male adults, 15+ years)[39]	23.a.	Global	N	830000	830000	810000	770000	720000	670000	630000
				% wrt 22.a.	48.82	48.82	50.63	51.33	51.43	51.54	52.50
		23.b.	Asia and the Pacific	N	220000	230000	220000	210000	200000	190000	180000
				% wrt 22.b.	66.67	65.71	64.71	65.63	64.52	65.52	66.67
		23.c.	India	N	140000	140000	130000	130000	110000	100000	91000
				% wrt 22.c.	63.64	63.64	59.09	61.90	57.89	58.82	60.67
24	AIDS-related deaths (Female adults, 15+ years)[39]	24.a.	Global	N	830000	830000	810000	770000	700000	640000	600000
				% wrt 22.a.	51.18	51.18	49.38	48.67	48.57	48.46	47.50
		24.b.	Asia and the Pacific	N	120000	120000	120000	110000	110000	97000	90000
				% wrt 22.b.	33.33	34.29	35.29	34.38	35.48	34.48	33.33
		24.c.	India	N	86000	88000	87000	83000	76000	67000	58000
				% wrt 22.c.	36.36	36.36	40.91	38.10	42.11	41.18	39.33
25	AIDS-related deaths (Childre n, <15 years)[39]	25.a.	Global	N	280000	280000	270000	250000	230000	210000	200000
				% wrt 2.a.	0.02	0.02	0.01	0.01	0.01	0.01	0.01
				% wrt 7.a.	14.00	13.33	12.86	11.90	10.95	10.00	9.52
				% wrt 21.a.	14.74	14.74	14.21	13.89	13.53	14.00	14.29
		25.b.	Asia and the Pacific	N	16000	16000	15000	14000	13000	12000	11000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	12.31	11.43	10.71	10.00	9.29	8.57	8.46
				% wrt 21.b.	4.44	4.44	4.29	4.12	4.06	4.00	3.93
				% wrt 25.a.	5.71	5.71	5.56	5.60	5.65	5.71	5.50
		25.c.	India	N	12000	11000	10000	9500	8600	7600	6800
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	12.00	11.00	10.00	9.50	8.87	8.17	7.73
				% wrt 21.c.	5.22	4.58	4.35	4.32	4.30	4.22	4.25
				% wrt 25.a.	4.29	3.93	3.70	3.80	3.74	3.62	3.40
				% wrt 25.b.	75.00	68.75	66.67	67.86	66.15	63.33	61.82
26	Change in AIDS-related	26.a.	Global	%							
		26.b.	Asia and the Pacific	%							

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	deaths, 2010-2017[39]	26.c.	India	%							
27	Incidence-Mortality ratio[39]	27.a.	Global		1.17	1.15	1.15	1.19	1.25	1.32	1.35
		27.b.	Asia and the Pacific		0.95	0.94	0.93	0.94	0.96	1.01	1.07
		27.c.	India		0.55	0.52	0.51	0.51	0.55	0.62	0.70
28	PLHIV receiving ART (All ages)[31-34,37,39,47-59]	28.a.	Global	N^	1490000	2107000	2736000	3696000	5008000	6380000	8020848
				% wrt 3.a.	5.00	7.00	9.00	12.00	16.00	20.00	24.76
		28.b.	Asia and the Pacific	N^	440000	520000	614950	735000	842800	972650	914472
				% wrt 3.b.	8.80	10.40	12.55	15.00	17.20	19.85	18.66
				% wrt 28.a.	29.53	24.68	22.48	19.89	16.83	15.25	11.40
		28.c.	India	N^		28000	78000	125000	216000	312000	412125
				% wrt 3.c.		1.00	3.00	5.00	9.00	13.00	17.92
				% wrt 28.a.		1.33	2.85	3.38	4.31	4.89	5.14
				% wrt 28.b.		5.38	12.68	17.01	25.63	32.08	45.07
		28.d.	Karnataka	N				7094	13599	16285	14100
				% wrt 3.d.				2.90	5.81	7.22	6.44
				% wrt 28.c.				5.68	6.30	5.22	3.42
		28.e.	Belgaum	N				675	1207	1778	2347
				% wrt 28.d.				9.52	8.88	10.92	16.65
29	PLHIV receiving ART (Adults, 15+ years)[39,41]	29.a.	Global	N^						6085000	7564938
				% wrt 4.a.						20.42	24.97
				% wrt 28.a.						95.38	94.32
		29.b.	Asia and the Pacific	N							869277
				% wrt 4.b.							18.11
				% wrt 28.b.							95.06
				% wrt 29.a.							11.49
		29.c.	India	N^				115642	179558	274277	386810
				% wrt 4.c.				4.82	7.81	11.93	17.58
				% wrt 28.c.				92.51	83.13	87.91	93.86
				% wrt 29.a.						4.51	5.11
				% wrt 29.b.							44.50
30	PLHIV receiving ART (Male adults, 15+ years)[37,39]	30.a.	Global	N^						3045000	3677872
				% wrt 29.a.						50.04	48.62
		30.b.	Asia and the Pacific	N							509124
				% wrt 29.b.							58.57
		30.c.	India	N^						154677	220619
				% wrt 29.c.						56.39	57.04

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
31	PLHIV receiving ART (Female adults, 15+ years)[39]	31.a.	Global	N^						3040000	3887065
				% wrt 29.a.						49.96	51.38
		31.b.	Asia and the Pacific	N							360152
				% wrt 29.b.							41.43
		31.c.	India	N^						119600	166190
				% wrt 29.c.						43.61	42.96
32	CLHIV receiving ART (<15 years)[31-34,39,41,42,47-59]	32.a.	Global	N						295000	455910
				% wrt 7.a.						14.05	21.71
				% wrt 28.a.						4.62	5.68
		32.b.	Asia and the Pacific	N							45195
				% wrt 7.b.							34.77
				% wrt 28.b.							4.94
				% wrt 32.a.							9.91
		32.c.	India	N				9358	13079	18618	25315
				% wrt 7.c.				9.36	13.48	20.02	28.77
				% wrt 28.c.				7.49	6.06	5.97	6.14
				% wrt 32.a.						6.31	5.55
				% wrt 32.b.							56.01
		32.d.	Karnataka	N[!]				1198	1928	3003	3640
				% wrt 7.d.				8.59	13.79	21.49	23.89
				% wrt 28.d.				16.89	14.18	18.44	25.82
				% wrt 32.c.				12.80	14.74	16.13	14.38
		32.e.	Belgaum	N				101	223		
				% wrt 32.d.				8.43	11.57		
33	Deaths averted by ART (All ages)[39]	33.a.	Global	N	117361	201803	313766	452850	609375	700109	840000
				% wrt 3.a.	0.39	0.67	1.03	1.47	1.95	2.19	2.59
				% wrt 28.a.	7.88	9.58	11.47	12.25	12.17	10.97	10.47
		33.b.	Asia and the Pacific	N	12156	23739	43307	60463	82448	100769	120000
				% wrt 3.b.	0.24	0.47	0.88	1.23	1.68	2.06	2.45
				% wrt 28.b.	2.76	4.57	7.04	8.23	9.78	10.36	13.12
				% wrt 33.a.	10.36	11.76	13.80	13.35	13.53	14.39	14.29
		33.c.	India	N		2540	8465	17839	33194	46558	60000
				% wrt 3.c.		0.09	0.33	0.71	1.38	1.94	2.61
				% wrt 28.c.		9.07	10.85	14.27	15.37	14.92	14.56
				% wrt 33.a.		1.26	2.70	3.94	5.45	6.65	7.14
				% wrt 33.b.		10.70	19.55	29.50	40.26	46.20	50.00
34	Pregnant women needing ARV for	34.a.	Global	N	1300000	1300000	1300000	1300000	1300000	1300000	1400000
				% wrt 1.a. (per million)	202	199	197	195	192	190	202
				% wrt 3.a.	4.36	4.32	4.28	4.22	4.15	4.08	4.32
				% wrt 4.a.	4.68	4.64	4.59	4.53	4.45	4.36	4.62

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	PMTCT [39,41]			% wrt 6.a.	9.22	9.09	8.97	8.84	8.72	8.55	9.03
		34.b.	Asia and the Pacific	N	74000	71000	68000	66000	64000	63000	62000
				% wrt 1.b. (per million)	20.71	19.65	18.61	17.88	17.16	16.72	16.29
				% wrt 3.b.	1.48	1.42	1.39	1.35	1.31	1.29	1.27
				% wrt 4.b.	1.54	1.48	1.42	1.38	1.33	1.31	1.29
				% wrt 6.b.	4.35	4.18	4.00	3.88	3.76	3.71	3.65
				% wrt 34.a.	5.69	5.46	5.23	5.08	4.92	4.85	4.43
		34.c.	India	N				51375	47122	43788	27000
				% wrt 1.c. (per million)				43.55	39.36	36.06	21.93
				% wrt 3.c.				2.06	1.96	1.82	1.17
				% wrt 4.c.				2.14	2.05	1.90	1.23
				% wrt 6.c.				5.30	5.01	4.76	3.00
				% wrt 34.a.				3.95	3.62	3.37	1.93
				% wrt 34.b.				77.84	73.63	69.50	43.55
		34.d.	Karnataka	N				4604	4047	3554	3189
				% wrt 1.d. (per million)				79.86	69.19	59.88	52.96
				% wrt 3.d.				1.88	1.73	1.57	1.46
				% wrt 4.d.				2.00	1.84	1.68	1.57
				% wrt 34.c.				8.96	8.59	8.12	11.81
35	Pregnant women who received ARV for PMTCT [39,41,42]	35.a.	Global	N							686136
				% wrt 34.a.							49.01
		35.b.	Asia and the Pacific	N							15224
				% wrt 34.b.							24.55
				% wrt 35.a.							2.22
		35.c.	India	N				9300	13474	13094	12651
				% wrt 34.c.				18.10	28.59	29.90	46.86
				% wrt 35.a.							1.84
				% wrt 35.b.							83.10
		35.d.	Karnataka	N				957	2163	2200	2187
				% wrt 34.d.				20.79	53.45	61.90	68.58
				% wrt 35.c.				10.29	16.05	16.80	17.29
36	HIV-exposed-but-uninfected children [39]	36.a.	Global	N	9800000	10400000	11000000	11500000	11900000	12400000	12800000
		36.b.	Asia and the Pacific	N	640000	690000	730000	760000	780000	790000	800000
				% wrt 36.a.	6.53	6.63	6.64	6.61	6.55	6.37	6.25
		36.c.	India	N	450000	470000	490000	500000	500000	500000	490000
				% wrt 36.a.	4.59	4.52	4.45	4.35	4.20	4.03	3.83
				% wrt 36.b.	70.31	68.12	67.12	65.79	64.10	63.29	61.25
37		37.a.	Global	N	19385	31653	44807	67215	89456	133045	130000

S. No.	Criteria	Sub-S. No.	Region	Description	2004	2005	2006	2007	2008	2009	2010
	New HIV infections averted by PMTCT[39]			% wrt 34.a.	1.49	2.43	3.45	5.17	6.88	10.23	9.29
				% wrt 35.a.							18.95
		37.b.	Asia and the Pacific	N	1611	2091	2431	2890	3370	3693	4200
				% wrt 34.b.	2.18	2.94	3.57	4.38	5.27	5.86	6.77
				% wrt 35.b.							27.59
				% wrt 37.a.	8.31	6.60	5.43	4.30	3.77	2.78	3.23
		37.c.	India	N							
				% wrt 34.c.							
				% wrt 35.c.							
				% wrt 37.a.							
				% wrt 37.b.							
38	Exposed children having a virological HIV test for EID within 2 months of age[39]	38.a.	Global	%							33.00
		38.b.	Asia and the Pacific	%							15.00
		38.c.	India	%							6.00

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
1	Total Population (All ages)[37, 38]	1.a.	Global	N	7014983968	7099557649	7185137526	7271322821	7357559450	7444157356	7530360149
		1.b.	Asia and the Pacific	N*	3844139182	3881923997	3919715835	3957568465	3995131535	4032833450	4070349094
				% wrt 1.a.	54.80	54.68	54.55	54.43	54.30	54.17	54.05
		1.c.	India	N	1247236029	1263065852	1278562207	1293859294	1309053980	1324171354	1339180127
				% wrt 1.a.	17.78	17.79	17.79	17.79	17.79	17.79	17.78
				% wrt 1.b.	32.45	32.54	32.62	32.69	32.77	32.83	32.90
		1.d.	Karnataka	N#	61095297	61987425	62892581	63810953	64742736	65688125	66647319
				% wrt 1.c.	4.90	4.91	4.92	4.93	4.95	4.96	4.98
		1.e.	Belgaum	N#	4779661	4840187	4901480	4963548	5026403	5090054	5154510
				% wrt 1.c.	0.38	0.38	0.38	0.38	0.38	0.38	0.38
				% wrt 1.d.	7.82	7.81	7.79	7.78	7.76	7.75	7.73
2	Child Population (0-14 years)[37, 38]	2.a.	Global	N	1870978894	1884010620	1897845372	1911832495	1925341700	1939488552	1952720168
				% wrt 1.a.	26.67	26.54	26.41	26.29	26.17	26.05	25.93
		2.b.	Asia and the Pacific	N*	966091116	966760329	967831797	968922850	969688268	970619918	971313072
				% wrt 1.b.	25.13	24.90	24.69	24.48	24.27	24.07	23.86
		2.c.	India	N	380287007	379512707	378168020	376631361	375144882	373356040	372060792

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
				% wrt 1.c.	30.49	30.05	29.58	29.11	28.66	28.20	27.78
				% wrt 2.a.	20.33	20.14	19.93	19.70	19.48	19.25	19.05
				% wrt 2.b.	39.36	39.26	39.07	38.87	38.69	38.47	38.30
		2.d.	Karnataka	N[#]	16024874	16258873	16496289	16737172	16981572	17229541	17481131
				% wrt 2.c.	4.21	4.28	4.36	4.44	4.53	4.61	4.70
		2.e.	Belgaum	N[#]	1366381	1383684	1401206	1418950	1436918	1455114	1473541
				% wrt 2.c.	0.36	0.36	0.37	0.38	0.38	0.39	0.40
				% wrt 2.d.	8.53	8.51	8.49	8.48	8.46	8.45	8.43
3	PLHIV (All ages)[20, 39,42]	3.a.	Global	N	33000000	33700000	34300000	35000000	35600000	36300000	36900000
				% wrt 1.a.	0.47	0.47	0.48	0.48	0.48	0.49	0.49
		3.b.	Asia and the Pacific	N	4900000	5000000	5000000	5000000	5100000	5100000	5200000
				% wrt 1.b.	0.13	0.13	0.13	0.13	0.13	0.13	0.13
				% wrt 3.a.	14.85	14.84	14.58	14.29	14.33	14.05	14.09
		3.c.	India	N	2300000	2300000	2200000	2200000	2200000	2200000	2100000
				% wrt 1.c.	0.18	0.18	0.17	0.17	0.17	0.17	0.16
				% wrt 3.a.	6.97	6.82	6.41	6.29	6.18	6.06	5.69
				% wrt 3.b.	46.94	46.00	44.00	44.00	43.14	43.14	40.38
		3.d.	Karnataka	N	214506	211519	206826	202622	199060	195000	
				% wrt 1.d.	0.35	0.34	0.33	0.32	0.31	0.30	
				% wrt 3.c.	9.33	9.20	9.40	9.21	9.05	8.86	
4	PLHIV (Adults, 15+ years)[39, 41,43]	4.a.	Global	N	31000000	31600000	32300000	33000000	33700000	34400000	35100000
				% wrt 3.a.	93.64	94.07	94.17	94.29	94.66	94.77	95.12
		4.b.	Asia and the Pacific	N	4800000	4900000	4900000	4900000	5000000	5000000	5100000
				% wrt 3.b.	97.35	97.60	97.60	97.60	97.65	97.84	97.88
				% wrt 4.a.	15.48	15.51	15.17	14.85	14.84	14.53	14.53
		4.c.	India	N	2200000	2200000	2200000	2100000	2100000	2100000	2100000
				% wrt 3.c.	96.35	96.57	96.59	96.77	96.91	97.05	97.10
				% wrt 4.a.	7.10	6.96	6.81	6.36	6.23	6.10	5.98
				% wrt 4.b.	45.83	44.90	44.90	42.86	42.00	42.00	41.18
		4.d.	Karnataka	N[$]	199962	198163	193624	189721	186714	183418	
				% wrt 3.d.	93.22	93.69	93.62	93.63	93.80	94.06	
				% wrt 4.c.	9.09	9.01	8.80	9.03	8.89	8.73	
5	PLHIV (Male adults, 15+ years)[39]	5.a.	Global	N	15100000	15400000	15700000	15900000	16200000	16500000	16800000
				% wrt 4.a.	48.71	48.73	48.61	48.18	48.07	47.97	47.86
		5.b.	Asia and the Pacific	N	3100000	3100000	3100000	3100000	3100000	3100000	3200000
				% wrt 4.b.	64.58	63.27	63.27	63.27	62.00	62.00	62.75
		5.c.	India	N	1300000	1300000	1300000	1200000	1200000	1200000	1200000
				% wrt 4.c.	59.09	59.09	59.09	57.14	57.14	57.14	57.14
6	PLHIV (Female adults,	6.a.	Global	N	15900000	16300000	16700000	17100000	17500000	17900000	18200000
				% wrt 4.a.	51.29	51.27	51.39	51.82	51.93	52.03	52.14
		6.b.		N	1800000	1800000	1800000	1800000	1800000	1900000	1900000

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	15+ years)[39]		Asia and the Pacific	% wrt 4.b.	35.42	36.73	36.73	36.73	38.00	38.00	37.25
		6.c.	India	N	900000	900000	890000	880000	880000	880000	880000
				% wrt 4.c.	40.91	40.91	40.91	42.86	42.86	42.86	42.86
7	CLHIV (<15 years)[39, 41-43]	7.a.	Global	N	2100000	2000000	2000000	2000000	1900000	1900000	1800000
				% wrt 2.a.	0.11	0.11	0.11	0.10	0.10	0.10	0.09
				% wrt 3.a.	6.36	5.93	5.83	5.71	5.34	5.23	4.88
		7.b.	Asia and the Pacific	N	130000	120000	120000	120000	120000	110000	110000
				% wrt 2.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	2.65	2.40	2.40	2.40	2.35	2.16	2.12
				% wrt 7.a.	6.19	6.00	6.00	6.00	6.32	5.79	6.11
		7.c.	India	N	84000	79000	75000	71000	68000	65000	61000
				% wrt 2.c.	0.02	0.02	0.02	0.02	0.02	0.02	0.02
				% wrt 3.c.	3.65	3.43	3.41	3.23	3.09	2.95	2.90
				% wrt 7.a.	4.00	3.95	3.75	3.55	3.58	3.42	3.39
				% wrt 7.b.	64.62	65.83	62.50	59.17	56.67	59.09	55.45
		7.d.	Karnataka	N[$]	14544	13356	13202	12900	12346	11582	
				% wrt 2.d.	0.09	0.08	0.08	0.08	0.07	0.07	
				% wrt 3.d.	6.78	6.31	6.38	6.37	6.20	5.94	
				% wrt 7.c.	17.31	16.91	17.60	18.17	18.16	17.82	
8	AIDS orphans[39]	8.a.	Global	N	15100000	14700000	14300000	13800000	13300000	12800000	12200000
		8.b.	Asia and the Pacific	N	2200000	2200000	2100000	2000000	2000000	1900000	1800000
				% wrt 8.a.	14.57	14.97	14.69	14.49	15.04	14.84	14.75
		8.c.	India	N	1400000	1300000	1300000	1200000	1100000	1000000	930000
				% wrt 8.a.	9.27	8.84	9.09	8.70	8.27	7.81	7.62
				% wrt 8.b.	63.64	59.09	61.90	60.00	55.00	52.63	51.67
9	HIV prevalence (Adults, 15-49 years)[20, 39,42]	9.a.	Global	%	0.70	0.80	0.80	0.80	0.80	0.80	0.80
		9.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		9.c.	India	%	0.30	0.30	0.20	0.20	0.20	0.20	0.20
		9.d.	Karnataka	%	0.53	0.51	0.49	0.47	0.45	0.43	
10	HIV pr-evalence (Male adults, 15-49 years)[39]	10.a.	Global	%	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		10.b.	Asia and the Pacific	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
		10.c.	India	%	0.30	0.30	0.30	0.30	0.30	0.30	0.20
11		11.a.	Global	%	0.80	0.80	0.80	0.80	0.80	0.80	0.80

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	HIV prevalence (Female adults, 15-49 years)[39]	11.b.	Asia and the Pacific	%	0.10	0.10	0.10	0.10	0.10	0.10	0.10
		11.c.	India	%	0.20	0.20	0.20	0.20	0.20	0.20	0.20
12	New HIV infections (All ages)[39, 43]	12.a.	Global	N	2100000	2100000	2000000	2000000	1900000	1900000	1800000
				% wrt 1.a.	0.03	0.03	0.03	0.03	0.03	0.03	0.02
				% wrt 3.a.	6.36	6.23	5.83	5.71	5.34	5.23	4.88
		12.b.	Asia and the Pacific	N	320000	310000	300000	290000	290000	280000	280000
				% wrt 1.b.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.b.	6.53	6.20	6.00	5.80	5.69	5.49	5.38
				% wrt 12.a.	15.24	14.76	15.00	14.50	15.26	14.74	15.56
		12.c.	India	N	110000	110000	100000	97000	93000	89000	84000
				% wrt 1.c.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.c.	4.78	4.78	4.55	4.41	4.23	4.05	4.00
				% wrt 12.a.	5.24	5.24	5.00	4.85	4.89	4.68	4.67
				% wrt 12.b.	34.38	35.48	33.33	33.45	32.07	31.79	30.00
		12.d.	Karnataka	N[I]	4075	3641	3264	3011	2703	2261	
				% wrt 1.d.	0.01	0.01	0.01	0.00	0.00	0.00	
				% wrt 3.d.	1.90	1.72	1.58	1.49	1.36	1.16	
				% wrt 12.c.	3.70	3.31	3.26	3.10	2.91	2.54	
13	New HIV infections (Adults, 15+ years)[20, 39,42]	13.a.	Global	N	1900000	1800000	1800000	1800000	1700000	1700000	1600000
				% wrt 4.a.	6.13	5.70	5.57	5.45	5.04	4.94	4.56
				% wrt 12.a.	88.10	89.05	89.00	90.00	90.00	90.53	90.00
		13.b.	Asia and the Pacific	N	300000	300000	290000	280000	280000	270000	270000
				% wrt 4.b.	6.25	6.12	5.92	5.71	5.60	5.40	5.29
				% wrt 12.b.	95.31	95.48	95.33	95.86	95.86	96.07	96.43
				% wrt 13.a.	15.79	16.67	16.11	15.56	16.47	15.88	16.88
		13.c.	India	N	110000	110000	100000	97000	93000	89000	84000
				% wrt 4.c.	5.00	5.00	4.55	4.62	4.43	4.24	4.00
				% wrt 12.c.	93.18	93.64	93.40	94.33	94.30	95.06	95.60
				% wrt 13.a.	5.79	6.11	5.56	5.39	5.47	5.24	5.25
				% wrt 13.b.	36.67	36.67	34.48	34.64	33.21	32.96	31.11
		13.d.	Karnataka	N	3199	2947	2715	2565	2383	1989	
				% wrt 4.d.	1.60	1.49	1.40	1.35	1.28	1.08	
				% wrt 12.d.	78.50	80.94	83.18	85.19	88.16	87.97	
				% wrt 13.c.	2.91	2.68	2.72	2.64	2.56	2.23	
14	New HIV infectio	14.a.	Global	N	950000	940000	920000	910000	890000	870000	850000
				% wrt 13.a.	50.00	52.22	51.11	50.56	52.35	51.18	53.13
		14.b.		N	200000	200000	190000	190000	190000	180000	180000

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	n (Male adults, 15+ years)[39]		Asia and the Pacific	% wrt 13.b.	66.67	66.67	65.52	67.86	67.86	66.67	66.67
		14.c.	India	N	66000	63000	61000	58000	56000	54000	50000
				% wrt 13.c.	60.00	57.27	61.00	59.79	60.22	60.67	59.52
15	New HIV infections (Female adults, 15+ years)[39]	15.a.	Global	N	930000	910000	880000	860000	830000	800000	760000
				% wrt 13.a.	50.00	47.78	48.89	49.44	47.65	48.82	46.88
		15.b.	Asia and the Pacific	N	100000	100000	98000	95000	93000	89000	86000
				% wrt 13.b.	33.33	33.33	34.48	32.14	32.14	33.33	33.33
		15.c.	India	N	44000	43000	41000	39000	37000	36000	34000
				% wrt 13.c.	40.00	42.73	39.00	40.21	39.78	39.33	40.48
16	New HIV infections (Children, <15 years)[39]	16.a.	Global	N	250000	230000	220000	200000	190000	180000	180000
				% wrt 2.a.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 7.a.	11.90	11.50	11.00	10.00	10.00	9.47	10.00
				% wrt 12.a.	11.90	10.95	11.00	10.00	10.00	9.47	10.00
		16.b.	Asia and the Pacific	N	15000	14000	14000	12000	12000	11000	10000
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	11.54	11.67	11.67	10.00	10.00	10.00	9.09
				% wrt 12.b.	4.69	4.52	4.67	4.14	4.14	3.93	3.57
				% wrt 16.a.	6.00	6.09	6.36	6.00	6.32	6.11	5.56
		16.c.	India	N	7500	7000	6600	5500	5300	4400	3700
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	8.93	8.86	8.80	7.75	7.79	6.77	6.07
				% wrt 12.c.	6.82	6.36	6.60	5.67	5.70	4.94	4.40
				% wrt 16.a.	3.00	3.04	3.00	2.75	2.79	2.44	2.06
				% wrt 16.b.	50.00	50.00	47.14	45.83	44.17	40.00	37.00
		16.d.	Karnataka	N[!]	876	693	550	446	320	272	
				% wrt 2.d.	0.01	0.00	0.00	0.00	0.00	0.00	
				% wrt 7.d.	6.02	5.19	4.17	3.46	2.59	2.35	
				% wrt 12.d.	21.50	19.03	16.85	14.81	11.84	12.03	
				% wrt 16.c.	11.68	9.90	8.33	8.11	6.04	6.18	
17	HIV incidence per 1000 population (All ages)[39]	17.a.	Global	%	0.32	0.31	0.30	0.28	0.27	0.26	0.25
		17.b.	Asia and the Pacific	%	0.09	0.08	0.08	0.08	0.08	0.07	0.07
		17.c.	India	%	0.09	0.09	0.08	0.08	0.07	0.07	0.10
18		18.a.	Global	%	0.50	0.48	0.47	0.45	0.44	0.42	0.40

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	HIV incidence per 1000 population (Adults, 15-49 years)[39]	18.b.	Asia and the Pacific	%	0.14	0.13	0.13	0.12	0.12	0.12	0.11
		18.c.	India	%	0.14	0.13	0.12	0.12	0.11	0.10	0.15
19	Change in new HIV infections, 2010-2017[39]	19.a.	Global	%							-18
		19.b.	Asia and the Pacific	%							-14
		19.c.	India	%							-27
20	Incidence-Prevalence ratio[39]	20.a.	Global		0.06	0.06	0.06	0.06	0.05	0.05	0.05
		20.b.	Asia and the Pacific		0.06	0.06	0.06	0.06	0.06	0.06	0.05
		20.c.	India		0.05	0.05	0.05	0.05	0.05	0.04	0.04
21	AIDS-related deaths (All ages)[20, 39,42]	21.a.	Global	N	1300000	1200000	1200000	1100000	1000000	990000	940000
				% wrt 1.a.	0.02	0.02	0.02	0.02	0.01	0.01	0.01
				% wrt 3.a.	3.94	3.56	3.50	3.14	2.81	2.73	2.55
		21.b.	Asia and the Pacific	N	260000	250000	230000	210000	200000	190000	170000
				% wrt 1.b.	0.01	0.01	0.01	0.01	0.01	0.00	0.00
				% wrt 3.b.	5.31	5.00	4.60	4.20	3.92	3.73	3.27
				% wrt 21.a.	20.00	20.83	19.17	19.09	20.00	19.19	18.09
		21.c.	India	N	140000	120000	110000	94000	86000	80000	69000
				% wrt 1.c.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 3.c.	6.09	5.22	5.00	4.27	3.91	3.64	3.29
				% wrt 21.a.	10.77	10.00	9.17	8.55	8.60	8.08	7.34
				% wrt 21.b.	53.85	48.00	47.83	44.76	43.00	42.11	40.59
		21.d.	Karnataka	N	8645	6920	5802	4972	3744	3236	
				% wrt 1.d.	0.01	0.01	0.01	0.01	0.01	0.00	
				% wrt 3.d.	4.03	3.27	2.81	2.45	1.88	1.66	
				% wrt 21.c.	6.18	5.77	5.27	5.29	4.35	4.05	
22	AIDS-related deaths (Adults, 15+ years)[39]	22.a.	Global	N	1200000	1100000	1000000	960000	910000	880000	830000
				% wrt 4.a.	3.87	3.48	3.10	2.91	2.70	2.56	2.36
				% wrt 21.a.	86.15	86.67	88.33	88.18	88.00	88.89	88.30
		22.b.	Asia and the Pacific	N	250000	240000	220000	200000	190000	180000	160000
				% wrt 4.b.	5.21	4.90	4.49	4.08	3.80	3.60	3.14
				% wrt 21.b.	96.19	96.32	96.26	96.24	96.25	96.32	96.24

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
				% wrt 22.a.	20.83	21.82	22.00	20.83	20.88	20.45	19.28
		22.c.	India	N	130000	120000	110000	90000	83000	77000	67000
				% wrt 4.c.	5.91	5.45	5.00	4.29	3.95	3.67	3.19
				% wrt 21.c.	95.86	95.75	96.00	95.85	95.93	96.13	96.23
				% wrt 22.a.	10.83	10.91	11.00	9.38	9.12	8.75	8.07
				% wrt 22.b.	52.00	50.00	50.00	45.00	43.68	42.78	41.88
23	AIDS-related deaths (Male adults, 15+ years)[39]	23.a.	Global	N	610000	590000	570000	550000	530000	500000	480000
				% wrt 22.a.	50.83	53.64	57.00	57.29	58.24	56.82	57.83
		23.b.	Asia and the Pacific	N	170000	160000	160000	140000	140000	130000	120000
				% wrt 22.b.	68.00	66.67	72.73	70.00	73.68	72.22	75.00
		23.c.	India	N	81000	75000	68000	59000	55000	52000	46000
				% wrt 22.c.	62.31	62.50	61.82	65.56	66.27	67.53	68.66
24	AIDS-related deaths (Female adults, 15+ years)[39]	24.a.	Global	N	550000	500000	450000	410000	390000	370000	350000
				% wrt 22.a.	49.17	46.36	43.00	42.71	41.76	43.18	42.17
		24.b.	Asia and the Pacific	N	82000	76000	68000	61000	57000	54000	49000
				% wrt 22.b.	32.00	33.33	27.27	30.00	26.32	27.78	25.00
		24.c.	India	N	50000	44000	38000	31000	27000	24000	20000
				% wrt 22.c.	37.69	37.50	38.18	34.44	33.73	32.47	31.34
25	AIDS-related deaths (Childre n, <15 years)[39]	25.a.	Global	N	180000	160000	140000	130000	120000	110000	110000
				% wrt 2.a.	0.01	0.01	0.01	0.01	0.01	0.01	0.01
				% wrt 7.a.	8.57	8.00	7.00	6.50	6.32	5.79	6.11
				% wrt 21.a.	13.85	13.33	11.67	11.82	12.00	11.11	11.70
		25.b.	Asia and the Pacific	N	9900	9200	8600	7900	7500	7000	6400
				% wrt 2.b.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.b.	7.62	7.67	7.17	6.58	6.25	6.36	5.82
				% wrt 21.b.	3.81	3.68	3.74	3.76	3.75	3.68	3.76
				% wrt 25.a.	5.50	5.75	6.14	6.08	6.25	6.36	5.82
		25.c.	India	N	5800	5100	4400	3900	3500	3100	2600
				% wrt 2.c.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				% wrt 7.c.	6.90	6.46	5.87	5.49	5.15	4.77	4.26
				% wrt 21.c.	4.14	4.25	4.00	4.15	4.07	3.88	3.77
				% wrt 25.a.	3.22	3.19	3.14	3.00	2.92	2.82	2.36
				% wrt 25.b.	58.59	55.43	51.16	49.37	46.67	44.29	40.63
26	Change in AIDS-related deaths, 2010-2017[39]	26.a.	Global	%							-34
		26.b.	Asia and the Pacific	%							-39
		26.c.	India	%							-56

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
27	Incidence-Mortality ratio[39]	27.a.	Global		1.40	1.44	1.48	1.51	1.52	1.53	1.53
		27.b.	Asia and the Pacific		1.11	1.14	1.18	1.24	1.30	1.34	1.42
		27.c.	India		0.76	0.80	0.85	0.92	0.96	0.98	1.02
28	PLHIV receiving ART (All ages)[31-34,37,39,47-59]	28.a.	Global	N^	9570113	11440428	13236969	15100115	17215858	19396217	21691374
				% wrt 3.a.	29.00	33.95	38.59	43.14	48.36	53.43	58.78
		28.b.	Asia and the Pacific	N^	1115081	1334104	1599337	1820625	2086440	2399622	2742317
				% wrt 3.b.	22.76	26.68	31.99	36.41	40.91	47.05	52.74
				% wrt 28.a.	11.65	11.66	12.08	12.06	12.12	12.37	12.64
		28.c.	India	N^	516412	632397	775466	851883	940187	1050326	1200965
				% wrt 3.c.	22.45	27.50	35.25	38.72	42.74	47.74	57.19
				% wrt 28.a.	5.40	5.53	5.86	5.64	5.46	5.42	5.54
				% wrt 28.b.	46.31	47.40	48.49	46.79	45.06	43.77	43.79
		28.d.	Karnataka	N	74821	85605		118607	127156	139671	155376
				% wrt 3.d.	34.88	40.47		58.54	63.88	71.63	
				% wrt 28.c.	14.49	13.54		13.92	13.52	13.30	12.94
		28.e.	Belgaum	N	8819	10383					17303
				% wrt 28.d.	11.79	12.13					11.14
29	PLHIV receiving ART (Adults, 15+ years)[39,41]	29.a.	Global	N^	9015316	10802195	12518842	14299824	16356330	18473423	20749941
				% wrt 4.a.	29.08	34.18	38.76	43.33	48.54	53.70	59.12
				% wrt 28.a.	94.20	94.42	94.57	94.70	95.01	95.24	95.66
		29.b.	Asia and the Pacific	N	1061690	1273853	1528896	1744868	2003177	2308981	2663604
				% wrt 4.b.	22.12	26.00	31.20	35.61	40.06	46.18	52.23
				% wrt 28.b.	95.21	95.48	95.60	95.84	96.01	96.22	97.13
				% wrt 29.a.	11.78	11.79	12.21	12.20	12.25	12.50	12.84
		29.c.	India	N^	485162	595763	730727	803807	886664	990750	1154195
				% wrt 4.c.	22.05	27.08	33.21	38.28	42.22	47.18	54.96
				% wrt 28.c.	93.95	94.21	94.23	94.36	94.31	94.33	96.11
				% wrt 29.a.	5.38	5.52	5.84	5.62	5.42	5.36	5.56
				% wrt 29.b.	45.70	46.77	47.79	46.07	44.26	42.91	43.33
30	PLHIV receiving ART (Male adults, 15+ years)[37,39]	30.a.	Global	N^	4180476	4861540	5531148	6133460	7012949	7860711	8853947
				% wrt 29.a.	46.37	45.01	44.18	42.89	42.88	42.55	42.67
		30.b.	Asia and the Pacific	N	621448	726015	866122	999686	1158859	1326732	1575221
				% wrt 29.b.	58.53	56.99	56.65	57.29	57.85	57.46	59.14
		30.c.	India	N^	271293	325136	392248	425171	459665	506529	598392
				% wrt 29.c.	55.92	54.57	53.68	52.89	51.84	51.13	51.84
31	PLHIV receiving ART	31.a.	Global	N^	4834838	5940654	6987694	8166362	9343380	10612710	11895996
				% wrt 29.a.	53.63	54.99	55.82	57.11	57.12	57.45	57.33
		31.b.		N	440242	547839	662774	745182	844318	982249	1088384

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	(Female adults, 15+ years)[39]		Asia and the Pacific	% wrt 29.b.	41.47	43.01	43.35	42.71	42.15	42.54	40.86
		31.c.	India	N^	213869	270627	338479	378636	426999	484221	555804
				% wrt 29.c.	44.08	45.43	46.32	47.11	48.16	48.87	48.16
32	CLHIV receiving ART (<15 years)[31-34,39,41,42,47-59]	32.a.	Global	N	554797	638233	718127	800291	859528	922794	941433
				% wrt 7.a.	26.42	31.91	35.91	40.01	45.24	48.57	52.30
				% wrt 28.a.	5.80	5.58	5.43	5.30	4.99	4.76	4.34
		32.b.	Asia and the Pacific	N	53391	60251	70441	75757	83263	90641	78713
				% wrt 7.b.	41.07	50.21	58.70	63.13	69.39	82.40	71.56
				% wrt 28.b.	4.79	4.52	4.40	4.16	3.99	3.78	2.87
				% wrt 32.a.	9.62	9.44	9.81	9.47	9.69	9.82	8.36
		32.c.	India	N	31249	36634	44740	48075	53522	59577	46767
				% wrt 7.c.	37.20	46.37	59.65	67.71	78.71	91.66	76.67
				% wrt 28.c.	6.05	5.79	5.77	5.64	5.69	5.67	3.89
				% wrt 32.a.	5.63	5.74	6.23	6.01	6.23	6.46	4.97
				% wrt 32.b.	58.53	60.80	63.51	63.46	64.28	65.73	59.41
		32.d.	Karnataka	N[!]	4569	5618		7415	8117	8899	10170
				% wrt 7.d.	31.42	42.06		57.48	65.75	76.83	
				% wrt 28.d.	6.11	6.56		6.25	6.38	6.37	6.55
				% wrt 32.c.	14.62	15.34		15.42	15.17	14.94	21.75
		32.e.	Belgaum	N		793					1411
				% wrt 32.d.		14.12					13.87
33	Deaths averted by ART (All ages)[39]	33.a.	Global	N	940000	1000000	1100000	1100000	1200000	1200000	1200000
				% wrt 3.a.	2.85	2.97	3.21	3.14	3.37	3.31	3.25
				% wrt 28.a.	9.82	8.74	8.31	7.28	6.97	6.19	5.53
		33.b.	Asia and the Pacific	N	130000	140000	150000	160000	160000	160000	170000
				% wrt 3.b.	2.65	2.80	3.00	3.20	3.14	3.14	3.27
				% wrt 28.b.	11.66	10.49	9.38	8.79	7.67	6.67	6.20
				% wrt 33.a.	13.83	14.00	13.64	14.55	13.33	13.33	14.17
		33.c.	India	N	70000	75000	78000	84000	83000	81000	83000
				% wrt 3.c.	3.04	3.26	3.55	3.82	3.77	3.68	3.95
				% wrt 28.c.	13.56	11.86	10.06	9.86	8.83	7.71	6.91
				% wrt 33.a.	7.45	7.50	7.09	7.64	6.92	6.75	6.92
				% wrt 33.b.	53.85	53.57	52.00	52.50	51.88	50.63	48.82
34	Pregnant women needing ARV for	34.a.	Global	N	1400000	1400000	1400000	1400000	1400000	1400000	1400000
				% wrt 1.a. (per million)	200	197	195	193	190	188	186
				% wrt 3.a.	4.24	4.15	4.08	4.00	3.93	3.86	3.79
				% wrt 4.a.	4.52	4.43	4.33	4.24	4.15	4.07	3.99
				% wrt 6.a.	8.81	8.59	8.38	8.19	8.00	7.82	7.69
		34.b.		N	62000	62000	62000	61000	61000	61000	61000

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	PMTCT [39,41]		Asia and the Pacific	% wrt 1.b. (per million)	16.13	15.97	15.82	15.41	15.27	15.13	14.99
				% wrt 3.b.	1.27	1.24	1.24	1.22	1.20	1.20	1.17
				% wrt 4.b.	1.29	1.27	1.27	1.24	1.22	1.22	1.20
				% wrt 6.b.	3.44	3.44	3.44	3.39	3.39	3.21	3.21
				% wrt 34.a.	4.43	4.43	4.43	4.36	4.36	4.36	4.36
		34.c.	India	N	26000	25000	25000	24000	23000	23000	23000
				% wrt 1.c. (per million)	20.85	19.79	19.55	18.55	17.57	17.37	17.17
				% wrt 3.c.	1.13	1.09	1.14	1.09	1.05	1.05	1.10
				% wrt 4.c.	1.18	1.14	1.14	1.14	1.10	1.10	1.10
				% wrt 6.c.	2.89	2.78	2.81	2.73	2.61	2.61	2.61
				% wrt 34.a.	1.86	1.79	1.79	1.71	1.64	1.64	1.64
				% wrt 34.b.	41.94	40.32	40.32	39.34	37.70	37.70	37.70
		34.d.	Karnataka	N	2823	2632	2407	2212	2025	1852	1951
				% wrt 1.d. (per million)	46.21	42.46	38.27	34.66	31.28	28.19	29.27
				% wrt 3.d.	1.32	1.24	1.16	1.09	1.02	0.95	
				% wrt 4.d.	1.41	1.33	1.24	1.17	1.08	1.01	
				% wrt 34.c.	10.86	10.53	9.63	9.22	8.80	8.05	8.48
35	Pregnant women who received ARV for PMTCT [39,41,42]	35.a.	Global	N	815090	918645	978751	1069739	1084303	1101680	1117840
				% wrt 34.a.	58.22	65.62	69.91	76.41	77.45	78.69	79.85
		35.b.	Asia and the Pacific	N	15052	17543	21467	28094	29124	33398	33971
				% wrt 34.b.	24.28	28.30	34.62	46.06	47.74	54.75	55.69
				% wrt 35.a.	1.85	1.91	2.19	2.63	2.69	3.03	3.04
		35.c.	India	N	12583	1568	5239	10233	10957	13951	13716
				% wrt 34.c.	48.40	6.27	20.96	42.64	47.64	60.66	59.63
				% wrt 35.a.	1.54	0.17	0.54	0.96	1.01	1.27	1.23
				% wrt 35.b.	83.60	8.94	24.40	36.42	37.62	41.77	40.38
		35.d.	Karnataka	N	2127					1517	
				% wrt 34.d.	75.35					81.90	
				% wrt 35.c.	16.90					10.87	
36	HIV-exposed-but-uninfected children [39]	36.a.	Global	N	13100000	13400000	13700000	14000000	14300000	14500000	14800000
		36.b.	Asia and the Pacific	N	790000	780000	760000	740000	730000	720000	720000
				% wrt 36.a.	6.03	5.82	5.55	5.29	5.10	4.97	4.86
		36.c.	India	N	460000	430000	410000	380000	350000	330000	320000
				% wrt 36.a.	3.51	3.21	2.99	2.71	2.45	2.28	2.16
				% wrt 36.b.	58.23	55.13	53.95	51.35	47.95	45.83	44.44
37	New HIV infectio	37.a.	Global	N	150000	160000	170000	190000	200000	200000	210000
				% wrt 34.a.	10.71	11.43	12.14	13.57	14.29	14.29	15.00
				% wrt 35.a.	18.40	17.42	17.37	17.76	18.45	18.15	18.79

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
	ns averted by PMTCT[39]	37.b.	Asia and the Pacific	N	3900	4200	4100	5200	5200	6600	7400
				% wrt 34.b.	6.29	6.77	6.61	8.52	8.52	10.82	12.13
				% wrt 35.b.	25.91	23.94	19.10	18.51	17.85	19.76	21.78
				% wrt 37.a.	2.60	2.63	2.41	2.74	2.60	3.30	3.52
		37.c.	India	N		1300	1300	2200	2200	2900	3500
				% wrt 34.c.		5.20	5.20	9.17	9.57	12.61	15.22
				% wrt 35.c.			24.81	21.50	20.08	20.79	25.52
				% wrt 37.a.		0.81	0.76	1.16	1.10	1.45	1.67
				% wrt 37.b.		30.95	31.71	42.31	42.31	43.94	47.30
38	Exposed children having a virological HIV test for EID within 2 months of age[39]	38.a.	Global	%	36.00	41.00	40.00	48.00	49.00	44.00	51.00
		38.b.	Asia and the Pacific	%	17.00	18.00	19.00	19.00	27.00	27.00	25.00
		38.c.	India	%	7.00	8.00	9.00	10.00	25.00	27.00	23.00

wrt: with respect to. *Calculated data. ^Calculated data for the period 2000-2009 from source 37.

[#]Calculated data for non-Census years, based on source 38. [$]Calculated value based on source 41for 2010 and 2011; based on source 42 for 2007 and 2016. [!]Calculated value based on source 42.

Note:

1. Values mentioned as less than 0.1 and 1000 in the database were given the dummy values of 0.05 and 500 (respectively) in the tables and figures.

2. All the share are mentioned in percentage (%), unless otherwise mentioned.

3. The classification of Asia and Pacific were different between UNAIDS and sources of population information. So the population values for those countries classified as 'Asia and Pacific' by UNAIDS were selectively summed up from World Bank database for population figures.

4. Population information for 0-14 year children were not available for four countries, viz. Marshall Islands, Nauru, Palau and Tuvalu, and hence not included in the figures. The total population for these countries together is less than 0.1 million in 2017, and hence the proportion of 0-14 year population would be too small to alter the Asia-Pacific 0-14 year population significantly.

5. Missing figures are assumed as same as that of previous year's, if the indicator was cumulative.

Sources: 20 (for Karnataka 2007-2015 data only), 31-34 (for 2012-2016 Karnataka data), 37, 38 (for Karnataka and Belgaum information only), 39, 41 (for Karnataka 2010-2011 data on CLHIV and PLHIV numbers; Karnataka 2007-2011 data on PPTCT; 2007-2009 India PLHIV-ART data), 42 (for 2007 and 2016 Karnataka data only), 43, 47-59.

Annexure 2: HIV data: Karnataka state and Belgaum district, 2003-2017[31-34,47-59,60].

S. No.	Criteria	Sub-S. No.	Region	Description	2003	2004	2005	2006	2007	2008	2009	2010
1	General population tested (excluding children < 15 years and pregnant women)[31-34,47-59]	1.a.i.	Karnataka	N					199324	445761	745723	626993
		1.a.ii.		HIV infections among 1.a.i.					28912	44847	48472	34869
				% wrt 1.a.i.					14.51	10.06	6.50	5.56
		1.b.i.	Belgaum	N					14578	33165	61076	43935
		1.b.ii.		HIV infections among 1.b.i.					2413	5165	5552	4091
				% wrt 1.b.i.					16.55	15.57	9.09	9.31
2	Children < 15 years tested[47-59]	2.a.i.	Karnataka	N								
		2.a.ii.		HIV infections among 2.a.i.								
				% wrt 2.a.i.								
		2.b.i.	Belgaum	N								
		2.b.ii.		HIV infections among 2.b.i.								
				% wrt 2.b.i.								
3	Pregnant women tested[31-34,47-59]	3.a.i.	Karnataka	N					392480	568464	795160	784794
		3.a.ii.		HIV infections among 3.a.i.					3301	3319	3549	2542
				% wrt 3.a.i.					0.84	0.58	0.45	0.32
		3.b.i.	Belgaum	N					17623	45056	75257	73380
		3.b.ii.		HIV infections among 3.b.i.					247	437	515	306
				% wrt 3.b.i.					1.40	0.97	0.68	0.42
4	Total population tested[47-59]	4.a.i.	Karnataka	N					591804	1014225	1540883	1411787
		4.a.ii.		HIV infections among 4.a.i.					32213	48166	52021	37411
				% wrt 4.a.i.					5.44	4.75	3.38	2.65
		4.b.i.	Belgaum	N					32201	78221	136333	117315
		4.b.ii.		HIV infections among 4.b.i.					2660	5602	6067	4397
				% wrt 4.b.i.					8.26	7.16	4.45	3.75
5	PLHIV (All ages) registered at ARTC (cumulative)[31-34,47-59]	5.a.i.	Karnataka	Registered, N					25180	39548	41386	43628
		5.a.ii.		Started ART, N					10547	19325	24475	29275
				% wrt 5.a.i.					41.89	48.86	59.14	67.10
		5.a.iii.		Alive and on ART, N					7094	13599	16285	14100
				% wrt 5.a.i.					28.17	34.39	39.35	32.32
				% wrt 5.a.ii.					67.26	70.37	66.54	48.16
		5.a.iv.		Dead after ART start, N					1938	3141	4419	4916
				% wrt 5.a.i.					7.70	7.94	10.68	11.27
				% wrt 5.a.ii.					18.37	16.25	18.06	16.79
		5.a.v.		Never started ART					14633	20223	16911	14353
		5.a.vi.		LFU/Missed after ART start					1515	2585	3771	10259
		5.b.i.	Belgaum	Registered, N					2679	3093	4471	6764

S. No.	Criteria	Sub-S. No.	Region	Description	2003	2004	2005	2006	2007	2008	2009	2010
				% wrt 5.a.i.					10.64	7.82	10.80	15.50
		5.b.ii.		Started ART, N					925	1575	2466	4613
				% wrt 5.a.ii.					8.77	8.15	10.08	15.76
				% wrt 5.b.i.					34.53	50.92	55.16	68.20
		5.b.iii.		Alive and on ART, N					675	1207	1778	2347
				% wrt 5.a.iii.					9.52	8.88	10.92	16.65
				% wrt 5.b.i.					25.20	39.02	39.77	34.70
				% wrt 5.b.ii.					72.97	76.63	72.10	50.88
		5.b.iv.		Dead after ART start, N					160	331	401	484
				% wrt 5.a.iv.					8.26	10.54	9.07	9.85
				% wrt 5.b.i.					5.97	10.70	8.97	7.16
				% wrt 5.b.ii.					17.30	21.02	16.26	10.49
		5.b.v.		Never started ART					1754	1518	2005	2151
		5.b.vi.		LFU/Missed after ART start					90	37	287	1782
6	CLHIV (< 15 years) registered at ARTC (cumulative)[47-59]	6.a.i.	Karnataka	Registered, N								
				% wrt 5.a.i.								
		6.a.ii.		Started ART, N								
				% wrt 5.a.ii.								
				% wrt 6.a.i.								
		6.a.iii.		Alive and on ART, N					1198	1928	3003	3640
				% wrt 5.a.iii.					16.89	14.18	18.44	25.82
				% wrt 6.a.i.								
				% wrt 6.a.ii.								
		6.a.iv.		Dead after ART start, N								
				% wrt 5.a.iv.								
				% wrt 6.a.i.								
				% wrt 6.a.ii.								
		6.a.v.		Never started ART								
		6.a.vi.		LFU/Missed after ART start								
		6.b.i.	Belgaum	Registered, N								
				% wrt 5.b.i.								
				% wrt 6.a.i.								
		6.b.ii.		Started ART, N								
				% wrt 5.b.ii.								
				% wrt 6.a.ii.								
				% wrt 6.b.i.								
		6.b.iii.		Alive and on ART, N					101	223		
				% wrt 5.b.iii.					14.96	18.48		
				% wrt 6.a.iii.					8.43	11.57		
				% wrt 6.b.i.								
				% wrt 6.b.ii.								

S. No.	Criteria	Sub-S. No.	Region	Description	2003	2004	2005	2006	2007	2008	2009	2010
		6.b.iv.		Dead after ART start, N								
				% wrt 5.b.iv.								
				% wrt 6.a.iv.								
				% wrt 6.b.i.								
				% wrt 6.b.ii.								
		6.a.v.		Never started ART								
		6.a.vi.		LFU/Missed after ART start								
7	HIV prevalence among ANC clinic attendees [60]	7.a.	India		0.80	0.95	0.90	0.60	0.49		0.49	
		7.b.	Karnataka	%	1.43	1.52	1.49	1.12	0.86		0.89	
		7.c.	Belgaum	%	4.50	4.25	3.63	3.13	2.00		1.50	

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
1	General population tested (excluding children < 15 years and pregnant women)[31-34,47-59]	1.a.i.	Karnataka	N	1179801	1239661	1659924	1911929	1948499	1940589	2220292
		1.a.ii.		HIV infections among 1.a.i.	39477	33611	29461	26509	21994	20004	18862
				% wrt 1.a.i.	3.35	2.71	1.77	1.39	1.13	1.03	0.85
		1.b.i.	Belgaum	N	101399	53664	118831	145170	143190	141733	153856
		1.b.ii.		HIV infections among 1.b.i.	4461	1991	3286	2915	2402	2164	2035
				% wrt 1.b.i.	4.40	3.71	2.77	2.01	1.68	1.53	1.32
2	Children < 15 years tested[47-59]	2.a.i.	Karnataka	N		22763					
		2.a.ii.		HIV infections among 2.a.i.		1062					
				% wrt 2.a.i.		4.67					
		2.b.i.	Belgaum	N		2982					
		2.b.ii.		HIV infections among 2.b.i.		144					
				% wrt 2.b.i.		4.83					
3	Pregnant women tested[31-34,47-59]	3.a.i.	Karnataka	N	1010822	962034	1170081	1253212	1285967	1321668	1418176
		3.a.ii.		HIV infections among 3.a.i.	2333	1831	1445	1295	1034	851	891
				% wrt 3.a.i.	0.23	0.19	0.12	0.10	0.08	0.06	0.06
		3.b.i.	Belgaum	N	104150	49373	100453	105804	112597	111822	111834
		3.b.ii.		HIV infections among 3.b.i.	257	101	146	146	119	98	95
				% wrt 3.b.i.	0.25	0.20	0.15	0.14	0.11	0.09	0.08
4	Total population tested[47-59]	4.a.i.	Karnataka	N	2190623	2224458	2830005	3165141	3234466	3262257	3638468
		4.a.ii.		HIV infections among 4.a.i.	41810	36504	30906	27804	23028	20855	19753
				% wrt 4.a.i.	1.91	1.64	1.09	0.88	0.71	0.64	0.54
		4.b.i.	Belgaum	N	205549	106019	219284	250974	255787	253555	265690

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
		4.b.ii.		HIV infections among 4.b.i.	4718	2236	3432	3061	2521	2262	2130
				% wrt 4.b.i.	2.30	2.11	1.57	1.22	0.99	0.89	0.80
5	PLHIV (All ages) registered at ARTC (cumulative)[31-34,47-59]	5.a.i.	Karnataka	Registered, N	209508	232761		268057	283670	303058	320492
		5.a.ii.		Started ART, N	121156	140520		176959	193197	216778	242935
				% wrt 5.a.i.	57.83	60.37		66.02	68.11	71.53	75.80
		5.a.iii.		Alive and on ART, N	74821	85605		118607	127156	139671	155376
				% wrt 5.a.i.	35.71	36.78		44.25	44.83	46.09	48.48
				% wrt 5.a.ii.	61.76	60.92		67.03	65.82	64.43	63.96
		5.a.iv.		Dead after ART start, N	20813	24727		41329	47091	55405	63530
				% wrt 5.a.i.	9.93	10.62		15.42	16.60	18.28	19.82
				% wrt 5.a.ii.	17.18	17.60		23.36	24.37	25.56	26.15
		5.a.v.		Never started ART	88352	92241		91098	90473	86280	77557
		5.a.vi.		LFU/Missed after ART start	25522	30188		17023	18950	21702	24029
		5.b.i.	Belgaum	Registered, N	24214	27751					35709
				% wrt 5.a.i.	11.56	11.92					11.14
		5.b.ii.		Started ART, N	14140	17100					26521
				% wrt 5.a.ii.	11.67	12.17					10.92
				% wrt 5.b.i.	58.40	61.62					74.27
		5.b.iii.		Alive and on ART, N	8819	10383					17303
				% wrt 5.a.iii.	11.79	12.13					11.14
				% wrt 5.b.i.	36.42	37.41					48.46
				% wrt 5.b.ii.	62.37	60.72					65.24
		5.b.iv.		Dead after ART start, N	2014	2487					7103
				% wrt 5.a.iv.	9.68	10.06					11.18
				% wrt 5.b.i.	8.32	8.96					19.89
				% wrt 5.b.ii.	14.24	14.54					26.78
		5.b.v.		Never started ART	10074	10651					9188
		5.b.vi.		LFU/Missed after ART start	3307	4230					2115
6	CLHIV (< 15 years) registered at ARTC (cumulative)[47-59]	6.a.i.	Karnataka	Registered, N		16778		17161	17814	18337	18799
				% wrt 5.a.i.		7.21		6.40	6.28	6.05	5.87
		6.a.ii.		Started ART, N		8318		9312	10206	11367	13051
				% wrt 5.a.ii.		5.92		5.26	5.28	5.24	5.37
				% wrt 6.a.i.		49.58		54.26	57.29	61.99	69.42
		6.a.iii.		Alive and on ART, N	4569	5618		7415	8117	8899	10170
				% wrt 5.a.iii.	6.11	6.56		6.25	6.38	6.37	6.55
				% wrt 6.a.i.		33.48		43.21	45.57	48.53	54.10
				% wrt 6.a.ii.		67.54		79.63	79.53	78.29	77.93
		6.a.iv.		Dead after ART start, N		763		1261	1389	1642	1922
				% wrt 5.a.iv.		3.09		3.05	2.95	2.96	3.03
				% wrt 6.a.i.		4.55		7.35	7.80	8.95	10.22
				% wrt 6.a.ii.		9.17		13.54	13.61	14.45	14.73

S. No.	Criteria	Sub-S. No.	Region	Description	2011	2012	2013	2014	2015	2016	2017
		6.a.v.		Never started ART		8460		7849	7608	6970	5748
		6.a.vi.		LFU/Missed after ART start		1937		636	700	826	959
		6.b.i.	Belgaum	Registered, N		2427					2832
				% wrt 5.b.i.		8.75					7.93
				% wrt 6.a.i.		14.47					15.06
		6.b.ii.		Started ART, N		1104					1786
				% wrt 5.b.ii.		6.46					6.73
				% wrt 6.a.ii.		13.27					13.68
				% wrt 6.b.i.		45.49					63.06
		6.b.iii.		Alive and on ART, N		793					1411
				% wrt 5.b.iii.		7.64					8.15
				% wrt 6.a.iii.		14.12					13.87
				% wrt 6.b.i.		32.67					49.82
				% wrt 6.b.ii.		71.83					79.00
		6.b.iv.		Dead after ART start, N		78					266
				% wrt 5.b.iv.		3.14					3.74
				% wrt 6.a.iv.		10.22					13.84
				% wrt 6.b.i.		3.21					9.39
				% wrt 6.b.ii.		7.07					14.89
		6.a.v.		Never started ART		1323					1046
		6.a.vi.		LFU/Missed after ART start		233					109
7	HIV prevalence among ANC clinic attendees [60]	7.a.	India		0.40		0.35		0.29		0.28
		7.b.	Karnataka	%	0.69		0.53		0.36		0.38
		7.c.	Belgaum	%	0.90		0.75		0.63		0.63

Sources: 31-34 (for 2012-2016 Karnataka data), 47-59, 60

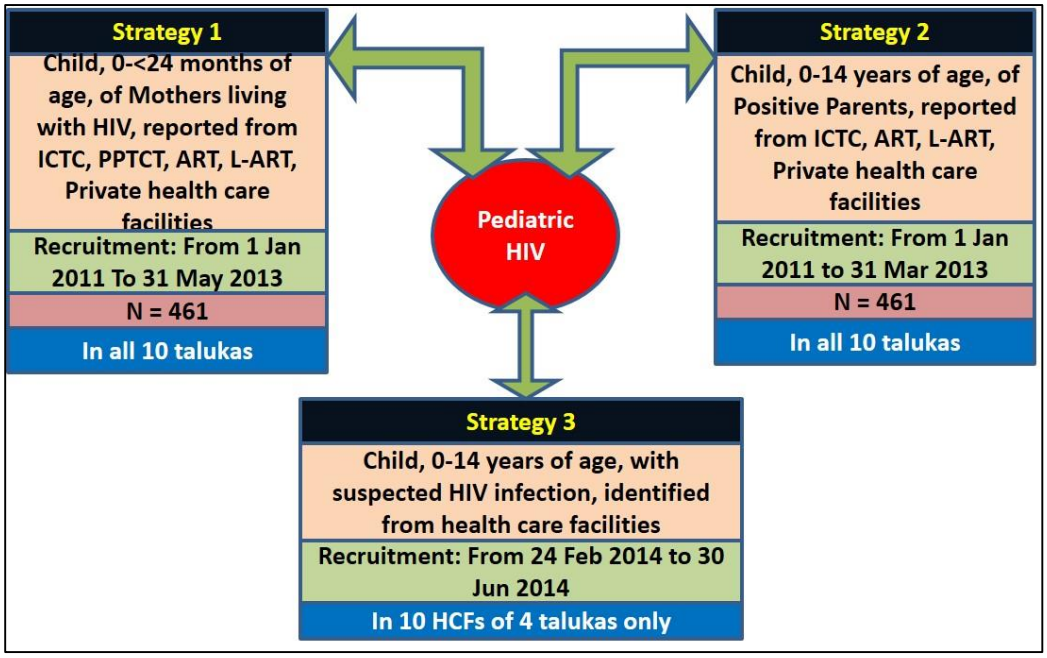
Annexure 3. Conceptual framework of the Phase 1 ICMR taskforce study, Belgaum district, 2011-2014.

The Phase 1 ICMR Taskforce study had three strategies:

- The first strategy included the children 0-24 months of age born to the HIV-infected mothers. This was a longitudinal study, and followed up the mother through pregnancy, delivery and then her child till 24 months of age, till three tests as per the EID protocol (at 6 weeks, 6months and 18 months) is completed for her child. Pregnant women living with HIV were recruited using sequential sampling from 01 January 2011 to 31 May 2013. The 18-month test of thus-enrolled children were completed by Nov 2014. This strategy ran in all the 10 talukas of the district, included 285 (HIV-testing) health care facilities (government, private and not-for-profit sectors) in the district, and recruited 528 (against the sample size of 461) positive pregnancies to the study.
- The second strategy was cross sectional, and included the children 0-14 years of age of the HIV-infected parents reported from the same health care facilities as in strategy 1. Data collection started from 01 January 2011, and sequentially recruited the positive parents till sample size was saturated in the study period. This strategy subjected the biological children (of age 0-14 years) of the reported infected parent to one-time age-specific HIV testing, to gather the data required. Sample size of 563 (against the sample size of 461) was achieved by 31 March 2013.
- The third strategy was again cross-sectional and was intended to identify the still-existing-but-unidentified cases of infection among children 0-14 years of age group through trained medical/field staff people from identified (by stratified sampling technique) health care facilities in the 4 talukas (selected based on the HIV-prevalence of 2008) of the district, from 24 February 2014 to 30 June 2014. The children likely to be infected were identified using the adapted IMNCI (Integrated Management of Neonatal and Childhood Illnesses) -HIV/ IMAAI (Integrated Management of Adolescent and Adulthood Illnesses) criteria. The child testing

protocol was the same as that for strategy 2. 509 children were screened positive for signs, from among the 24342 clinic footfalls.

The conceptual framework diagram of the Phase 1 ICMR taskforce study in Belgaum district is given below.



Annexure 4. Planned scheduled visits and codes.

SCHEDULE OF VISIT

Children 0-1 month of age			
Age of child for visit (in days)	**Response code**	**Age of child for visit (in days)**	**Response code**
8-10	8D	22-24	22D
15-17	15	29-31	29

Children >1-12 months of age					
Age of child for visit (in months) and Response code					
2	4	6	8	10	12
3	5	7	9	11	

Children >12 months-5 years of age					
Age of child for visit (in months) and Response code					
14	22	30	38	46	54
16	24	32	40	48	56
18	26	34	42	50	58
20	28	36	44	52	59 (end)

For all			
	Consider it as	**Visit No.**	**Schedule of visit Code**
During the first visit, if the child is not in the specified age, OR, if the pregnant mother is not in the specified weeks of completed pregnancy	Baseline visit	1	0
During the last visit, if the child is not in the specified age, OR, if the pregnant mother is not in the specified weeks of completed pregnancy	End point visit	Next visit number	900
If the child/pregnant mother is visited other than the scheduled time period	Others	Next visit number	200

GENERAL CODE LIST

Taluka	**Religion**	**ART/ARV regimen**	**ARV/ART adverse effects**
01 = Bailhongal 02 = Athani 03 = Belgaum 04 = Chikodi 05 = Gokak 06 = Hukkeri 07 = Khanapur 08 = Saudatti 09 = Raibag 10 = Ramdurg **Literacy/Education** 1 = Non-literate 2 = Literate, but no formal education 3 = Standard 1-4 completed 4 = Standard 5-7 completed 5 = Standard 8-10 completed 6 = Standard 11-12/PUC completed 7 = Degree completed 8 = PG or above completed. **Caste** 1 = SC 2 = ST 3 = OBC 4 = Others **Sex/Gender** 1 = Male 2 = Female **HIV status** 1 = Positive 2 = Negative 3 = Not known	1 = Hindu 2 = Muslim 3 = Christian 4 = Jain 5 = Others **Marital Status** 1 = Married 2 = Single 3 = Divorced 4 = Separated 5 = Widowed 6 = Others (specify) **Relationship** 1 = Father or Mother 2 = Brother or Sister 3 = Grand parent 4 = Step father / Step mother 5 = Other Relative 6 = Other not related **Occupation** 1 = Daily Wages 2 = Salaried 3 = Business 4 = Housewife 5 = Retired 6 = Student 7 = Sex Work 8 = Others (Specify) **Reason for not testing** 1= Death 2= Refusal 3= Separated 4= Not willing to test. 5= Age over. 6= Others.	01 = AZT+3TC+NVP (ZLN) 02 = d4T+3TC+NVP (SLN) 03 = AZT+3TC+EFV (ZLE) 04 = d4T+3TC+EFV (SLE) 05 = TDF+3TC+NVP (TLN) 06 = TDF+3TC+EFV (TLE) 07 = AZT+3TC+ATV/r (ZL ATV/R) 08 = AZT+3TC+LPV/r (ZL LPV/R) 09 = d4T+3TC+ATV/r (SL ATV/R) 10 = d4T+3TC+LPV/r (SL LPV/R) 12 = TDF+3TC+ATV/r (TL ATV/R) 13 = TDF+3TC+LPV/r (TL LPV/R) 14 = ABC+3TC+NVP (ALN) 15 = ABC+3TC+EFV (ALE) 16 = ABC+3TC+LPV/r (AL LPV/R) 17 = AZT+3TC+LPV/r (ZL LPV/R) 18 = ABC+3TC+ddi+LPV/r (ALD LPV/R) 19 = AZT+3TC (ZL) 20 = sdNVP 21 = Long term / Extended NVP 22 = Others	01. Diarrhea. 02. Nausea/Vomiting. 03. Loss of appetite. 04. Increased thirst. 05. Abdominal pain. 06. Tiredness/Fatigue. 07. Sleeplessness. 08. Weight loss. 09. Dizziness. 10. Anxiety. 11. Depression. 12. Mood changes. 13. Fever. 14. Muscle aches. 15. Sore throat. 16. Rash. 17. Losing or gaining body fat. 18. Lipid abnormalities. 19. Diabetes. 20. Heart attack. 21. Liver damage/Jaundice. 22. Kidney damage/increased urination 23. Allergy/hypersensitivity reaction. 24. Peripheral neuropathy/Pain and numbness and pins in hands or feet. 25. Pancreatitis. 26. Others.

Annexure 5. Tools.

1. General form 1.

FORM G1: REGISTRATION (To be elicited for the family, for each mother, once, at the time of recruitment)

A. Required Information		
1.	Date of Recruitment: (DD/MM/YY)	☐☐/☐☐/☐☐
2.	Recruited: (Name in CAPITAL letters)	
3.	HCF Name: (In CAPITAL letters)	
4.	HCF Code:	☐☐☐
5.	Pregnant woman/Mother ID: (TTHHH)	☐☐☐☐☐
6.	Pregnant Woman/Mother's Full Name: (In CAPITAL letters)	
7.	Address: (In CAPITAL letters)	
8.	Consent form signed by: (In CAPITAL letters)	
9.	Child assent witness signed by: (In CAPITAL letters)	

10.	Consent available for:			
	a. Home visit: (1. Yes. 2. No.)	☐	e. Hemoglobin Test: (1. Children only. 2. Mother only. 3. Both. 4. None.)	☐
	b. Meeting elsewhere: (1. Yes. 2. No.)	☐	f. HIV Test: (1. Children only. 2. Spouse only. 3. Both. 4. None.)	☐
	c. Sharing information: (1. Children only. 2. Mother only. 3. Both. 4. None.)	☐		
	d. Health checkup and anthropometry: (1. Children only. 2. Mother only. 3. Both. 4. None.)	☐	g. CD4 Test: (1. Children only. 2. Mother only. 3. Both. 4. None.)	☐

2. General form 2.

FORM G2: FAMILY AND HOUSEHOLD INFORMATION (To be elicited twice, for each mother, at the time of recruitment and the end point of the study)

A. Family member information: (Start with father, mother and then biological children by age in decreasing order) (Relationship code with respect to the eldest child) (Include children born live, even if the child is no more) (Use additional sheet if required)

1. Sl. No.	2. Name	3. Age* (YY)	4. Gender	5. Relationship**	6. Marital Status	7. Education	8. Occupation	9. HIV tested? (1. Yes. 2. No.)	10. Date of HIV test (DD/MM/YY) (Leave blank if not known)	11. HIV status	12. Reason for not testing	13. Alive or dead? (1. Alive. 2. Dead)	14. If dead, date of death (DD/MM/YY)	15. ID***	16. Date of Birth*** (DD/MM/YY)	17. Birth Weight*** (in kg)
	Father:															
	Mother:															
	Eldest child:															

* If less than one year mention 00. ** Codes to be entered with respect to the first child in the family. *** Only for children.

B. Contact information

1. Address: (in CAPITAL letters) (Don't repeat name of family member)

2. Phone No.

3. Alternate Phone No.

4. Whether all 0-14 year child(ren) live(s) in the above address? (1. Yes. 2. No.)	If no,	4. a. Child ID	4. b. Address and phone number of child	4. c. Whether permitted to meet the child in the alternate address? (1. Yes. 2. No.)
	Child 1			
	Child 2			
	Child 3			

C. Socio economic Information

1. Religion:	2. Caste:	3. Type of family: 1. Nuclear. 2. Joint. 3. Three generation. 4. Others.	4. Total no. of earning family members:
5. Approx. annual family income: (Rs.)	6. No. of dependents in the family: *(dependents: <15, 60+ years of age & 15-60 yr unemployed)*	7. Ration card held: 1. APL. 2. BPL. 3. No ration card. 4. Don't know.	8. Getting ration from PDS? 1. Anna bhagya. 2. AAY. 3. Yes, Others. 4. Don't know. 5. Not getting ration.
9. Any person in the family pay income tax? 1.Yes; 2.No; 3.Don't know.	10. Land holding: 1.Less than 3 Hectares; 2.More than 3 hectares; 3.No land; 4. Don't know. *(1 Hectare = 2.47 acres = 100 Ares = 102.7 Guntas = 247 cents = 10000 square meters = 107600 square feet)*		11. Any financial or other support system availed? 1. Yes. 2. No. 3. Don't know

If yes, what all? (1.Yes. 2. No. 3. Don't know)				
	a. School/Hostel admission / utilities	b. Award/Scholarship/Sponsorship	c. Non-formal education	d. Skills training
e. Counselling services	f. Nutrition/Food	g. Foster/Care home/Orphanage	h. Health Check-up/ Medical care	i. House construction/electrification
j. Legal aid	k. SHG/Micro credit scheme/ Interest free loans	l. Bus pass/TA for medical care	m. Pension/Financial aid/Insurance	n. NGO projects: OVC/VIHAAN/CSC/Others

Govt. projects: o. Bhagyalaxmi p. Bidaai q. Ganga kalyan yojana r. Santwana s. Others (specify) _____

12. Ever did the breadwinner in the family lose a job in the last one year? 1.Yes; 2.No; 3.Don't know.	13. Ever was the family indebted to a bank/money lender in the last one year? 1.Yes; 2.No; 3.Don't know.
14. Any expenditure on health care for any family member in the last three months? 1. Yes. 2. No. 3. Don't know	14. a. If yes how much? (Approx. Rs.)

D. Household information.	
1. Source of water for drinking/cooking: 1. Piped water. 2. Water tanker. 3. Deep well. 4. Shallow well. 5. Ponds/Lake. 6. Shudh Ganga scheme 7. Others (specify) _____. 8. Don't know. ☐	2. Source of water for other uses: 1. Piped water. 2. Water tanker. 3. Deep well. 4. Shallow well. 5. Ponds/Lake. 6. Shudh Ganga scheme 7. Others (specify) _____. 8. Don't know. ☐
3. Distance of source of water from house: 1. Available at home. 2. < 50m. 3. 50-100m. 4. 100-300m. 5. >300m. 6. Don't know. ☐	4. Water storage in house: 1. Closed vessels/tanks inside house. 2. Open vessels/tanks inside house. 3. Outside the house. 4. Others (specify) _____. 5. Not stored. 6. Don't know. ☐
5. Water disinfection method for cooking/drinking: 1. Sedimentation & Filtering. 2. Boiling. 3. Chlorine. 4. $KMnO_4$. 5. Others (specify) _____. 6. No disinfection done. 7. Don't know. ☐	6. Type of toilet: 1. Latrine with septic tank / aqua privy. 2. Pit latrine. 3. Overhung latrine. 4. Others (specify) _____. 5. No latrine (Open defecation). 6. Don't know ☐
7. If latrine present, water availability: 1. Piped water. 2. Carried each time. 3. Others (specify) _____. 4. Don't know. 5. Not Applicable. ☐	8. If latrine present, whether always used by everyone in the family? 1. Yes. 2. No. 3. Don't know. 4. Not Applicable. ☐
9. Type of house: (to be elicited only after visiting the house. Leave blank if house is not visited). 1. Kuccha. 2. Semi-Pukka. 3. Pukka. ☐	10. No. of rooms (exclude toilet, kitchen and store) ☐
11. Roof type: 1. Concrete. 2. Tiles. 3. Asbestos/Tin sheet. 4. Thatched. 5. Others (specify) _____. 6. No roof. ☐	12. House electrified: 1.Yes; 2. No. ☐
13. Kitchen/cooking: 1. Outside the house. 2. Inside the house, separate from other rooms. 3. Inside the house, in a living room. ☐	14. If inside the house, whether any vent for smoke present? 1. Yes. 2. No. 3. Not applicable ☐
15. Type of fuel used for cooking? 1. LPG. 2. Firewood. 3. Gobar gas. 4. Kerosene. 5. Electricity. 6. Others (specify)_____. 7. Don't know. ☐	

3. General form 3.

FORM G3: DATA COLLECTION PARTICULARS ***(To be elicited during each visit to the family)***

A. Required information:

1. Date of Visit/Data collection: (DD/MM/YY): ☐☐/☐☐/☐☐

2. Respondent Name: (In CAPITAL letters) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

3. If respondent is not PW/mother, relationship to PW/ mother: ☐☐
(01. Husband. 02. Son/Daughter. 03. Parent/ Guardian. 04. Parent-In-Law. 05. Brother/Sister. 06. Brother/ Sister-In-Law. 07. Niece/Nephew. 08. ANM/ASHA. 09. Uncle/Aunt. 10. Others (Specify). 11. Not applicable.)

3. a. If others, specify: (In CAPITAL letters) ☐☐☐☐☐☐☐☐☐

4. Address: (If changed, in CAPITAL letters) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

5. Phone No. (If changed) ☐☐☐☐☐☐☐☐☐☐☐☐

6. Venue of data collection: 1. Home. 2. HCF. 3. Others ☐

7. Visit summary

Child ID (TTHHHC)	i. Age of the child at visit (YY/MM/DD)	ii. Visit No.	iii. Schedule of visit*	iv. If others, reason for visit
a. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
b. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
c. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
d. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
e. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
f. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
g. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐
h. ☐☐☐☐☐☐	☐☐/☐☐/☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐

i. Whether any twins above? (1. Yes. 2. No.) ☐ j. If yes, child IDs: ☐☐☐☐☐☐ & ☐☐☐☐☐☐

k. No. of children for whom the forms were completed: ☐ l. Whether mother visited? (1. Yes. 2. No.) ☐

Pregnant mother UID	i. Completed weeks of pregnancy	ii. Visit No.	iii. Schedule of visit*	iv. If others, reason for visit
m. ☐☐☐☐☐☐	☐☐	☐☐	☐☐☐	☐☐☐☐☐☐☐☐☐☐☐☐☐☐

4. General form 4.

FORM G4: ADDITIONAL INFORMATION ***(To be elicited during each visit to the family)***

A. Required information.		
1. Reason for any premature closure of the form.		
a. Mother / Child ID	b. Form closed	c. Reason for closure
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
☐☐☐☐☐☐	☐☐☐☐	
2. Any unusual circumstances / adverse events during data collection.		
3. Extra space for additional information/elaboration/clarification, if any.		

5. Mother form.

FORM M1: MOTHER INFORMATION (To be elicited twice, at the time of Phase 2 recruitment and at the end point of the study, for the biological mother)

A. Basic information:

1. Full name of the mother: (in CAPITAL letters)

2. Date of marriage: (DD/MM/YY) (If answered, go to Q. No. 4)

3. If date not available, age at marriage: (in years)

4. Date of positive HIV test: (DD/MM/YY)

5. Whether found pregnant / delivered on or after 01 Jan 2011? 1. Yes. 2. No. (If yes, fill up M&I form, for each pregnancy, if not already filled) (If no, go to Q. No. 7)

6. If yes, Mother UID (if pregnant during the Phase 1 & 2 study period): (HCFSLN)
UID 1: UID 2: UID 3

7. Is the mother alive now? 1. Yes. 2. No.

8. Obstetric formula: (Now or at the time of death) G P L A

9. Whether linked to ART? 1. Yes. 2. No. (If no, go to Q. No. 22)

10. If yes, Pre-ART No.

11. Whether ART started ever? 1. Yes. 2. No. (If no, go to Q. No. 17)

12. If yes, ART No.

13. If yes, ART start date: (DD/MM/YY)

14. If yes, ART status: 1. On ART. 2. LFU. 3. Not applicable.

15. If yes, ART regimen: (Refer code list)

16. HCF providing ART: (Enter 990 for others; Enter HCF name in form G4. A. 3)

17. Last CD4 count:

18. Last CD4 test date: (DD/MM/YY)

19. HIV clinical stage: (Now or at the time of death)

20. Any ARV/ART adverse effects ever? 1. Yes. 2. No. (If no, go to Q. No. 22)

21. If yes, what? (Refer code list)

22. Current pregnancy status: 1. Not pregnant. 2. Pregnant. 3. Missed periods, pregnancy not confirmed. 4. Don't know. 5. Not applicable.

B. Previous pregnancy-related information (For only biological children) (For all live born children of the mother) (Use additional sheet if required)					
	Child 1:	Child 2:	Child 3:	Child 4:	Child 5:
1. Child ID	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐	☐☐☐☐☐☐
2. Whether any care received during pregnancy (ANC)? 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 6)	☐	☐	☐	☐	☐
3. If yes, antenatal care provider: (Enter 990 for others; Enter HCF name in form G4. A. 3)	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐
4. If yes, no. of TT doses received: 1. 1. 2. 2. 3. Don't remember. 4. None.	☐	☐	☐	☐	☐
5. If yes, whether had IFA? 1. Yes. 2. No. 3. Don't remember.	☐	☐	☐	☐	☐
6. Any complications during pregnancy: 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 8)	☐	☐	☐	☐	☐
7. If yes, what? 1. Excessive nausea and vomiting; 2. Unclear vision; 3. Fever; 4. Severe headache; 5. Swelling of feet/face/hands; 6. Vaginal bleeding; 7. Fluid loss / Vaginal leaking (before 37 weeks of pregnancy); 8. Foul smelling vaginal discharge; 9. Abdominal cramps/pain; 10. Seizures/Fits; 11. Pain during urination; 12. Blood in urine; 13. Less feeling of fetal movements; 14. Feeling of heart beats/Palpitation; 15. Sleeplessness; 16. Anemia/Pallor; 17. Depression. 18. Others. (Enter three most encountered problems, if any)	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐
8. Any blood transfusion done during pregnancy? 1. Yes. 2. No. 3. Don't remember.	☐	☐	☐	☐	☐
9. Whether mother known as HIV positive during this pregnancy? 1. Yes. 2. No. (If no, go to Q. No.19)	☐	☐	☐	☐	☐
10. Whether ARV given for mother? 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No.15)	☐	☐	☐	☐	☐
11. If yes, ARV regimen: (Refer code list)	☐☐	☐☐	☐☐	☐☐	☐☐
12. If yes, ARV start date: (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
13. If response code is not 20 in Q. 10 above, ARV duration (in weeks)	☐☐	☐☐	☐☐	☐☐	☐☐
14. If yes, HCF providing ARV: (Enter 990 for others; Enter HCF name in form G4. A. 3)	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐
15. Whether mother on ART during the pregnancy? 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 19)	☐	☐	☐	☐	☐
16. If yes, ART regimen: (Refer code list)	☐☐	☐☐	☐☐	☐☐	☐☐

17. If yes, ART start date: (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
18. If yes, HCF providing ART: (Enter 990 for others; Enter HCF name in form G4. A. 3)	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐
19. Any drug history during pregnancy? (Other than ARV/ART) 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 21)	☐	☐	☐	☐	☐
20. If yes, which medicine(s)?					
21. Date of delivery (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
22. In case date of delivery is not available, year of delivery:	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
23. Place of delivery 1. Govt. Hosp. 2. Pvt. Hosp. 3. Home. 4. Other. (If answered Govt./ Pvt. hospital, go to Q. No. 25) (If other, mention place of delivery in form G4. A. 3)	☐	☐	☐	☐	☐
24. If delivery not in hospital, who assisted: 1. ASHA. 2. ANM. 3. Trained birth attendant. 4. Other Skilled birth attendant. 5. Family member. 6. Friend. 7. Others. 8. None.	☐	☐	☐	☐	☐
25. If hospital delivery, after how many days discharged?	☐☐	☐☐	☐☐	☐☐	☐☐
26. Type of delivery: 1. Normal. 2. Forceps/Vacuum used. 3. Caesarean.	☐	☐	☐	☐	☐
27. Birth type: 1. Single. 2. Twins.	☐	☐	☐	☐	☐
28. Any complications during delivery: 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 30)	☐	☐	☐	☐	☐
29. If yes, what? 1. Delivery before 36 weeks of pregnancy. 2. Prolonged delivery. 3. Parts of the baby other than head delivered first (Abnormal foetal presentations). 4. Baby breathes in meconium (Meconium aspiration). 5. Umbilical cord around baby's neck. 6. Early fluid loss (Premature rupture of membranes. 7. Placenta obstructing delivery. 8. Child distress. 9. Excessive bleeding. 10. Others. (Enter three most encountered problems, if any)	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐
30. Any complications after delivery: 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 32)	☐	☐	☐	☐	☐
31. If yes, what? 1. Vaginal tear. 2. Foul smelling vaginal discharge. 3. Fever. 4. Abdominal pain on touching. 5. Problems with urination. 6. Breast milk leaking. 7. Breast swelling. 8. Mood changes/Depression. 9. Weight loss. 10. Hair loss. 11. Excessive bleeding. 12. Others. (Enter three most encountered problems, if any)	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐	a. ☐☐ b. ☐☐ c. ☐☐

32. Any blood transfusion done after delivery? 1. Yes. 2. No. 3. Don't remember.	☐	☐	☐	☐	☐
33. Breast feeding initiation: 1. <30min. 2.30- <60 min. 3.1-4 hrs. 4 4-24 hrs. 5.> 24 hrs. 6. Not started. (If not started, go to Q. No. 35)	☐	☐	☐	☐	☐
34. Breast feeding duration (in weeks)	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐
35. Age of child at other feeds (in weeks)	☐☐	☐☐	☐☐	☐☐	☐☐
36. Any mixed feeding (both breast milk and other foods for more than 2 weeks)? 1. Yes. 2. No	☐	☐	☐	☐	☐
37. Whether ARV given for mother after delivery? 1. Yes, for the whole duration of breast feeding. 2. Yes, for some time during breast feeding. 3. No. 4. Don't remember. (If no/don't remember, go to Q. No.39)	☐	☐	☐	☐	☐
38. If yes, ARV regimen: (Refer code list)	☐☐	☐☐	☐☐	☐☐	☐☐
39. Whether mother on ART after delivery? 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 41)	☐	☐	☐	☐	☐
40. If yes, ART regimen: (Refer code list)	☐☐	☐☐	☐☐	☐☐	☐☐
41. Any drug history after delivery? (Other than ARV/ART) 1. Yes. 2. No. 3. Don't remember. (If no/don't remember, go to Q. No. 43)	☐	☐	☐	☐	☐
42. If yes, which medicines?					
43. CD4 count nearest to date of delivery: (If don't know/ no information, enter 9998)	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
44. Date of CD4 count nearest to delivery: (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐

C. Chronic Morbidity details						
		(Leave blank if not applicable)				
Any chronic maternal morbidities ever?	i. Diagnosed? 1. Yes. 2. No.	ii. Diagnosed when? Before delivery of ___ child: 1. 1st. 2. 2nd. 3. 3rd. 4. 4th. 5. 5th. After: 6. Delivery of last child.	iii. Treated ever? 1. Yes. 2. No.	iv. Duration of treatment? (in months)	v. Now on treatment? 1. Yes. 2. No.	vi. Treated with?
1. Diabetes	☐	☐	☐	☐☐	☐	
2. Hypertension	☐	☐	☐	☐☐	☐	
3. Heart Disease	☐	☐	☐	☐☐	☐	
4. Asthma	☐	☐	☐	☐☐	☐	
5. Mental ill-health	☐	☐	☐	☐☐	☐	
6. Cancer (specify)	☐	☐	☐	☐☐	☐	
7. Stroke / Paralytic disease (specify)	☐	☐	☐	☐☐	☐	
8. Liver disease (specify)	☐	☐	☐	☐☐	☐	
9. Kidney disease (specify)	☐	☐	☐	☐☐	☐	
10. Other (specify)	☐	☐	☐	☐☐	☐	

D. Acute Morbidity details					
		(Leave blank if not applicable)			
Any acute maternal morbidities in the past one month?	i. Present? 1. Yes. 2. No.	ii. Treated? 1. Yes. 2. No.	iii. Duration of treatment? (in days)	iv. Now on treatment? 1. Yes. 2. No.	v. Treated with?
1. Fever	☐	☐	☐☐	☐	
2. Diarrhea/Dysentery	☐	☐	☐☐	☐	
3. Cough	☐	☐	☐☐	☐	
4. Sore throat	☐	☐	☐☐	☐	
5. Breathlessness	☐	☐	☐☐	☐	
6. Hemoptysis / TB	☐	☐	☐☐	☐	
7. Skin rashes/abscess	☐	☐	☐☐	☐	
8. Eye discharge	☐	☐	☐☐	☐	
9. Ear discharge	☐	☐	☐☐	☐	
10. Chicken pox	☐	☐	☐☐	☐	
11. Mouth ulcers	☐	☐	☐☐	☐	
12. Oral candidiasis/White patches in mouth	☐	☐	☐☐	☐	
13. Others (specify)	☐	☐	☐☐	☐	

E. Any OTHER drug history		
1. Any OTHER drug history in the last one month? (Exclude ARV/ ART) 1. Yes. 2. No. ☐	(Leave blank if not applicable)	
	2. If yes, which medicine?	3. For what problem?

F. Nutrient deficiency sign/symptom (1. Yes. 2. No.)					
1. Dry eyes	☐	2. Red eyes (corneal vascularization)	☐	3. Night blindness	☐
4. Cannot look into light (Photophobia)	☐	5. Unclear vision	☐	6. Color blindness	☐
7. Limited eye movement (Ocular paralysis)	☐	8. White patches in eye (Bitot's spots)	☐	9. Bleeding from nose	☐
10. Mouth ulcers	☐	11. Bleeding gums	☐	12. Red tongue (Glossitis)	☐
13. Sore tongue/White coating on tongue	☐	14. Scaly angles of mouth, eyes (Angular Cheilitis)	☐	15. Premature teeth fall-out	☐
16. Rough dry scaly/ cracked skin	☐	17. Skin infection/ Dermatitis	☐	18. Bleeding below skin	☐
19. Dark or light discoloration of skin	☐	20. Flaky paint dermatosis	☐	21. Easy bleeding from wounds	☐
22. Dry brittle hair/ nails	☐	23. Hair loss/alopecia	☐	24. Premature grey hair	☐
25. Excessive muscle weakness	☐	26. Muscle cramps	☐	27. Muscle wasting (muscle loss)	☐
28. Feeling of heart beat / Palpitation	☐	29. Sleeplessness	☐	30. Depression	☐
31. Irritability	☐	32. Confusions/ Disorientation	☐	33. Forgetfulness/ Dementia	☐
34. Mood disorder	☐	35. Shooting/burning pain in feet	☐	36. Numbness/ Tingling in limbs	☐
37. Headache	☐	38. Loss of taste/ smell/appetite	☐	39. Loss of balance/ Cannot walk in a straight line/Falling while walking Movement disorder	☐
40. Fits/Seizures	☐	41. Constipation (no regular daily toilet)	☐	42. Diarrhea	☐
43. Anemia/Pallor	☐	44. Cyanosis (Blue color of skin)	☐	45. Asthma	☐
46. Ankle edema/Swelling of feet	☐	47. Delayed wound healing	☐	48. Frequent infections	☐
49. Frequent miscarriages	☐	50. "Moon face" appearance	☐	51. Skeletal deformities (bones not in right shape)	☐
52. Painful joints	☐	53. Costo-chondral swelling (Swollen chest)	☐	54. Frequent fractures	☐

G. Additional questions for dietary recall	
1. Who is the food preparation in charge at the house? ☐ 1. Child's mother; 2. Child's father; 3. Child's grandmother; 4. Others. 5. Don't know.	2. Did the mother eat food from outside home yesterday? ☐ 1. Yes; 2. No; 3. Don't know.
3. In case the family runs an eatery, is the food of eatery same as that used in the house? ☐ 1. Yes; 2. No; 3. Don't know. 4. Family does not run an eatery.	4. Which oil or fat do you use for meal preparation in your household? ☐ 1. Groundnut oil; 2. Gingelly Oil; 3. Sunflower oil; 4. Safflower oil; 5. Soybean oil; 6. Coconut oil; 7. Vanaspati/Dalda; 8. Others; 9. Don't know.
6. How frequently do you use this oil or fat for meal preparation in your household? ☐ 1. Rarely; 2. Sometimes; 3. Often; 4. Always	
7. If having any ready-made preparations as food, what is the nutrition formula/facts of the product?	
8. In case of mothers, the type and quantity of alcohol consumed, if any.	

H. 24-HOUR DIETARY RECALL

(To be elicited for a normal day of the mother)

Name: Age: Date: Day:

What did you eat or drink the whole of yesterday starting with what you had after waking in the morning till you went to bed. Include foods that you ate outside.

TIMING	FOOD EATEN	TYPE OF FOOD (Homemade=1 or Readymade=2)	PORTION SIZE

What did you add to the drink/beverages & how many tsp of it? E.g. sugar, honey, supplement like bournvita, milo etc. Did you eat anything with your beverage such as biscuits, rusks etc.
Did you add anything to your breakfast? E.g. Ghee / butter / curds, pickle etc.
For lunch and dinner, did you consume anything in addition to the above foods? (Salad, pickles, chips, papads, sweets etc.).
Did you have any snack to eat in the evening before or after your tea?
Did you have chips, cakes/ sweet, biscuits or chocolates at any time during the day?
Did you add salt or sugar while eating any of the meals?
Did you take any vitamin or mineral tablets during the day?

I. Psychosocial information		
What do the mother feel in the last one month? 1. Yes. 2. No. 3. Not applicable.	i. Are the family members / relatives	ii. Are the people (other than family members)
1. Talking to her?	☐	☐
2. Visiting her house?	☐	☐
3. Eating and drinking in her house?	☐	☐
4. Inviting her to visit their houses?	☐	☐
5. Inviting her to social occasions like marriage?	☐	☐
6. Inviting her to religious occasions like festivals/pujas/prayers/jatras?	☐	☐
7. Allowing her children to continue social relations or access social institutions like school?	☐	☐
8. Caring her?	☐	☐
9. Avoiding/Ignoring her?	☐	☐
10. Suspecting her movements?	☐	☐
11. Quarrelling with her?	☐	☐
12. Insulting/teasing/taunting her?	☐	☐
13. Getting angry with her over silly things?	☐	☐
14. Torturing her?	☐	☐
15. Spreading rumors about her?	☐	☐
16. Rejoicing/happy over her situation?	☐	☐

17. Did the house owner throw her family out of their rented house? ☐	18. Did the employer refuse to offer her job / work as before? ☐
19. Did the family members throw her out of the family and house? ☐	20. Did the family members abandon her and leave her home alone? ☐
21. Did the whole family migrate to avoid public insult? ☐	22. Did the mother face any violence from any one? ☐
23. Did the mother or any family member have any legal issues? ☐	

J. Anthropometric measurements and Hemoglobin	
1. Height	☐☐☐.☐ cm
2. Weight	☐☐☐.☐☐☐ kg
3. Hemoglobin	☐☐.☐ g/dl

6. Child form.

FORM C: CHILD INFORMATION (To be elicited for each biological child of mother)

A. Basic Information: (To be filled up for each visit)

1. Date of visit: (DD/MM/YY) ☐☐/☐☐/☐☐	2. Visit No. ☐☐	3. Schedule of visit: ☐☐
4. Name of child: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	5. Child ID: ☐☐☐☐☐☐ T T H H H C	6. Phase 1 UID: ☐☐☐☐☐☐☐☐☐

7. Was the child seen? ☐ 1. Yes. 2. No. (If yes, go to Q. No. 8).	7. a. If no, reason: 1. Temporary Migration. 2. Permanent migration. 3. Refusal. 4. Death. 5. Others. ☐ 7. b. If others. specify: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ (Note: 1. If answered code 2/3/4 in 7.a. go to section B, Q. No. 1, for children born during Phase 2. For other children, close the form here. 2. If answered code 1 or 5 in 7.a., make another visit to the child and fill up the form. 3. If answered code 4 in 7.a., fill up N-VSA for neonates or P-VSA for other children).

8. Where living? 1. With mother at home. 2. Without mother at home. 3. Hostel. 4. In other home. 5. Orphanage. 6. Others. ☐	9. Person taking care: 1. Mother. 2. Step-mother. 3. Father. 4. Guardian. 5. Other un-related. ☐

B. Milestones of Growth and Social / Physical Development achieved: 1. Yes. 2. No. (For children 0-<5 years) (To be filled up for each visit)

1. 0-2 months: Respond to mother with smile ☐	2. 1-3 months: Eyes follow pen/ pencil ☐	3. 1-3.5 months: Hold head steady ☐	4. 2.5-4.5 months: Rolls from back to stomach ☐
5. 3-5.5 months: Turns head to voice/ sounds of bell, rattle or toys ☐	6. 4-7 months: Transfers objects hand to hand ☐	7. 5.5-11 months: Raises self to sitting position ☐	8. 6.5-11 months: Stand up by furniture ☐
9. 6.5-11 months: Fine prehension pellet ☐	10. 6.5-12.5 months: Pat a cake ☐	11. 7.5-13 months: Walks with help ☐	12. 9.5-16.5 months: Throws ball ☐
13. 9.5-17.5 months: Walks alone ☐	14. 11-19 months: Says two words ☐	15. 11-19.5 months: Walks backwards ☐	16. 12-24.5 month: Walk upstairs with help ☐
17. 15.5-24.5 months: Points to parts of doll (3 parts) ☐	18. 21-25 months: Removes garments ☐	19. 23-32 months: Brush teeth with help ☐	20. 23-35 month: Answer at least half understandable to others ☐
21. 24-27 months: Uses words for personal needs ☐	22. 26-29 months: Jumps in place ☐	23. 26-31 months: Points to 7 common objects ☐	24. 27-30 months: Differentiates big and small ☐
25. 30-33 months: Tells gender when asked ☐	26. 30-36 months: Asks simple questions ☐	27. 33-36 months: On instruction, places objects IN, ON or UNDER ☐	
48 months: 28. Hops on one foot ☐		29. Alternate feet going downstairs ☐	
30. Plays cooperatively in a group ☐		31. Goes to toilet alone ☐	

C. Additional Milestones of Language development achieved. 1. Yes. 2. No. (For children 0-<5 year) (To be filled up for each visit)

1. 0-1.5 month: Respond to Bell/Rattle/ Clap (Feel sound) ☐	2. 2-3 months: Vocalize with 2 or more syllables ☐	3. 4-5 months: Respond to own name ☐	4. 5-6 months: Recognize words like daddy, mamma, tata etc. ☐
5. 6-9 months: Listen when spoken to ☐	6. 6-9 months: Dada, mama non-specific ☐	7. 6-12 month: Listen to adult speech sounds intonation patterns or like games ☐	8. 9-12 months: Respond to requests ☐
9. 9-12 months: Use one word ☐	10. 10-12 months: Respond to music by bodily movements ☐	11. 10-15 months: Point to objects / toys when asked ☐	12. 12-14 months: Sustain interest for 2 minutes in one picture ☐
13. 12-15 months: Use voice to pointing ☐	14. 14-16 months: Recognize parts of the body ☐	15. 16-20 months: Follow simple commands ☐	16. 18-21 months: Understand distinction between personal pronouns ☐
17. 18-21 months: Speaking vocabulary of 10-20 words ☐	18. 18-24 months: Pretend with dolls/himself/herself ☐	19. 19-22 months: Identifies common objects and pictures ☐	20. 20-24 months: Shows interest in TV sound ☐
21. 21-25 months: Combines Words ☐	22. 24-27 months: Identify names of family members ☐	23. 24-29 months: Names four pictures ☐	24. 26-27.5 months: Concept of one ☐
25. 27-30 months: Listens to story and rhymes ☐	26. 30-33 months: Gives own name when asked ☐	27. 30-33 months: Understand common adjectives ☐	28. 48 months: Says a song or poem ☐
29. 48 months: Tells stories ☐		30. 48 months: Ask meaning of words ☐	

D. Immunizations / Vitamin A given? 1. Yes. 2. No. (To be filled up for each visit, based on the age of the child; If not applicable, leave blank)			
At birth	1. BCG ☐ 2. OPV 0 ☐ 3. HBV ☐	6 weeks	4. DPT 1 ☐ 5. OPV 1 ☐ 6. HBV 1 ☐
10 weeks	7. DPT 2 ☐ 8. OPV 2 ☐ 9. HBV 2 ☐	14 weeks	10. DPT 3 ☐ 11. OPV 3 ☐ 12. HBV 3 ☐
9 month	13. Measles ☐ 14. Vit. A ☐	15 month	15. MMR ☐
18 month	16. DPT Booster ☐ 17. OPV 4 ☐ 18. Vit. A ☐	24 month	19. Vit. A ☐
30 month	20. Vit. A ☐	36 month	21. Vit. A ☐
42 month	22. Vit. A ☐	48 month	23. Vit. A ☐
54 month	24. Vit. A ☐	5 years	25. DPT/DT ☐

E. Chronic Morbidity details (To be filled up on first visit to child, and if there is any change in the follow up visits. If no change, leave blank)

		(Leave blank if not applicable)				
Any chronic child morbidities ever / since the last visit?	i. Diagnosed? 1. Yes. 2. No.	ii. Age of the child when diagnosed (YY/MM/DD)	iii. Treated ever? 1. Yes. 2. No.	iv. Duration of treatment? (in months)	v. Now on treatment? 1. Yes. 2. No.	vi. Treated with?
1. Congenital anomaly 1 (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
2. Congenital anomaly 2 (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
3. Paralytic disease (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
4. Asthma	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
5. Cancer (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
6. Mental Retardation	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
7. Speech defects	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
8. Liver disease (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
9. Kidney disease (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
10. Birth injury (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	
11. Other (specify)	☐	☐☐/☐☐/☐☐	☐	☐☐	☐	

F. Acute Morbidity details (To be filled up for each visit)

		(Leave blank if not applicable)			
Any acute child morbidities in the past one month / since the last visit?	i. Present? 1. Yes. 2. No.	ii. Treated? 1. Yes. 2. No.	iii. Duration of treatment? (in days)	iv. Now on treatment? 1. Yes. 2. No.	v. Treated with?
1. Fever	☐	☐	☐☐	☐	
2. Diarrhea/Dysentery	☐	☐	☐☐	☐	
3. Vomiting	☐	☐	☐☐	☐	
4. Rhinitis/Running nose	☐	☐	☐☐	☐	
5. Cough	☐	☐	☐☐	☐	
6. Sore throat	☐	☐	☐☐	☐	
7. Breathlessness	☐	☐	☐☐	☐	
8. Hemoptysis / TB	☐	☐	☐☐	☐	
9. Skin rashes/ abscess/ infection/scabies	☐	☐	☐☐	☐	
10. Seborrhoeic dermatitis / capitis	☐	☐	☐☐	☐	
11. Eye discharge	☐	☐	☐☐	☐	
12. Ear discharge	☐	☐	☐☐	☐	
13. Chicken pox	☐	☐	☐☐	☐	

14. Mouth ulcers					
15. Oral candidiasis					
16. Worm infestation					
17. Liver disease (specify)					
18. Others (specify)					
19. Others (specify)					

G. Any OTHER drug / treatment history (To be filled up on first visit to child, and if there is any change in the follow up visits. If no change, leave blank)

	(If no, leave blank)		
1. Any OTHER drugs given in the last one month / since last visit? (Exclude ART/Vit/INH/CPT) 1. Yes. 2. No.	a. If yes, which medicine?	b. For what problem?	
2. Any vitamin supplements given in the last one month / since last visit? 1. Yes. 2. No.	a. If yes, which medicine?	b. For what problem?	
3. Any blood transfusion given ever / since last visit? 1. Yes. 2. No.	a. If yes, for what reason? 1. Accident/injuries. 2. Anemia. 3. Blood disorders/Thalassemia. 4. Others.	b. If others, reason:	c. If yes, at what age? (YY/MM/DD)
4. Any history of INH prophylaxis ever / since the last visit? 1. Yes. 2. No.	a. If yes, date of start: (DD/MM/YY)	5. Any history of CPT ever / since the last visit? 1. Yes. 2. No.	a. If yes, date of start: (DD/MM/YY)

H. HIV related information: (To be filled up on first visit to child, and if there is any change in the follow up visits. If no change, leave blank)

For positive children

1. Whether linked to ART? 1. Yes. 2. No. (If no, go to Q. No. 9).	2. If yes, Pre-ART No.	
3. Whether ART started ever? 1. Yes. 2. No. (If no, go to Q. No. 9).	4. If yes, ART No.	5. If yes, start date: (DD/MM/YY)
6. If yes, ART status: 1. On ART. 2. LFU. 3. Not applicable.	7. If yes, ART regimen: (Refer code list)	8. HCF providing ART: (Enter 990 for others; Enter HCF name in form G4.A.3.)
9. Whether ARV given ever? 1. Yes. 2. No. (If no, go to Q. No. 15).	10. If yes, start date: (DD/MM/YY)	11. If yes, ARV regimen: (Refer code list)
12. Any ARV/ART adverse effects ever? 1. Yes. 2. No. (If code 2 in Q. No. 3 and 9, go to Q. No. 15)	13. If yes, what? (Refer code list)	14. If yes, date of start of adverse effects: (DD/MM/YY)
15. Last CD4 count:	16. Last CD4 test date:	17. HIV clinical stage:

For negative children

18. Date of repeat HIV test: (DD/MM/YY)	19. Type of test: 1. ABT. 2. DBS. 3. WBS. 4. Others (specify)	20. Result: 1. Positive. 2. Negative.

I. Nutrient deficiency sign/symptom 1. Yes. 2. No. (To be filled up for each visit)

1. Dry eyes	2. Red eyes (corneal vascularization)	3. Night blindness
4. Cannot look into light (Photophobia)	5. Unclear vision	6. Color blindness
7. Limited eye movement (Ocular paralysis)	8. White patches in eye (Bitot's spots)	9. Bleeding from nose
10. Mouth ulcers	11. Bleeding gums	12. Red tongue/ Glossitis
13. White coating on tongue (Sore tongue)	14. Scaly angles of mouth, eyes (Angular Cheilitis)	15. Premature teeth fall-out
16. Rough dry scaly/ cracked skin	17. Skin infection / Dermatitis	18. Bleeding below skin
19. Dark or light discoloration of skin	20. Flaky paint dermatosis	21. Easy bleeding from wounds
22. Dry brittle hair/ nails	23. Hair loss/alopecia	24. Premature grey hair
25. Excessive muscle weakness	26. Muscle cramps	27. Muscle wasting (muscle loss)
28. Feeling of heart beat / Palpitation	29. Sleeplessness / Insomnia	30. Depression
31. Irritability	32. Confusions/ Disorientation	33. Forgetfulness/ Dementia
34. Mood disorder	35. Shooting/burning pain in feet	36. Numbness/ Tingling in limbs

37. Headache	☐	38. Loss of taste/ smell/appetite	☐	39. Loss of balance/ Movement disorder (Cannot walk in a straight line/Falling on walking)	☐
40. Fits/Seizures	☐	41. Constipation (no regular daily toilet)	☐	42. Diarrhea	☐
43. Anemia/Pallor	☐	44. Cyanosis (Blue color of skin)	☐	45. Asthma	☐
46. Ankle edema/ Swelling of feet	☐	47. Delayed wound healing	☐	48. Frequent infections	☐
49. Pinched face (Old monkey appearance)	☐	50. "Moon face" appearance	☐	51. Skeletal deformities (bones not in right shape)	☐
52. Painful joints	☐	53. Costochondral swelling (Swollen chest)	☐	54. Brittle bones / Frequent fractures	☐
55. Thin / Lanugo hair	☐	56. Loose skin folds (over buttock/axilla)	☐	57. Distended abdomen	☐
58. Growth retardation	☐	59. Soft skull	☐	60. Knock knees	☐

J. Anthropometric measurements and Hemoglobin

1. Height (for all children, on each visit)	☐☐☐.☐ cm
2. Weight (for all children, on each visit)	☐☐☐.☐☐☐ kg
3. Head circumference (for less than 2 year children, on each visit)	☐☐☐.☐ cm
4. Mid arm circumference (for all children, on each visit)	☐☐☐.☐ cm
5. Hemoglobin (for all children, twice, at the beginning and end of the study)	☐☐.☐ g/dl

K. Pre-school non formal education information (To be filled up for each visit) (For children 3-5 years only)

1. Institution: 1. Anganwadi 2. Nursery. 3. Day care. 4. None. ☐	2. How many days did he/she go in the last one week? ☐
3. Any reason for absence?	4. Whether availing any nutrition services? ☐ 1. Yes. 2. No. 3. Don't know.

L. Additional questions for dietary recall: (Only for children for whom other feeds have been started) (To be filled up for each visit)

1. Did the child eat food from outside home yesterday? 1. Yes; 2. No; 3. Don't know. ☐

2. If having any ready-made preparations as food, what is the nutrition formula/facts of the product?

M. 24-HOUR DIETARY RECALL (For children of age 2 years or more)

Name: Age: Date: Day:

What did you <u>eat or drink</u> the whole of <u>yesterday</u> starting with what you had after waking in the morning till you went to bed. Include foods that you ate outside.

TIMING	FOOD EATEN	TYPE OF FOOD (Homemade=1 or Readymade=2)	PORTION SIZE

What did you add to the drink/beverages & how many tsp of it? E.g. sugar, honey, supplement like bournvita, milo etc. Did you eat anything with your beverage such as biscuits, rusks etc.
Did you add anything to your breakfast? E.g. Ghee / butter / curds, pickle etc.

For lunch and dinner, did you consume anything in addition to the above foods? (Salad, pickles, chips, papads, sweets etc.).
Did you have any snack to eat in the evening before or after your tea?
Did you have chips, cakes/ sweet, biscuits or chocolates at any time during the day?
Did you add salt or sugar while eating any of the meals?
Did you take any vitamin or mineral tablets during the day?

N. DIETARY INTAKE ASSESSMENT (For children of age less than 2 years)

Mother Name: Child Name: Age: (DD/MM/YY) ☐☐/☐☐/☐☐

1. Has the child been ever breastfed? 1. Yes. 2. No ☐
   (a) If yes, was the child put on breastfeeds within one hour of birth? 1. Yes. 2. No. *(Leave blank if not applicable)* ☐
2. Is the child being currently breastfed? 1. Yes. 2. No ☐
   If yes:
   (a) Type of breast feeding: 1. Timed feeding. 2. Demand feeding. *(Leave blank if not applicable)* ☐
   (b) Approximate number of breastfeeds given in last 24 hours? ☐☐☐
   (c) Is the child being exclusively breast fed? 1. Yes. 2. No ☐
3. If answer to Q 2 is 'No': then over the past 24 hours:

A. Did the child drink any liquids yesterday or during the night? 1. Yes. 2. No ☐			B. Did the child drink any liquids yesterday or during the night? 1. Yes. 2. No ☐	
If yes, whether:	i. Given? 1. Yes. 2. No. 3. Don't know.	ii. If yes, no. of times	If yes, whether:	i. Given? 1. Yes. 2. No. 3. Don't know.
1. Plain water	☐		1. Cereals: wheat, rice, jowar, ragi	☐
2. Infant formula	☐	☐☐☐	2. Pulses: Bengal gram, Black gram, Green gram, Lentil, Red gram	☐
3. Powdered milk	☐	☐☐☐	3. Green leafy vegetables	☐
4. Animal milk	☐	☐☐☐	4. Roots and tubers: Carrot, potato, onion	☐
5. Juice	☐		5. Other vegetables	☐
6. Curd water	☐		6. Nuts and oilseeds: Groundnuts	☐
7. Lemon water	☐		7. Fruits	☐
8. Vegetable/meat broth	☐		8. Animal foods-chicken, meat, fish, egg	☐
9. Thin porridge	☐		9. Milk: Cow/buffalo	☐
10. Any other liquid	☐		10. Fats and oils: ghee, cooking oil	☐

4. If the child has eaten solid/semi-solid or soft foods, how many times did the child eat them yesterday or during the night? ☐☐☐ (Enter 998 for don't know)

7. Participant information sheet (English)

PARTICIPANT INFORMATION SHEET

Health and life outcomes of children exposed to maternal HIV infection in Belgaum district, Karnataka

General information:

This is the information sheet for participants of the research study undertaken by Dr. Rajeev N S (Registration No. 805063/2013, Centre of Social Medicine and Community Health, Jawaharlal Nehru University, New Delhi -110067. Phone: 9686679445), for his Ph.D. program.

Study Introduction:

Reports from many countries have found high number of illnesses and loss of life from infectious diseases among both infected and un-infected exposed children. So, HIV/AIDS among children is a matter of health concern. While HIV prevalence is showing a decline in the Belgaum district, mother to child transmission continues to be the most common method by which children get infected with HIV. We have advanced PPTCT programs these days, to prevent the mother to child transmission. Still, there are some children infected in spite of these efforts. Also we have a lot number of children who are exposed and uninfected in our community. However, it is important to know the course of health and life events of your children, so as to enable the government and other agencies, to plan the way ahead. It will also help me to complete my Ph.D. program.

You and your child have been selected as participants for this study, because you have been identified to be a mother living with HIV and have a child (children) less than 5 years of age, OR, because you were detected to be a pregnant woman living with HIV, on or after 01 Jan 2011, as per the records of health care facilities in Belgaum district. This study will be an enquiry into your and your child's (children's) health aspects. The study is for a period of one year, or till the child completes 5 years of life. I request you to share some of the information required, if it is OK for you. This would help me to understand health and life outcomes among the exposed cohort of children, and differentially between the infected and uninfected, in terms of growth and development, clinical and nutritional profiles, and morbidity/mortality events in relation to their HIV infection status, natural course of infection, prophylaxis or treatment status, etc. This is the objective of my Ph.D. study, and all these are also important for future planning of health care and other services. And your child is kindly requested to be one among the participants, with your consent. I would be extremely thankful to you for sharing the required information at your convenience.

Study procedures:

You (mother/father/caretaker) will be explained what this research study is all about, and all your questions would be answered. Then, if you feel that you understand what you will have to do, you will be asked to sign, or put your thumbprint on the consent form. If you agree and sign/make thumb impression on the consent form, you will be offered a copy of your signed consent form. You will then be given a number which is unique to you, and the same number will be used on your child's (children's) records

with me. That is, your name or your child's (children's) names will not be written on any of the records, to maintain confidentiality of the information shared by you.

Once you sign/keep thumb seal on this format, I understand that you agreed on your own to permit me:

1. to visit you (and/or your family) at a convenient place; and,
2. to ask you certain questions about the health of your child; and,
3. to take periodical measurements of your and your child's height and weight, and mid upper arm circumference of your child; and,
4. to motivate and refer you/your child to a convenient government health care facility/ICTC/ART center nearby for Hemoglobin blood test, HIV test and CD4 count, as per national protocol and schedule; and,
5. to check your child for milestones of growth and development and signs of nutritional deficiencies; and,
6. to clarify your / your child's treatment / prophylaxis status and other clinical particulars with your health care providers; and,
7. to ask you certain questions about the health on the last few days of your child, in case of any death.

All these (except sl. no. 7) would be done for a minimum of three times during the one-year study period, or as and when warranted by the health condition of the child.

In case of reported newly diagnosed HIV positive pregnancy or delivery and subsequent pregnancy among already identified women from ICMR study phase 1, during this study period, it is also understood that, you agreed on your own to permit me (in addition to the above):

1. to follow up you during pregnancy till delivery; and,
2. to ask you certain questions about your (or if the consent is given by anyone other than mother, the mother's) pregnancy (in case of any subsequent pregnancy).

If your child turns out to be HIV infected, he/she would be referred to the nearest ART centre for registration and further assessment as to whether the child needs treatment, if not already registered with them.

Please feel free to contact me any time during the study period, if you need any support with referral for your child's health care or his/her social needs. You may also report to me any form of stigma that your child may face, so that I can try to facilitate appropriate action.

Risks related to study participation:

This study does not confer any (potential) risk to the study participants. The activities in this research study includes data collection through interviews, anthropometric measurements and screening for nutritional deficiencies of the mother and child, and referral for blood sample collection for estimation of Hemoglobin, HIV status, in Government ICTCs, as per agreed national and study protocols. Interviews, anthropometric measurements and screening for nutritional deficiencies are non-invasive, and pose minimal risks to the mothers and children.

Blood collection for age-specific HIV test and CD4 count of the child would be done by the existing government systems as per agreed national protocols, and the research would access and accept the data of the same. Similarly, family screening for HIV (for a newly detected HIV infected mother) is a part of the national protocol and this would be again done through the government systems. The assessment of HIV status poses minimal risk to the participant as their status, if disclosed, can lead to some stigma and discrimination. The researcher would adopt and adhere to national protocol for privacy and shared confidentiality. However, the participants have their right to refuse any of these tests for themselves / their children.

Blood samples of mother and children would be usually collected at government health care facilities/ ICTC/ART centers for Hemoglobin estimation, even though it is mandated only for children on ART, as per national protocol. The researcher would access and accept the data of the same, wherever done.

Blood sample collection is a part of the plan for early infant diagnosis and treatment planning. Administering questionnaire and taking anthropometric measurements are non-invasive and the information is maintained strictly confidential and de-identified. However, you might feel anxious to know your child's health, nutrition, morbidity and HIV status. Sometimes, you may also not want to know the status because of the fear of HIV infection. Though HIV infection cannot be cured, the disease can be treated. Early detection and prompt medical care can save the life of your child and help it to live a fuller and longer life. The researcher would counsel you to put you at ease and minimize your discomfort, if any.

Benefits:

There are no direct benefits to you as a result of this study participation. However**,** you will get to know your and your child's (children's) nutritional and anthropometric status, and HIV status of your child and will receive support to ensure that the mother / your child is linked to existing systems of care and treatment. Thus the study may indirectly benefit participants by early diagnosis of HIV infection, prompt initiation for ART, early action to prevent / correct malnutrition related morbidity and timely linkage to schemes/services etc.

Alternative to study participation:

Please understand that you are participating in this study voluntarily, so as to help the investigators to learn more about the burden imposed by HIV infection among children in this area of India. You have an option not to participate in this research study, or leave the study any time.

Costs and Compensation:

You don't have to pay any fees to participate in this study. The study does not offer nor entitle the participants to any benefits or economic compensation for their participation.

Your participation:

Your participation is completely voluntary. It is up to you to decide if you wish to get tested. Your refusal to participate in this study will not affect any health care you receive now or in the future.

Confidentiality:

Your contact details will only be available to the researcher and his guide who runs the research study, and they will be kept under lock and key separately from your other information. All the information that is collected for the study is identified by a study number that is unique to you / your child(ren). If the results of this research study are published, your name will not be shown. Your information will be stored by the researcher till the end of 5 years from the award of Ph.D. degree.

Compensation for Illness or Injury:

There is no anticipated illness/injury that would result from being a participant in this study. So no compensation would be offered. However, for medical care, if required, the participant would be referred to the health care facility with which you have already been registered.

What will happen to the results of the study?

All the information will be closely looked at, at the end of the research study. The information will contribute to the Ph.D. thesis submitted by the researcher. The results may also be published in medical journals and presented at meetings / conferences. If the burden of child morbidity / mortality / malnutrition is high, it will be possible to advocate for further government commitment to support families with children exposed to HIV.

Minor's Assent:

This is not elicited separately as the participant children are less than 5 years of age. Mother's consent is deemed to be sufficient.

Grievance redressal options:

A. If you have a question or problem, or if you feel you have health concerns related to this study, you may contact:

(1) Dr. Rajeev. N. S, C-20(A), MIT staff quarters, Near Swimming Pool, Manipal – 5776104, Udupi district, Karnataka. Mob. 9686679445. E-mail: drrajeevns@gmail.com; or,

(2) Dr, Rajib Dasgupta, Associate Professor, Centre of Social Medicine and Community Health, Jawaharlal Nehru University, New Delhi – 110067. Mob. 09811106025. E-mail: rdasgupta@mail.jnu.ac.in

B. If you have any problems or questions about your right as a research participant, you may contact: Member Secretary, Institutional Ethics Review Board, Jawaharlal Nehru University, New Delhi – 110067. Ph: 011-26704697 E-mail: ierbjnu@gmail.com

8. Participant information sheet (Kannada).

ಭಾಗವಹಿಸುವವರ ಮಾಹಿತಿ ಹಾಳೆ:

ಕರ್ನಾಟಕದ ಬೆಳಗಾವಿ ಜಿಲ್ಲೆಯಲ್ಲಿರುವ ತಾಯಿಯ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿಗೆ ಒಡ್ಡಿಕೊಂಡು ಜನಿಸಿದ ಮಕ್ಕಳ ಆರೋಗ್ಯ ಹಾಗೂ ಜೀವನದ ಫಲತಾಂಶ/ಪರಿಣಾಮಗಳು:

ಸಾಮಾನ್ಯ ಮಾಹಿತಿ:

ಡಾ. ರಾಜೀವ್ ಎನ್ ಎಸ್ (ನೋಂದಣಿ ಸಂಖ್ಯೆ: 8055063/2013, ಸಾಮಾಜಿಕ ಔಷಧ ಮತ್ತು ಸಮುದಾಯ ಆರೋಗ್ಯ ಕೇಂದ್ರ, ಜವಾಹರಲಾಲ ನೆಹರು ವಿಶ್ವವಿದ್ಯಾಲಯ, ನವದೆಹಲಿ-110067. ದೂರವಾಣಿ ಸಂಖ್ಯೆ: 9686679445) ರವರ ಪಿ.ಹೆಚ್.ಡಿ ಸಂಶೋಧನೆ ಕಾರ್ಯಕ್ರಮದಲ್ಲಿ ಭಾಗವಹಿಸುವವರಿಗೆ, ಅವರು ಕೈಗೊಳ್ಳುತ್ತಿರುವ ಅಧ್ಯಯನದ ಕುರಿತು ಮಾಹಿತಿ ಪತ್ರ.

ಅಧ್ಯಯನದ ಪಿಠಿಕೆ:

ಹಲವಾರು ದೇಶಗಳ ವರದಿಯ ಪ್ರಕಾರ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿಗೆ ಒಡ್ಡಿಕೊಂಡು ಜನಿಸಿದ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ಮತ್ತು ಸೋಂಕಿತವಲ್ಲದ ಮಕ್ಕಳಲ್ಲಿ ಹೆಚ್ಚಿನ ಸಂಖ್ಯೆಯ ಅಸ್ವಸ್ಥತೆ ಮತ್ತು ಸಾವುಗಳು, ಸಾಂಕ್ರಾಮಿಕ ರೋಗಗಳಿಂದ ಸಂಭವಿಸಿರುವದು ಕಂಡು ಬಂದಿದೆ. ಆದ್ದರಿಂದ ಮಕ್ಕಳಲ್ಲಿ ಹೆಚ್.ಐ.ವಿ/ಏಡ್ಸ್ ಒಂದು ಆರೋಗ್ಯ ಕಾಳಜಿಯ ವಿಷಯವಾಗಿರುತ್ತದೆ. ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿನ ಹರಡುವಿಕೆಯ ಪ್ರಮಾಣವು ಬೆಳಗಾವಿ ಜಿಲ್ಲೆಯಲ್ಲಿ ಇಳಮುಖವಾಗುತ್ತಿರುವುದು ಕಂಡುಬರುತ್ತಿದ್ದರೂ ಸಹ, ತಾಯಿಯರಿಂದ ಮಕ್ಕಳಿಗೆ ಹೆಚ್.ಐ.ವಿ ಹರಡುವ ವಿದಾನವು ಸರ್ವೇಸಾಮಾನ್ಯ ವಿಧಾನವಾಗಿ ಮುಂದುವರೆದಿದೆ ಮತ್ತು ಇದರಿಂದ ನವಜಾತ ಶಿಶುಗಳು ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿನಿಂದ ಜನಿಸುವಂತಾಗಿದೆ. ನಮ್ಮಲ್ಲಿ ಈಗ ತಂದೆ-ತಾಯಿಯರಿಂದ ಮಕ್ಕಳಿಗೆ ಹರಡುವ ಹೆಚ್.ಐ.ವಿ ತಡೆಗಟ್ಟುವದರ್ಕಕಾಗಿ ಮುಂದುವರೆದ ಪಿಪಿಟಿಸಿಟಿ ಕಾರ್ಯಕ್ರಮ ಇದೆ. ಆದರು ಸಹ ನಮ್ಮಲ್ಲಿ ಕೆಲವು ಮಕ್ಕಳು ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿಗೆ ಒಳಗಾಗಿದ್ದಾರೆ. ಹಾಗೆಯೇ, ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿಗೆ ಒಡ್ಡಿಕೊಂಡು ಜನಿಸಿದ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತರಲ್ಲದ ಬಹಳಷ್ಟು ಮಕ್ಕಳಿದ್ದಾರೆ. ಹೇಗೆ ಇರಲಿ, ಈ ಮಕ್ಕಳ ಆರೋಗ್ಯ ಮತ್ತು ಜೀವನ ಘಟನೆಗಳನ್ನು ತಿಳಿಯುವದು ಪ್ರಾಮುಖ್ಯವಾಗಿರುತ್ತದೆ, ಇದರಿಂದ ಸರಕಾರ ಮತ್ತು ಸರಕಾರೇತರ ಸಂಸ್ಥೆಗಳಿಗೆ ಅವರ ಭವಿಷ್ಯದ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸಲು ಸಹಾಯಕವಾಗುತ್ತದೆ. ಹಾಗೆಯೇ, ನನ್ನ ಪಿ.ಹೆಚ್.ಡಿ ಅಧ್ಯಯನ ಪೂರ್ಣಗೊಳಿಸಲು ಸಹಾಯಕವಾಗುತ್ತದೆ.

ಬೆಳಗಾವಿ ಜಿಲ್ಲೆಯ ಆರೋಗ್ಯ ಕೇಂದ್ರಗಳ ದಾಖಲಾತಿಗಳ ಪ್ರಕಾರ ನೀವು ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ತಾಯಿಯಾಗಿದ್ದು 5 ವರ್ಷದೊಳಗಿನ ಮಗು (ಮಕ್ಕಳು) ಹೊಂದಿರುವದರಿಂದ ಅಥವಾ 01ನೇ ಜನೇವರಿ 2011 ಅಥವಾ ಅದರ ನಂತರ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ಗರ್ಭಿಣಿಯಾಗಿರುವಿರೆಂದು ತಿಳಿದುಬಂದಿರುವದರಿಂದ ನಿಮ್ಮನ್ನು ಮತ್ತು ನಿಮ್ಮ ಮಗುವನ್ನು (ಮಕ್ಕಳನ್ನು) ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಆಯ್ಕೆಮಾಡಿಕೊಳ್ಳಲಾಗಿದೆ. ಈ ಅಧ್ಯಯನವು ಒಂದು ವರ್ಷ ಅಥವಾ ನಿಮ್ಮ ಮಗು 5 ವರ್ಷದ ಜೀವನಾವಧಿಯನ್ನು ಪೂರ್ಣಗೊಳಿಸುವವರೆಗೆ ಇರುತ್ತದೆ. ನಿಮಗೆ ಅಭ್ಯಂತರವಿಲ್ಲದಿದ್ದಲ್ಲಿ ನನ್ನ ಬಳ ನಿಮ್ಮ ಮಾಹಿತಿಯನ್ನು ಹಂಚಿಕೊಳ್ಳಲು ಕೋರುತ್ತೆನೆ. ಇದು ನನಗೆ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿಗೆ ಒಡ್ಡಿಕೊಂಡು ಜನಿಸಿದ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ಮಕ್ಕಳ ಆರೋಗ್ಯ ಮತ್ತು ಜೀವನದ ಫಲತಾಂಶಗಳನ್ನು, ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ಮಕ್ಕಳ ಹಾಗೂ ಸೋಂಕಿತವಲ್ಲದ ಮಕ್ಕಳ ನಡುವಣ ಬೆಳವಣಿಗೆ ಮತ್ತು ಅಭಿವೃದ್ಧಿಯಲ್ಲಿರುವ ವ್ಯತ್ಯಾಸ, ವೈದ್ಯಕೀಯ ಮತ್ತು ಪೌಷ್ಟಿಕತೆಯ ಸಂಕ್ಷಿಪ್ತ ವ್ಯಕ್ತಿಚಿತ್ರ, ಅವರ ಹೆಚ್.ಐ.ವಿ ಸ್ಥಿತಿಗೆ ಸಂಬಂದಿಸಿದಂತೆ ಹರಡುವಿಕೆ ಮತ್ತು ಸಾವಿನ ಘಟನೆಗಳು, ಸ್ವಾಭಾವಿಕ ಸಾಂಕ್ರಾಮಿಕತೆ, ರೋಗನಿರೋಧಕ ಚಿಕಿತ್ಸೆ ಅಥವಾ ಚಿಕಿತ್ಸೆ, ಹಾಗೂ ಇತ್ಯಾದಿ ಸ್ಥಿತಿಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಹಾಯ ಮಾಡುತ್ತದೆ. ಇದು ನನ್ನ ಪಿ.ಹೆಚ್.ಡಿ ಅಧ್ಯಯನದ ಉದ್ಧೇಶವಾಗಿರುತ್ತದೆ, ಹಾಗೂ ಈ ಎಲ್ಲಾ ಮಾಹಿತಿಗಳು ಮುಂದಿನ ಆರೋಗ್ಯ ಆರೈಕೆ ಮತ್ತು ಇತರೆ ಸೇವೆಗಳ ಯೋಜನೆಗಳಿಗೆ ಮುಖ್ಯವಾಗುತ್ತವೆ. ನೀವು ಮತ್ತು ನಿಮ್ಮ ಮಗು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವವರಲ್ಲಿ ಒಬ್ಬರಾಗಲು ನೀವು ಸಮ್ಮತಿಸಬೇಕೆಂದು ನಾನು ನಿಮ್ಮಲ್ಲಿ ವಿನಮ್ರವಾಗಿ ವಿನಂತಿಸಿಕೊಳ್ಳುತ್ತೆನೆ. ತಾವು ನನ್ನಲ್ಲಿ ಅವಶ್ಯಕ ಮಾಹಿತಿಯನ್ನು ಹಂಚಿಕೊಳ್ಳುವದಕ್ಕಾಗಿ ನಾನು ತಮಗೆ ಕೃತಜ್ಞತೆಯನ್ನು ಸಲ್ಲಿಸುತ್ತೆನೆ.

ಅಧ್ಯಯನ ವಿಧಾನ:

ನಿಮಗೆ (ತಾಯಿ/ತಂದೆ/ಆರೈಕೆದಾರರು) ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಬಗ್ಗೆ ಎಲ್ಲವನ್ನು ವಿವರಿಸಲಾಗುವದು, ನಿಮ್ಮ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಲಾಗುವುದು. ನೀವು ಏನು ಮಾಡಬೇಕು ಎಂಬುದು ನಿಮಗೆ ತದನಂತರ ಸ್ಪಷ್ಟವಾಗಿ

ಮನವರಿಕೆಯಾಗುವುದು, ತದನಂತರ ನಿಮ್ಮನ್ನು ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರಕ್ಕೆ ಸಹಿ ನೀಡುವಂತೆ ಅಥವಾ ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು ನೀಡುವಂತೆ ಕೇಳಲಾಗುವುದು. ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರಕ್ಕೆ ಸಹಿ ಹಾಕಲು ಅಥವಾ ಹೆಬ್ಬೇರಳನ ಗುರುತು ನೀಡಲು ಒಪ್ಪಿಗೆ ನೀಡಿದ ನಂತರ, ಸಹಿ ಮಾಡಿದ ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರದ ಒಂದು ಪ್ರತಿಯನ್ನು ನಿಮಗೆ ನೀಡಲಾಗುವುದು. ನಿಮಗೆ ಒಂದು ಪ್ರತ್ಯೇಕ ಗುರುತಿನ ಸಂಖ್ಯೆಯನ್ನು ನೀಡಲಾಗುವುದು, ಇದೇ ಗುರುತಿನ ಸಂಖ್ಯೆಯನ್ನು ನನ್ನೊಂದಿಗಿರುವ ನಿಮ್ಮ ಮಗುವಿನ ದಾಖಲಾತಿಗಳಲ್ಲಿ ನಮೂದಿಸಲಾಗುವದು. ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ನಿಮ್ಮ ಮಗುವಿನ ಹೆಸರನ್ನು ನಮ್ಮ ಯಾವುದೇ ಕಡತಗಳಲ್ಲಿ ದಾಖಲಿಸಲಾಗುವುದಿಲ್ಲ. ಇದು ನೀವು ನೀಡಿದ ಮಾಹಿತಿ ಮತ್ತು ನಮ್ಮ ಪ್ರಶ್ನೆಗಳಿಗೆ ನೀವು ನೀಡಿದ ಉತ್ತರವು ಗೌಪ್ಯವಾಗಿರುವಂತೆ ಕಾಯ್ದುಕೊಳ್ಳಲು ಸಹಾಯಕವಾಗುವುದು.

ಒಮ್ಮೆ ನೀವು ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರಕ್ಕೆ ಸಹಿ/ಹೆಬ್ಬೆರಳನ ಗುರುತು ಹಾಕಿ ಒಪ್ಪಿಗೆ ನೀಡಿದ ನಂತರ, ನೀವು ಈ ಕೆಳಗಿನವುಗಳಿಗೆ ಅನುಮತಿ ನೀಡಿರುತ್ತಿರೆಂದು ಅರ್ಥ ಮಾಡಿಕೊಳ್ಳಲಾಗುವದು:

1. ನಿಮ್ಮ ಅನೂಕೂಲಕರ ಜಾಗದಲ್ಲಿ ನಾನು ನಿಮ್ಮನ್ನು (ಮತ್ತು/ಅಥವಾ ನಿಮ್ಮ ಕುಟುಂಬವನ್ನು) ಭೇಟಿ ಮಾಡಲು: ಮತ್ತು
2. ನಿಮ್ಮ ಮಗುವಿನ ಆರೋಗ್ಯದ ಬಗ್ಗೆ ಕೆಲವು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು: ಮತ್ತು
3. ಕಾಲ ಕಾಲಕ್ಕೆ ನಿಮ್ಮ ಮತ್ತು ನಿಮ್ಮ ಮಗುವಿನ ಎತ್ತರ ಮತ್ತು ತೂಕ, ಮಗುವಿನ ತೋಳಿನ ಸುತ್ತಳತೆ ಪಡೆಯಲು: ಮತ್ತು
4. ನಿಮಗೆ ಪ್ರೋತ್ಸಾಹಿಸುವ ಮೂಲಕ ನಿಮ್ಮನ್ನು ಹಾಗೂ ನಿಮ್ಮ ಮಗುವನ್ನು ಹತ್ತಿರದ ಅನೂಕೂಲಕರ ಸರಕಾರಿ ಆರೋಗ್ಯ ಸೌಲಭ್ಯ/ಐಸಿಟಿಸಿ/ಎಆರ್‌ಟಿ ಕೇಂದ್ರಕ್ಕೆ ರಾಷ್ಟ್ರೀಯ ಸೂಚನೆಗಳು ಹಾಗೂ ಅವಧಿಗಳಗನುಗುಣವಾಗಿ ಹಿಮೋಗ್ಲೋಬಿನ್ ರಕ್ತ ಪರೀಕ್ಷೆ, ಹೆಚ್‌ಐವ್ಹಿ ರಕ್ತ ಪರೀಕ್ಷೆ, ಮತ್ತು ಸಿಡಿ4 ಎಣಿಕೆ ಪರೀಕ್ಷೆಗಾಗಿ ಸೂಚಿಸಲು: ಮತ್ತು
5. ನಿಮ್ಮ ಮಗುವಿನ ಬೆಳವಣಿಗೆ ಮತ್ತು ಅಭವೃದ್ಧಿಯ ಮೈಲಿಗಲ್ಲು ಹಾಗೂ ಅಪೌಷ್ಟಿಕತೆಯ ಚಿಹ್ನೆಗಳನ್ನು ಅಳೆಯಲು: ಮತ್ತು
6. ನಿಮ್ಮ ಮತ್ತು ನಿಮ್ಮ ಮಗುವಿನ ಚಿಕಿತ್ಸೆ/ನಿರೋದಕ ಚಿಕಿತ್ಸೆಯ ಸ್ಥಿತಿಗತಿ ಹಾಗೂ ಆರೋಗ್ಯಕ್ಕೆ ಸಂಬಂದಿಸಿದ ಇತರೆ ಮಾಹಿತಿಗಳನ್ನು ನಿಮ್ಮ ಆರೋಗ್ಯ ಆರೈಕೆದಾರರಿಂದ ಸ್ಪಷ್ಟಪಡಿಸಿಕೊಳಲು: ಮತ್ತು
7. ಒಂದೊಮ್ಮೆ ನಿಮ್ಮ ಮಗುವಿನ ಸಾವು ಸಂಭಂವಿಸಿದಲ್ಲಿ, ಅದರ ಕೊನೆಯ ದಿನಗಳಲ್ಲಿನ ಆರೋಗ್ಯದ ಬಗ್ಗೆ/ಆರೋಗ್ಯಕ್ಕೆ ಸಂಬಂದಿಸಿದ ಕೆಲವು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು.

ಒಂದು ವರ್ಷದ ಅಧ್ಯಯನದಲ್ಲಿ ಈ ಮೇಲಿನ ಎಲ್ಲಾ (ಸಂಖ್ಯೆ.7 ನ್ನು ಹೊರತುಪಡಿಸಿ) ಕನಿಷ್ಟ ಪಕ್ಷ ಮೂರು ಬಾರಿ ಅಥವಾ ಮಗುವಿನ ಆರೋಗ್ಯ ಸ್ಥಿತಿಗತಿ ಅವಶ್ಯಕತೆಗೆ ಸಂಬಂದಿಸಿದಂತೆ ಮಾಡಲಾಗುತ್ತದೆ.

ಒಂದೊಮ್ಮೆ ವರದಿಯಾದ ಹೊಸದಾಗಿ ಪತ್ತೆಯಾದ ಹೆಚ್‌ಐವ್ಹಿ ಪಾಸಿಟಿವ್ ಗರ್ಭಿಣಿ ಅಥವಾ ಪ್ರಸೂತಿ/ಹೆರಿಗೆಗೊಳಗಾದವಳು ಮತ್ತು ಐ.ಸಿ.ಎಮ್.ಆರ್ ಅಧ್ಯಯನದ – ಮೊದಲ ಫೇಸ್ ನಲ್ಲಿ ಪತ್ತೆಯಾದ ಮರು ಗರ್ಭಿಣಿಯಾದ ಮಹಿಳೆಯಾಗಿದ್ದಲ್ಲಿ, ಈ ಅಧ್ಯಯನ ಅವಧಿಯಲ್ಲಿ ಈ ಕೆಳಗಿನವುಗಳಿಗೆ ನಿಮ್ಮ ಒಪ್ಪಿಗೆಯನ್ನು ಸೂಚಿಸಿರುವದಾಗಿ ಅರ್ಥೈಸಿಕೊಳ್ಳಲಾಗುವದು (ಮೇಲೆ ತಿಳಿಸಿದವುಗಳೊಂದಿಗೆ)

1. ನಿಮ್ಮ ಹೆರಿಗೆಯಾಗುವವರೆಗೆ ನಿಮ್ಮನ್ನು ಅನೂಸರಣೆ ಮಾಡಲು: ಮತ್ತು,
2. ನಿಮ್ಮ ಗರ್ಭಾವಸ್ಥೆಗೆ ಸಂಬಂದಿಸಿದಂತೆ ಕೆಲವು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು (ಅಥವಾ ತಾಯಿಯನ್ನು ಹೊರತು ಪಡಿಸಿ ತಾಯಿಯ ಬೇರೆಯಾರಾದರು ಒಪ್ಪಿಗೆಯನ್ನು ಸೂಚಿಸಿದಲ್ಲಿ) (ಒಂದೊಮ್ಮೆ ಮರು ಗರ್ಭಿಣಿಯಾಗಿದ್ದರೆ)

ಒಂದು ವೇಳೆ ನಿಮ್ಮ ಮಗುವಿಗೆ ಹೆಚ್.ಐ.ವ್ಹಿ ಸೋಂಕು ಇದೆ ಎಂದು ಕಂಡುಬಂದರೆ, ಈ ಮೊದಲೇ ಎ.ಆರ್.ಟಿ ಕೇಂದ್ರದಲ್ಲಿ ನೊಂದಣಿಯಾಗಿರದಿದ್ದರೆ, ಮಗುವಿನ ಎ.ಆರ್.ಟಿ ನೊಂದಣಿ ಅಥವಾ ಹೆಚ್ಚಿನ ಚಿಕಿತ್ಸೆಯ ಅವಶ್ಯಕತೆ ತಿಳಿಯಲು ನಿಮ್ಮನ್ನು (ನಿಮ್ಮ ಮಗು) ಹತ್ತಿರದ ಎ.ಆರ್.ಟಿ ಕೇಂದ್ರಕ್ಕೆ ಹೋಗಲು ಸೂಚಿಸಲಾಗುವುದು/ರೆಫರ್‌ಮಾಡಲಾಗುವುದು.

ನಿಮ್ಮ ಮಗುವಿನ ಆರೋಗ್ಯ ಸಂರಕ್ಷಣೆಯ ಕುರಿತಾದ ಯಾವುದೇ ಮಾಹಿತಿ ಅಥವಾ ಸಾಮಾಜಿಕ ಅವಶ್ಯಕತೆಯ ಕುರಿತಾದ ಯಾವುದೇ ಉಲ್ಲೇಖಕ್ಕಾಗಿ ಅಧ್ಯಯನ ಕೇಂದ್ರಕ್ಕೆ ಅಧ್ಯಯನದ ಅವದಿಯಲ್ಲಿ ಭೇಟಿ ನೀಡುವಂತೆ ಕೋರಲಾಗಿದೆ. ನಿಮ್ಮ ಮಗುವು ಎದುರಿಸಬಹುದಾದ ಯಾವುದೇ ಕಳಂಕ ಅಥವಾ ತಾರತಮ್ಯಗಳ ಬಗ್ಗೆ ದಯವಿಟ್ಟು ನಮ್ಮ ಗಮನಕ್ಕೆ ತನ್ನಿರಿ ಮತ್ತು ಆ ಮೂಲಕ ನಾವು ಸೂಕ್ತ ಕ್ರಮ ಕೈಗೊಳ್ಳಬಹುದಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದರಿಂದ ಅಪಾಯಗಳು:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಿಸುವವರಿಗೆ ಯಾವುದೆ ರೀತಿಯ ಅಪಾಯಗಳಿರುವದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿನ ಚಟುವಟಿಕೆಗಳೆಂದರೆ ಸಂದರ್ಶನದ ಮೂಲಕ ಮಾಹಿತಿಯನ್ನು ಕಲೆಹಾಕುವದು, ಮಾನವ ಮಾಪನ ಅಳತೆಗಳು ಮತ್ತು ತಾಯಿ ಮತ್ತು ಮಗುವಿನ ಅಪೌಷ್ಟಿಕತೆಯನ್ನು ಅಳೆಯುವುದು, ಹಾಗೂ ರಾಷ್ಟ್ರೀಯ ಮತ್ತು ಅಧ್ಯಯನದ ಪ್ರೊಟೊಕಾಲ್ಸ/ಮಾರ್ಗದರ್ಶಿಗಳ ಪ್ರಕಾರ ಸರಕಾರಿ ಐಸಿಟಿಸಿಗಳಲ್ಲಿ ನಿಮ್ಮ ಮಗುವಿನ ಹೆಚ್.ಐ.ವ್ಹಿ ಸ್ಥಿತಿಗತಿಯನ್ನು ತಿಳಿಯಲು, ಹಿಮೋಗ್ಲೋಬಿನ್ (ರಕ್ತ ಪ್ರಮಾಣ) ಅಳೆಯಲು ರಕ್ತ ಮಾದರಿಯನ್ನು ಪಡೆಯಲು ಶಿಫಾರಸ್ಸು ಮಾಡುವದು. ಸಂದರ್ಶನಗಳು, ಮಾನವ ಮಾಪನ ಅಳತೆಗಳು, ಹಾಗೂ ತಾಯಿ ಮತ್ತು ಮಗುವಿನ ಅಪೌಷ್ಟಿಕತೆಯನ್ನು ಅಳೆಯುವುದು ಆಕ್ರಮಣಕಾರಿಯಾಗಿರುವದಿಲ್ಲ, ಹಾಗೂ ತಾಯಿ ಮತ್ತು ಮಗುವಿಗೆ ಅಲ್ಪ ಪ್ರಮಾಣದ ಅಪಾಯಗಳನ್ನು ಒಳಗೊಂಡಿರುತ್ತವೆ.

ಮಗುವಿನ ಹೆಚ್.ಐ.ವಿ ಪರಿಕ್ಷೆ ಸಿಡಿ-4 ಪರೀಕ್ಷೆಗಳಿಗಾಗಿ ವಯಸ್ಸಿಗೆ ನಿರ್ದಿಷ್ಟವಾಗಿ ರಕ್ತ ಮಾದರಿಗಳನ್ನು ಸರಕಾರಿ ವ್ಯವಸ್ಥೆಯಲ್ಲಿ ರಾಷ್ಟ್ರೀಯ ಮಾರ್ಗದರ್ಶಿಗಳ ಪ್ರಕಾರ ಪಡೆಯಲಾಗುತ್ತದೆ. ಸಂಶೋಧನೆಯು ಅವುಗಳ ವರದಿಗಳನ್ನು ಪಡೆದು ಒಪ್ಪಿಕೊಳ್ಳುತ್ತದೆ. ಅದೇ ತರನಾಗಿ ಕುಟುಂಬದವರ ಹೆಚ್.ಐ.ವಿ ಪರೀಕ್ಷೆಯನ್ನು (ಹೊಸದಾಗಿ ಪತ್ತೆಯಾದ ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿತ ತಾಯಿ) ಸರಕಾರಿ ವ್ಯವಸ್ಥೆಯಲ್ಲಿ ರಾಷ್ಟ್ರೀಯ ಮಾರ್ಗದರ್ಶಿಗಳ ಪ್ರಕಾರ ನಡೆಸಲಾಗುತ್ತದೆ. ಹೆಚ್.ಐ.ವಿ ಪರೀಕ್ಷೆಯ ವರದಿಯು ಭಾಗವಹಿಸುವವರರಿಗೆ ಕನಿಷ್ಟ ಅಪಾಯವನ್ನು ಒಡ್ಡುತ್ತದೆ. ಸಂಶೋಧಕರ ಗೌಪ್ಯೆತೆ ಹಂಚಿಕೆ-ಗೌಪ್ಯೆತೆಗಳನ್ನು ರಾಷ್ಟ್ರೀಯ ಮಾರ್ಗದರ್ಶಿಗಳ ಪ್ರಕಾರ ಕಾಪಾಡಲು ಬದ್ಧರಾಗಿರುತ್ತಾರೆ. ಭಾಗವಹಿಸುವವರು ಈ ಪರಿಕ್ಷೆಗಳಿಗೆ ತಾವು ಮತ್ತು ತಮ್ಮ ಮಗು ಒಳಗಾಗುವುದನ್ನು ನಿರಾಕರಿಸುವ ಹಕ್ಕನ್ನು ಹೊಂದಿರಿತ್ತಾರೆ.

ತಾಯಿ ಮತ್ತು ಮಕ್ಕಳ (ಮಗುವಿನ) ರಕ್ತದ ಮಾದರಿಯನ್ನು ಸರಕಾರಿ ವ್ಯವಸ್ಥೆ/ಆಸ್ಪತ್ರೆಗಳು / ಐಸಿಟಿಸಿ/ಎಆರ್‌ಟಿ ಕೇಂದ್ರಗಳಲ್ಲಿ ಹಿಮೊಗ್ಲೊಬಿನ ಸಂಖ್ಯೆ ಅಳೆಯಲು ಮಾತ್ರಪಡೆಯಲಾಗುತ್ತದೆ, ಇದು ರಾಷ್ಟ್ರೀಯ ಮಾರ್ಗದರ್ಶಿಗಳ ಪ್ರಕಾರ ಎಆರ್‌ಟಿ ಪಡೆಯುವ ಮಕ್ಕಳಿಗೆ ಮಾತ್ರ ಕಡ್ಡಾಯವಾಗಿರುತ್ತದೆ. ಸಂಶೋಧಕರು ವರದಿಗಳನ್ನು ಅಲ್ಲಿಂದ ಪಡೆಯುತ್ತಾರೆ ಮತ್ತು ಒಪ್ಪಿಕೊಳ್ಳುತ್ತಾರೆ (ದಾಖಲಿಸಿಕೊಳ್ಳುತ್ತಾರೆ).

ರಕ್ತದ ಮಾದರಿಯನ್ನು ಪಡೆಯುವದು, ಶಿಶುವಿನಲ್ಲಿ ಬಹುಬೇಗನೆ ಹೆಚ್.ಐ.ವಿ ಪತ್ತೆ ಹಚ್ಚಿ ಚಿಕಿತ್ಸೆಗೆ ಒಳಪಡಿಸುವುದು ಯೋಜನೆಯ ಭಾಗವಾಗಿರುತ್ತದೆ. ಪ್ರಶ್ನಾವಳಿಗಳನ್ನು ಕೇಳುವದು, ಮಾನವ ಮಾಪನಗಳನ್ನು ಪಡೆಯುವುದು ಆಕ್ರಮಕಾರಿಯಾಗಿರುವುದಿಲ್ಲ. ಈ ಮೂಲಕ ಪಡೆದ ಮಾಹಿತಿಗಳನ್ನು ಕಟ್ಟುನಿಟ್ಟಾಗಿ ಗೌಪ್ಯವಾಗಿ, ಗುರುತಿಸಲ್ಪಡದ ರೀತಿಯಲ್ಲಿ ಇಡಲಾಗುತ್ತದೆ. ಆದರೆ ನಿಮಗೆ ನಿಮ್ಮ ಮಗುವಿನ ಆರೋಗ್ಯ, ಪೌಷ್ಠಿಕತೆ, ಅನಾರೋಗ್ಯ, ಮತ್ತು ಹೆಚ್.ಐ.ವಿ ಸ್ಥಿತಿಯನ್ನು ತಿಳಿಯಲು ಆಸಕ್ತಿ ಇರಬಹುದು, ಕೆಲಮೋಮ್ಮೆ ಹೆಚ್.ಐ.ವಿ ಹರಡುವಿಕೆಯ ಭಯದಿಂದಾಗಿ ನಿಮಗೆ ನಿಮ್ಮ ಮಗುವಿನ ಕುರಿತು ತಿಳಿಯಲು ಆಸಕ್ತಿ ಇರದಿರಬಹುದು. ಹೆಚ್.ಐ.ವಿಯನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ಗುಣಪಡಿಸದಿದ್ದರೂ ಸಹ ಬಹು ಬೇಗನೆ ಹೆಚ್.ಐ.ವಿ ಪತ್ತೆ ಹಚ್ಚುವುದರಿಂದ, ಸರಿಯಾದ ಸಮಯದಲ್ಲಿ ಆರೋಗ್ಯ ಆರೈಕೆಯನ್ನು ನೀಡುವ ಮೂಲಕ ಮಗುವಿನ ಜೀವ ಉಳಸಬಹುದು. ಮಗು ಸುದೀರ್ಘ/ಸಂಪೂರ್ಣ ಜೀವನ ಹೊಂದಲು ಸಹಾಯವಾಗುವುದು. ಒಂದೋಮ್ಮೆ ನಿಮ್ಮಲ್ಲಿ ಅನಾನೂಕೂಲಗಳಿದ್ದರೆ (ಭಯ), ಸಂಶೋಧಕರು ನಿಮ್ಮ ಆಪ್ತಸಮಾಲೋಚನೆ ನೀಡುವ ಮೂಲಕ ಅದನ್ನು ಕಡಿಮೆ/ತಿಳ ಗೊಳಸುವರು.

ಲಾಭಗಳು:

ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದರಿಂದ ನಿಮಗೆ ಯಾವುದೇ ನೇರವಾದ ಲಾಭಗಳಿಲ್ಲ. ಆದರೆ ನೀವು ನಿಮ್ಮ ಮತ್ತು ನಿಮ್ಮ ಮಗುವಿನ ಪೌಷ್ಟಿಕತೆಯನ್ನು, ಬೆಳವಣಿಗೆಯನ್ನು (ಮಾನವ ಮಾಪನವನ್ನು) ತಿಳಿಯಬಹುದು, ಹಾಗೆಯೇ ನಿಮ್ಮ ಮಗುವಿನ ಹೆಚ್.ಐ.ವ್ಹಿ ಸ್ಥಿತಿಯನ್ನು ತಿಳಿಯಬಹುದಾಗಿದೆ, ಹಾಗೂ ನಿಮ್ಮ ಮಗುವನ್ನು ಪ್ರಸ್ತುತ ಅರೋಗ್ಯ ಆರೈಕೆ, ಚಿಕಿತ್ಸೆ ಮತ್ತು ಬೆಂಬಲ ಸೇವೆಗಳಿಗೆ ಸೂಚಿಸುವದನ್ನು ಖಚಿತಪಡಿಸಿಕೊಳ್ಳಲಾಗುವದು. ಹೀಗಾಗಿ ಅಧ್ಯಯನವು ಪರೋಕ್ಷವಾಗಿ ಮಗುವಿನಲ್ಲಿ ಬಹು ಬೇಗನೆ ಹೆಚ್.ಐ.ವಿ ಪತ್ತೆ ಹಚ್ಚುವ, ಸರಿಯಾದ ಸಮಯದಲ್ಲಿ ಎಆರ್‌ಟಿ ಪ್ರಾರಂಭಿಸುವ ಅಪೌಷ್ಟಿಕತೆಗೆ ಸಂಬಂದಿಸಿದ ರೋಗಗಳ ಹರಡುವಿಕೆಯನ್ನು ತಡೆಯುವ/ಚಿಕಿತ್ಸಿಸುವ, ಹಾಗೂ ಸಕಾಲಿಕ ಪೌಷ್ಟಿಕತೆಗೆ ಸಂಬಂದಿಸಿದ ಯೋಜನೆ/ಸ್ಕೀಮ್‌ಗಳಿಗೆ ಸಂಪರ್ಕ ಹೊಂದಬಹುದಾದ ಉಪಯೋಗಗಳನ್ನು ಪಡೆಯಬಹುದಾಗಿದೆ.

ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದರ ಪರ್ಯಾಯ:

ನಿಮ್ಮನ್ನು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಕೇಳಲಾಗುತ್ತಿದೆ ಎಂಬ ಕಾರಣಗಳಿಗಾಗಿ ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುತ್ತಿಲ್ಲ ಎಂಬುದನ್ನು ದಯವಿಟ್ಟು ತಿಳಿದುಕೊಳ್ಳಿ. ಭಾರತ ದೇಶದ ಈ ಭಾಗದ ಮಕ್ಕಳಲ್ಲಿ ಹೆಚ್.ಐ.ವಿ ಪ್ರಮಾಣದ ಬಗೆಗೆ ಸಂಶೋಧಕರು ಹೆಚ್ಚು ತಿಳಿದುಕೊಳ್ಳುವ ಸಲುವಾಗಿ ನೀವು ಸ್ವಇಚ್ಛೆಯಿಂದ ಭಾಗವಹಿಸುತ್ತಿದ್ದೀರಿ. ಈ ಸಂಶೋಧನಾತ್ಮಕ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸದಿರುವಂತೆ ತೀರ್ಮಾನಿಸುವ ಆಯ್ಕೆ ನಿಮಗಿದೆ.

ಖರ್ಚು ಮತ್ತು ಸಹಾಯಧನ:

ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಯಾವುದೇ ಹಣ ಕೊಡಬೇಕಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿಮಗೆ ಯಾವುದೆ ತೆರನಾದ ಹಣವನ್ನು/ಆರ್ಥಿಕ ಸಹಾಯ/ನೆರವನ್ನು ನಿಡುವದಾಗಿ ಹೇಳಿರುವದಿಲ್ಲ.

ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆ:

ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆ ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಇಚ್ಛೆಯಿಂದ ಕೂಡಿರುತ್ತದೆ. ನಿಮ್ಮ ಮಕ್ಕಳನ್ನು ಪರೀಕ್ಷೆಗೊಳಪಡಿಸುವ ಕುರಿತು ನಿರ್ಧರಿಸುವುದು ನಿಮ್ಮ ತೀರ್ಮಾನಕ್ಕೆ ಬಿಟ್ಟದ್ದು. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ತಿರಸ್ಕರಿಸಿದರೆ ಅದು ನೀವು ಈ ಕೇಂದ್ರದಲ್ಲಿ ಇಂದು ಅಥವಾ ಮುಂದೆ ಯಾವಾಗಲಾದರೂ ಪಡೆಯುವ ಚಿಕಿತ್ಸೆಯ ಮೇಲೆ ಯಾವುದೇ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಗೌಪ್ಯತೆ:

ನಿಮ್ಮ ಸಂಪರ್ಕ ವಿವರಗಳು ಈ ಚಿಕಿತ್ಸಾಲಯದಲ್ಲಿರುವ ಸಿಬ್ಬಂದಿಗಳಿಗೆ ಮಾತ್ರ ಲಭ್ಯವಿರುತ್ತದೆ ಹಾಗು ಅದನ್ನು ನಿಮ್ಮ ಇತರೆ ಮಾಹಿತಿಯಿಂದ ಬೇರ್ಪಡಿಸಿ ಬೀಗ ಹಾಕಿ ಇಡಲಾಗುತ್ತದೆ ಅಧ್ಯಯನದಲ್ಲಿ ಪಡೆದುಕೊಂಡ ನಿಮ್ಮ ಮಗುವಿನ ಎಲ್ಲಾ ಮಾಹಿತಿಗಳನ್ನು ಒಂದು ಪ್ರತ್ಯೇಕ ಅಧ್ಯಯನ ಸಂಖ್ಯೆಯಿಂದ ಗುರುತಿಸಲಾಗುವುದು. ಪ್ರಯೋಗಾಲಯಕ್ಕೆ ಹೋಗುವ ನಮೂನೆಗಳನ್ನು ಸಹ ಈ ಪ್ರತ್ಯೇಕ ಸಂಖ್ಯೆಯಿಂದ ಗುರುತಿಸಲಾಗುವುದು. ಈ ಸಂಶೋಧನೆಯ ಫಲಿತಾಂಶವನ್ನು ಪ್ರಕಟಿಸಬೇಕಾದಲ್ಲಿ ನಿಮ್ಮ ಹೆಸರನ್ನು ತೋರಿಸಲಾಗುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮಾಹಿತಿಯನ್ನು ಸಂಶೋಧಕರು ಪಿ.ಹೆಚ್.ಡಿ ಪದವಿ ದೊರಕಿದ ನಂತರ ೫ ವರ್ಷಗಳು ಮುಗಿಯುವವರೆಗೆ ಸಂಗ್ರಹಿಸಿಡುತ್ತಾರೆ.

ಅಸ್ವಸ್ಥತೆ ಅಥವಾ ಗಾಯಗಳಿಗೆ ಸಹಾಯಧನ:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವದರಿಂದ ತಮಗೆ ಯಾವುದೆ ಗಾಯ/ಕಾಯಿಲೆಗಳು ಬರುತ್ತವೆಂದು ಅನಿಸಿರುವದಿಲ್ಲ. ಆದ್ದರಿಂದ ಅದಕ್ಕಾಗಿ ಯಾವುದೆ ಸಹಾಯಧನ ಅಥವಾ ವೈದ್ಯಕೀಯ ಆರೈಕೆ ಎಂಬ ಕಾರಣಕ್ಕಾಗಿ ಯಾವುದೇ ಹಣವನ್ನು ಮೀಸಲಿಡಲಾಗಿಲ್ಲ. ಆದರೆ, ನಿಮ್ಮನ್ನು ನೀವು ಈಗಾಗಲೆ ನೀವು ನೊಂದಣಿಯಾಗಿರುವ ಆರೋಗ್ಯ ಆರೈಕೆ ಕೇಂದ್ರಕ್ಕೆ ಶಿಪಾರಸ್ಸು ಮಾಡಲಾಗುವುದು.

ಈ ಅಧ್ಯಯನದ ಫಲಿತಾಂಶದಿಂದ ಏನಾಗುತ್ತದೆ:

ಸಂಶೋಧನೆಯ ಅಂತ್ಯದಲ್ಲಿ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಕೂಲಂಕುಷವಾಗಿ ನೋಡಲಾಗುತ್ತದೆ. ಸಂಶೋದಕರು ಪ್ರಭಂದವನ್ನು ಸಲ್ಲಿಸುವುದಕದಕ್ಕೆ ಮಾಹಿತಿಯು ಕಾರಣವಾಗುವುದು. ಫಲಿತಾಂಶಗಳು ವೈದ್ಯಕೀಯ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಪ್ರಕಟಿಸಲ್ಪಡಬಹುದು ಹಾಗು ಸಭೆಗಳಲ್ಲಿ ಪ್ರಸ್ತಾಪಿಸಲ್ಪಡಬಹುದು. ಮಕ್ಕಳಲ್ಲಿ ಹೆಚ್.ಐ.ವಿ ಪ್ರಮಾಣವು ಅತಿಯಾಗಿದ್ದರೆ, ಹೆಚ್.ಐ.ವಿ ಸೋಂಕಿನಿಂದ ಬಾಧಿತವಾಗಿರುವ ಮಕ್ಕಳ ಕುಟುಂಬಗಳಿಗೆ ಸಹಾಯ ಹಸ್ತ ನೀಡುವಂತೆ ಸರಕಾರದೊಂದಿಗೆ ವಕಾಲತ್ತು ವಹಿಸಬಹುದಾಗಿದೆ.

ಚಿಕ್ಕವರ ಒಪ್ಪಿಗೆ:

೫ ವರ್ಷಕ್ಕಿಂತ ಕಡಿಮೆ ವಯಸ್ಸಿನ ಮಕ್ಕಳು ಭಾಗವಹಿಸುವದನ್ನು ಪ್ರತ್ಯೇಕವಾಗಿ ಪರಿಗಣಿಸುತ್ತಿಲ್ಲ. ಬದಲಾಗಿ ತಾಯಿಯು ನೀಡಿದ ಒಪ್ಪಿಗೆ ಪತ್ರದೊಂದಿಗೆ ಮಕ್ಕಳು ಭಾಗವಹಿಸುವದನ್ನು ಪರಿಗಣಿಸಲಾಗುತ್ತದೆ.

ನಿಮಗೆ ಪ್ರಶ್ನೆಗಳು ಅಥವಾ ಸಮಸ್ಯೆಗಳಿದ್ದರೆ:

ಅ. ನಿಮಗೆ ಯಾವುದಾದರೂ ಪ್ರಶ್ನೆಗಳು ಅಥವಾ ಸಮಸ್ಯೆಗಳಿದ್ದರೆ, ಅಥವಾ ನಿಮಗೆ ವೈದ್ಯಕೀಯ ತೊಂದರೆಗಳಾದರೆ, ಈ ಕೆಳಗಿನವರನ್ನು ಸಂಪರ್ಕಿಸಲು ಕೋರಲಾಗಿದೆ.

1. ಡಾ. ರಾಜೀವ್ ಎನ್ ಎಸ್, ಸಿ-20 (ಅ), ಎಮ್ಐಟಿ ಸ್ಟಾಫ್ ಕ್ವಾರ್ಟರ್ಸ, ಸ್ವಿಮ್ಮಿಂಗ್ ಪೂಲ್ ಹತ್ತಿರ, ಮಣಿಪಾಲ-5776104, ಉಡುಪಿ ಜಿಲ್ಲೆ, ಕರ್ನಾಟಕ. ಮೊ. 9686679445, ಇಮೇಲ್: drrajeevns@gmail.com.; ಅಥವಾ
2. ಡಾ. ರಾಜೀಬ್ ದಾಸಗುಪ್ತಾ, ಪ್ರೊಫೆಸರ್, ಸಾಮಾಜಿಕ ಔಷಧ ಮತ್ತು ಸಮುದಾಯ ಆರೋಗ್ಯ ಕೇಂದ್ರ, ಜವಹಾರಲಾಲ ನೆಹರು ವಿಶ್ವವಿಧ್ಯಾಲಯ, ನವದೆಹಲಿ-110067. ಮೊ.09811106025.; ಇಮೇಲ್: rdasgupta@mail.jnu.ac.in

ಬ. ನಿಮಗೆ ಸಂಶೋಧನೆಗೆ ಸಂಬಂದಿಸಿದಂತೆ ಯಾವುದಾದರೂ ಸಮಸ್ಯೆಗಳಿದ್ದರೆ ಅಥವಾ ಪ್ರಶ್ನೆಗಳಿದ್ದರೆ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವವರ ಹಕ್ಕಿನವ್ವಯ ನೀವು ಸದಸ್ಯ ಕಾರ್ಯದರ್ಶಿ ಸ್ವಾಂಸ್ಥಿಕ ನೈತಿಕ ವಿಮರ್ಶೆ ಬೋರ್ಡ, ಸಾಮಾಜಿಕ ಔಷಧ ಮತ್ತು ಸಮುದಾಯ ಆರೋಗ್ಯ ಕೇಂದ್ರ, ಜವಾಹರಲಾಲ ನೆಹರು ವಿಶ್ವವಿದ್ಯಾಲಯ, ನವದೆಹಲಿ-110067 ಫೋ.011-26704697 ಇ-ಮೇಲ್: **ierbjnu@gmail.com**.

9. Informed consent form (English).

Participant ID

INFORMED CONSENT FORM

Health and life outcomes of children exposed to maternal HIV infection in Belgaum district, Karnataka

Dear participant,

Please indicate your willingness and consent for following activities related to this research:
(Please mark (X) the appropriate box. For illiterate Participant check appropriate box in presence of witness and take the thumb impression of the participant.)

Sl. No.	Willingness for	Consent: Yes	Consent: No
1	Visiting you at your home		
2	Visiting you at a place convenient for you		
3	Sharing information on the study questionnaire for the child		
4	Sharing information on the study questionnaire for the mother		
5	Health checkup for the mother		
6	Health checkup for the child(ren)		
7	Anthropometric measurements for the mother		
8	Anthropometric measurements for the child(ren)		
9	Referral for HIV test for the child		
10	Referral for Hemoglobin test for the mother		
11	Referral for Hemoglobin test for the child(ren)		
12	Referral for CD4 test for the mother		
13	Referral for CD4 test for the child(ren)		
14	Referral for Family screening for HIV infection		

Additional Comments if any: _____

_____

_____

The advantages and disadvantages of the research in which I am expected to participate has been explained to me.

1. I confirm that *I have read the participant information sheet / participant information sheet has been read out to me*. I have understood its contents and have had the opportunity to ask questions.
2. I agree that my participation in the study is voluntary, and not further to any force by the researcher.
3. I understand that only the researcher and his guide will be able to review my records without my permission. I agree to this access. Also, I understand that my identity will not be revealed in any information released to third parties or when results are published.
4. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).
5. I understand that there are no direct benefits or economic compensation to me from participating in this study.
6. I understand and retain my rights as a participant, and have been communicated on the person(s) to be contacted in case of any problem.
7. I agree to take part in this research, participate in investigations (as below) which will help acquire knowledge for the benefit of the mankind.

_____	_____
Participant's Name	Participant's Signature or Left Thumb impression with Date
Rajeev N. S.	_____
Researcher's Name	Researcher's Signature with Date
_____	_____
Witness's Name (If applicable)	Witness's Signature with Date

Comments, if any:

_____

_____

_____

Dr Rajib Das Gupta	_____
Guide's Name	Signature of Guide with Date

10. Informed consent form (Kannada).

ಭಾಗವಹಿಸುವವರ ಸಂಖ್ಯೆ

ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರ

ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಬೆಳಗಾವಿ ಜಿಲ್ಲೆಯಲ್ಲಿನ ತಾಯಿಯ ಪೆಚ್.ಐ.ವ್ಹಿ ಸೋಂಕಿಗೆ ಒಡ್ಡಿಕೊಂಡು ಜನಿಸಿದ ಮಕ್ಕಳ ಆರೋಗ್ಯ ಮತ್ತು ಜೀವನದ ಫಲಿತಾಂಶಗಳು

ಆತ್ಮೀಯ ಭಾಗವಹಿಸುವವರೇ,

ಈ ಕೆಳಗಿನ ಸಂಶೋಧನೆಗೆ ಸಂಬಂಧಿಸಿದ ಕಾರ್ಯಚಟುವಟಿಕೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವ ಕುರಿತು ತಮ್ಮ ಇಚ್ಛೆ ಮತ್ತು ಸಮ್ಮತಿಯನ್ನು ಹೇಳಿರಿ:

ಸೂಕ್ತ ಬಾಕ್ಸ(ಚೌಕ)ನಲ್ಲಿ (X) ನ್ನು ಗುರುತಿಸಿರಿ. ಅನಕ್ಷರಸ್ಥ ಅಭ್ಯರ್ಥಿಗಳ ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತನ್ನು ಸಾಕ್ಷಿದಾರರ ಸಮ್ಮುಖದಲ್ಲಿ ಸರಿಯಾದ ಬಾಕ್ಸ(ಚೌಕ)ನಲ್ಲಿ ಗುರುತಿಸುವುದನ್ನು ಖಾತ್ರಿ ಪಡಿಸಿಕೊಂಡು ತೆಗೆದುಕೊಳ್ಳಿರಿ.

ಅ.ಸಂ	ಒಪ್ಪಿಗೆ	ಸಮ್ಮತಿ ಇದೆ	ಸಮ್ಮತಿ ಇಲ್ಲ
1	ನಿಮ್ಮ ಮನೆಯಲ್ಲಿ ನಿಮ್ಮನ್ನು ಭೇಟಿಯಾಗುವುದು.		
2	ನಿಮಗೆ ಅನೂಕುಲಕರವಾದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮನ್ನು ಭೇಟಿಯಾಗುವುದು		
3	ಮಗುವಿನ ಅಧ್ಯಯನದ ಪ್ರಶ್ನಾವಳಿಗೆ ಮಾಹಿತಿಯನ್ನು ಹಂಚಿಕೊಳ್ಳುವುದು		
4	ತಾಯಿಯ ಅಧ್ಯಯನದ ಪ್ರಶ್ನಾವಳಿಗೆ ಮಾಹಿತಿಯನ್ನು ಹಂಚಿಕೊಳ್ಳುವುದು		
5	ತಾಯಿಯ ಆರೋಗ್ಯ ತಪಾಸಣೆ		
6	ಮಗುವಿನ ಆರೋಗ್ಯ ತಪಾಸಣೆ		
7	ತಾಯಿಯ ಮಾನವ ಮಾಪನ (Anthropometric measurements)		
8	ಮಗುವಿನ ಮಾನವ ಮಾಪನ (Anthropometric measurements)		
9	ಊಟಗಿ ಪರೀಕ್ಷೆಗೆ ಮಗುವನ್ನು ಸೂಚಿಸುವುದು		
10	ಹಿಮೋಗ್ಲೋಬಿನ್ (HB) ಪರೀಕ್ಷೆಗೆ ತಾಯಿಯನ್ನು ಸೂಚಿಸುವುದು		
11	ಹಿಮೋಗ್ಲೋಬಿನ್ (HB) ಪರೀಕ್ಷೆಗೆ ಮಗುವನ್ನು ಸೂಚಿಸುವುದು		
12	CD4 ಪರೀಕ್ಷೆಗೆ ತಾಯಿಯನ್ನು ಸೂಚಿಸುವುದು		
13	CD4 ಪರೀಕ್ಷೆಗೆ ಮಗುವನ್ನು ಸೂಚಿಸುವುದು		
14	HIV ಪರೀಕ್ಷೆಗೆ ಕುಟುಂಬವದರನ್ನು ಸೂಚಿಸುವುದು		

ಇತರೆ ಟಿಪ್ಪಣಿ (ಒಂದೊಮ್ಮೆ ಏನಾದರೂ ಇದ್ದರೆ)----------

ನಾನು ಭಾಗವಹಿಸುತ್ತಿರುವ ಸಂಶೋಧನೆಯಲ್ಲಿನ ಪ್ರಯೋಜನೆಗಳು & ದುಷ್ಪರಿಣಾಮಗಳನ್ನು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

1. ನಾನು ಈ ಸೂಚಿತ ಸಮ್ಮತಿ ಪತ್ರವನ್ನು ಓದಿರುತ್ತೇನೆ ಅಥವಾ ಇದನ್ನು ನನಗೆ ಓದಿ ವಿವರಿಸಿ ಹೇಳಿರುತ್ತಾರೆ ಹಾಗೂ ಈ ಮೇಲ್ಕಂಡ ಅಧ್ಯಯನದ ಸಮ್ಮತಿ ಪತ್ರದಲ್ಲಿನ ಅಂಶಗಳನ್ನು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿರುತ್ತೇನೆ ಮತ್ತು ಪ್ರಶ್ನೆಮಾಡಲು ನನಗೆ ಅವಕಾಶವಿರುತ್ತದೆ.

2. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಭಾಗವಹಿಸುವಿಕೆಯು ಸಂಪೂರ್ಣ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಎಂಬುದು ನನಗೆ ತಿಳಿದಿದೆ.

3. ಐ.ಸಿ.ಎಂ.ಆರ್, ಸಂತ ಜಾನ್ ನೀತಿಶಾಸ್ತ್ರ ಸಮೀತಿ, ಸೂಚಿತ ಅಧ್ಯಯನ ಸಿಬ್ಬಂದಿ ಮತ್ತು ಅಧ್ಯಯನ ಮೌಲ್ಯಮಾಪಕರು ನನ್ನ ಒಪ್ಪಿಗೆ ಇಲ್ಲದೆಯೇ ನನ್ನ ದಾಖಲೆಗಳನ್ನು ಪರಿಶೀಲಿಸಬಹುದಾಗಿದೆ. ಇದಕ್ಕೆ ನನ್ನ ಒಪ್ಪಿಗೆ ಇದೆ. ಆದಾಗ್ಯೂ, ಮಾಹಿತಿ ಪ್ರಕಟಿಸುವುದರಿಂದ ಅಥವಾ ಮೂರನೆ ವ್ಯಕ್ತಿಗೆ ಮಾಹಿತಿಗಳನ್ನು ನೀಡುವುದರಿಂದ, ನನ್ನ ಗುರುತಿಸುವಿಕೆಯು ಬಹಿರಂಗಗೊಳ್ಳುವುದಿಲ್ಲ ಎಂಬುದು ನನಗೆ ತಿಳಿದಿದೆ.

4. ವೈಜ್ಞಾನಿಕ ತಿಳುವಳಿಕೆಗಳಗಾಗಿ ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಅಂಶ ಅಥವಾ ವಿಚಾರಗಳ, ಫಲಿತಾಂಶಗಳ ಬಳಕೆಗೆ ನಾನು ಅಡ್ಡಿ ಪಡಿಸುವುದಿಲ್ಲ ಎಂದು ಒಪ್ಪಿರುತ್ತೇನೆ.

5. ನಾನು ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದರಿಂದ ನನಗೆ ಯಾವುದೆ ನೇರ ಲಾಭ, ಆರ್ಥಿಕ ನೆರವು / ಪರಿಹಾರ ಸಿಗುವುದಿಲ್ಲ ಎಂದು ತಿಳಿದಿರುತ್ತೆನೆ.

6. ನನ್ನ ಭಾಗವಹಿಸುವಿಕೆಯ ಹಕ್ಕನ್ನು ಉಳಿಸಿಕೊಳ್ಳಲು & ಯಾವುದೇ ಸಂದರ್ಭದಲ್ಲಿ ಸಂಪರ್ಕಿಸಬಹುದಾದ ವ್ಯಕ್ತಿಯನ್ನು ನನಗೆ ತಿಳಿಸಲಾಗಿರುತ್ತದೆ.

7.ಮಾನವಕೂಲಕ್ಕೆ ಅನುಕೂಲವಾಗುವ ಜ್ಞಾನಾರ್ಜನೆಗಾಗಿ ನಡೆಸುತ್ತಿರುವ ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸಲು ನನ್ನ ಒಪ್ಪಿಗೆಯಿರುತ್ತದೆ.

ಭಾಗವಹಿಸುವವರ ಹೆಸರು	ದಿನಾಂಕದೊಂದಿಗೆ ಭಾಗವಹಿಸುವವರ ಸಹಿ ಅಥವಾ ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು
ರಾಜೀವ ಎನ್.ಎಸ್	ಸಂಶೋಧಕರ ಹೆಸರು
ದಿನಾಂಕದೊಂದಿಗೆ ಸಂಶೋಧಕರ ಸಹಿ	
ಸಾಕ್ಷಿಯ ಹೆಸರು (ಅವಶ್ಯವಿದ್ದರೆ)	ದಿನಾಂಕದೊಂದಿಗೆ ಸಾಕ್ಷಿಯ ಸಹಿ

ಟಿಪ್ಪಣಿ, ಒಂದೊಮ್ಮೆ ಏನಾದರೂ ಇದ್ದರೆ :----------

ಡಾ. ರಾಜಿಬ್ ದಾಸ ಗುಪ್ತಾ	
ಮಾರ್ಗದರ್ಶಕರ ಹೆಸರು	ದಿನಾಂಕದೊಂದಿಗೆ ಮಾರ್ಗದರ್ಶಕರ ಸಹಿ

11. Verbal and social autopsy form for child death 1-5 years.

VERBAL AND SOCIAL AUTOPSY FORM FOR CHILD (1-5 YEAR) MORTALITY

Instructions to interviewer:

1. Wherever, textual information is elicited, please write the respondent's own words in local language in pencil. This can be discussed and translated to English in pen later.
2. Use general code list for responses, unless otherwise mentioned against each question.
3. This form has to be elicited for all death of live born children, dead on or after 01.01.2011, at the age of 365 days and above, till the end of the study.
4. In this form, "deceased child" means the "child who is dead and for whom this format is filled up for."

A. Introduction.

Namaskara.

I am Rajeev N S. I am extremely sorry to hear that your young baby died recently and I would like to take some information related to this. This information will help us to assess the actual causes/factors lead to your infant's death and also help both of us in preventing such deaths in future either in your family or in community by developing suitable strategies for interventions to reduce child deaths. Whatever information you provide will be kept confidential and will not be shared as it is with other persons. While there is no direct benefit for you individually, it is possible that the findings of such interviews would enable us to identify the gaps and to develop better health strategies to strengthen the measures to improve the child survival in the community. If you want to ask me anything further on this, you are most welcome.

B. Details of the deceased child and household.

1. Name of the deceased child | 2. UID | 3. ID

4. Sex of the deceased child | 5. Date of birth *(DD/MM/YY)* | 6. Age at death *(YY/MM/DD)*

7. Mother's **FIRST** name | 8. Father's **FIRST** name

9. Present address | 10. Phone number | 11. Under PHI *(Enter HCF code; If code 990, specify)*

12. Permanent address *(If different from B.9. above; Leave blank if not applicable.)* | 13. Phone number *(If different from B.10. above; Leave blank if not applicable.)* | 14. Under PHI *(Enter HCF code; If code 990, specify)*

C. Details of Interview.

1. Place *(Mention village/locality name)* | 2. Date *(DD/MM/YY)*

D. Details of the respondent.

1. **FULL** Name

2. Age | 3. Gender | 4. Education | 5. Occupation | 6. Phone number

7. Address

8. Relationship with deceased child | 9. If others *(code 5 or 6 in D.8.)*, specify *(Leave blank if not applicable)*

10. If others *(code 5 or 6 in D.8.)*, since how long did he/she knew the child? *(YY/MM/DD, with respect to the date of death of the child) (Leave blank if not applicable)*

11. Whether respondent was physically present with the child at the time of death? 1. Yes. 2. No. 3. Don't remember. *(If answered code 1, 2, 3 or 4 in D.8., AND code 2 or 3 in D.11, please go ahead to Section E. If answered code 5 or 6 in D.8., AND code 2 or 3 in D.11, please stop the interview and find another suitable respondent. If you don't find any other suitable respondent upon enquiry, go ahead with the same respondent.)*

E. Information about child's death.

1. Date of death *(DD/MM/YY)* | 2. Time of death *(24-hr clock)*

3. Place of death 01. Home. 02. Transit/ambulance. 03. SC. 04. PHC/UHC/UHFWC. 05. TH/FRU/CHC. 06. DH/BIMS. 07. Pvt. clinic/nursing home. 08. Pvt. tertiary hospital. 09. Orphanage/ Children's home. 10. Other.

4. If home or others *(code 01 or 10 in E.3.)*, specify *(Mention name of the place of death and address here; Leave blank if not applicable)*

5. If institutional death *(code 03-09 in E.3.)*, name and address of institution *(Leave blank if not applicable)* | 6. If hospital death *(code 03-08 in E.3.)*, HCF code *(If code 03 in E.3., mention HCF code of the PHI this is attached to. If code 990, specify; Leave blank if not applicable)*

F. Family background. *(For Q. Nos. 25, 28, 30-40, please mention a brief situation in the additional information section)*

1. Usually, who will take decision in the family on health care seeking for illnesses at hospitals? *(in relation to the deceased child)* 1. Mother. 2. Father. 3. Brother. 4. Sister. 5. Stepfather/mother. 6. Grandfather/mother. 7. Others. ☐

2. If others *(code 7 in F.1.)*, specify *(Leave blank if not applicable)* ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

3. Is there any mode of transport services within reach so as to reach a hospital within 30 minutes? 1. Yes. 2. No. 3. Don't Know. ☐
(Elicit this information for the place where the family stayed at the time of terminal illness/death of the child)

4. If yes *(code 1 in F.3.)*, what is the mode of transport? 1. 108/Ambulance. 2. Bus/Train/Taxi/other local public transport. 3. Private vehicles. 4. Others. ☐

5. If others *(code 7 in F.4.)*, specify *(Leave blank if not applicable)* ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

6. Whether the marriage of father and mother was consanguineous *(parents or grandparents of the deceased child were siblings)*? 1. Yes. 2. No. 3. Don't know. ☐

7. Was there **ANY OTHER** child *(0-14 yr)* deaths *(exclude abortions, still birth)* in the **FAMILY** *(consider only the nuclear family here)* **EVER IN THE PAST** *(before the date of death of deceased child)*? 1. Yes. 2. No. 3. Don't know. ☐
(If answered code 1, please ask information in sections G-O in this format with the name of the deceased child as prefix. If answered code 2 or 3, leave F.8. to F.10. blank. If more than one child deaths, enter the details of the most recent child death, just before the date of death of the deceased child, in F.8. to F.10. If more than one child deaths, verify whether the previous child deaths have happened on or after 01.01.2011 and fill up separate VSA forms as applicable, based on the age of the child at death.)

8. If yes *(code 1 in F.7.)*, when? ☐☐/☐☐/☐☐
*(YY/MM/DD **before** the date of death of the deceased child; Leave blank if not applicable)*

9. If yes *(code 1 in F.7.)*, other child's age at death ☐☐/☐☐/☐☐
(YY/MM/DD; Leave blank if not applicable)

10. If yes *(code 1 in F.7.)*, reason for other child's death *(as stated by the respondent; Leave blank if not applicable)* ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

11. Was there **ANY** adult *(≥ 15 year)* deaths in the **HOUSEHOLD** *(all members residing in that house; do not consider the nuclear family here)* in **PAST ONE YEAR** *(before the date of death of deceased child)*? 1. Yes. 2. No. 3. Don't know. *(If answered code 2 or 3, leave F.12. to F.15. blank. If more than one adult deaths, enter the details of the most recent adult death, just before the date of death of the deceased child, in F.12. to F.15.)* ☐

12. If yes *(code 1 in F.11.)*, who *(in relation to the deceased current child)*? 1. Mother. 2. Father. 3. Brother. 4. Sister. 5. Stepfather/mother. 6. Grandfather/mother. 7. Others. *(Leave blank if not applicable)* ☐

13. If yes *(code 1 in F.11.)*, when? ☐☐/☐☐/☐☐
*(YY/MM/DD **before** the date of death of the deceased child; Leave blank if not applicable)*

14. If yes *(code 1 in F.11.)*, age of the deceased adult at death ☐☐/☐☐/☐☐
(YY/MM/DD; Leave blank if not applicable)

15. If yes *(code 1 in F.11.)*, reason for adult death *(as stated by the respondent; Leave blank if not applicable)* ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

16. Whether mother alive at the time of death of the deceased child? 1. Yes. 2. No. 3. Don't know. ☐

17. Whether father alive at the time of death of the deceased child? 1. Yes. 2. No. 3. Don't know. ☐

18. Whether anyone in the **HOUSEHOLD** *(all members residing in that house; do not consider the nuclear family here)* had any of the following conditions at the time of child's death or a month before that? *(response to be made in relation to the deceased child)* 1. Mother. 2. Father. 3. Brother. 4. Sister. 5. Stepfather/mother. 6. Grandfather/mother. 7. Others staying in the house. 8. No. 9. Don't know/Don't remember. *(If yes for more than one relation, enter the codes in priority: Mother/Stepmother> Father/Stepfather> Brother/Sister> Grandfather/mother> Others staying in the house.)*

a. Diarrhea/dysentery ☐	b. Cough with sputum ☐	c. Dry cough ☐	d. Hemoptysis/TB ☐
e. Breathlessness ☐	f. Difficulty in swallowing ☐	g. Pneumonia ☐	h. Fever with chills/Malaria ☐
i. Night sweating ☐	j. Neck stiffness/Meningitis ☐	k. Jaundice ☐	l. Chicken pox ☐
m. Other illness (specify) _____ ☐		n. Other illness (specify) _____ ☐	

19. HIV status of the mother 1. Positive. 2. Negative. 3. Not known/Not tested ☐

20. HIV status of the father 1. Positive. 2. Negative. 3. Not known/Not tested. ☐

21. Whether the mother belongs to HIV high risk group? 1. FSW. 2. IDU. 3. Migrant. 4. No. 5. Don't know. ☐

22. Whether the father belongs to HIV high risk group? 1. MSM. 2. IDU. 3. Migrant. 4. Trucker. 5. No. 6. 3. Don't know. ☐

23. Was the child attending an Anganwadi ever? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐

24. If yes *(code 1 in F.23.)* was the child attending Anganwadi before his/her terminal illness/death? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Leave blank if not applicable)* ☐

25. If yes *(code 1 in F.23.)*, was there any situation that the deceased child was discriminated in Anganwadi he/she was attending? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Leave blank if not applicable)* ☐

26. Was the child attending a school ever? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐

27. If yes *(code 1 in F.26.)*, was the child attending the school before his/her terminal illness/death? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Leave blank if not applicable)* ☐

28. If yes *(code 1 in F.26.)*, was there any situation that the deceased child was discriminated in school he/she was attending? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Leave blank if not applicable)* ☐

29. If yes *(code 1 in F.26.)*, was the child availing mid-day meal from the school? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Leave blank if not applicable)* ☐

30. Was the child a member of a constantly migrating family? ☐

31. Was the child a child laborer? ☐

1. Yes. 2. No. 3. Don't know.	1. Yes. 2. No. 3. Don't know/Don't remember.
32. Did you ever feel that the child was frustrated/depressed? 1. Yes. 2. No. 3. Don't know. ☐	33. Did you ever feel that the child did not have adequate sleep? 1. Yes. 2. No. 3. Don't know. ☐
34. Was there a history of child battering? 1. Yes. 2. No. 3. Don't know. ☐	35. Was the child attending social/religious occasions before he/she fell ill? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐
36. Was there a history of child neglect/avoidance/ torturing? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐ *(Note: Sending child to an orphanage cannot be considered as child avoidance or neglect)*	
37. Was there any situation that the **DECEASED CHILD** had less food available to satisfy his/her hunger on any day in the month prior to death? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐	38. Was there any situation that **ANY OF THE FAMILY MEMBERS** *(consider only the nuclear family here)* of the deceased child had less food available to satisfy his/her hunger on any day in the month prior to child's death? 1. Yes. 2. No. 3. Don't know. ☐
39. Was there any situation that the breadwinner in the family of deceased child lost a job in the last one year? 1. Yes. 2. No. 3. Don't know. ☐	40. Was there any situation that the family of deceased child is ever indebted to a bank / money lender? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐
Reminder: Ensure that you have included a brief description of the situations for Q. Nos. 25, 28, 30-40, in the additional information section, if applicable)	
41. Was the deceased child or his/her family getting any support services at the time of child's death/2 weeks before death? 1. Yes, from PPN. 2. Yes, from NGO/CBO. 3. Yes, from Govt. 4. Yes, from other agencies. 5. No. 6. Don't know/Don't remember. *(Exclude health care services, but include allied services, availed from hospital at the time of death, if any. If mentioned code 2, please mention the services availed and institution providing the services in additional information section. If multiple sources, mention the sources in additional information section)*	
a. School/Hostel admission / utilities ☐ b. Award/Scholarship/Sponsorship ☐ c. Non-formal education ☐	
d. Skills training ☐ e. Counselling services ☐ f. Nutrition/Food/Annabhagya ☐	
g. Foster/Care home/Orphanage ☐ h. Health Check-up/ Medical care ☐ i. House construction/electrification ☐	
j. Legal aid ☐ k. Loan from SHG/Micro credit/bank ☐ l. Bus pass/TA for medical care ☐	
m. Pension/Financial aid/Insurance ☐ n. NGO projects (OVC/VIHAAN/CSC/Others) ☐ o. Bhagyalaxmi ☐	
p. Bidaai ☐ q. Ganga kalyan yojana ☐ r. Santwana ☐	
s. Shuddh Ganga/Drinking water ☐ t. Bhagyajyoti/Electricity ☐ u. Others (specify) _____ ☐	
G. History of the deceased child.	
1. Order of birth ☐	2. Was the deceased child a preterm baby *(born before 37 weeks of pregnancy)*? 1. Yes. 2. No. 3. Don't know/Don't remember. ☐
2. Was there any of the following complications for the deceased child at or within 28 days after birth? 1. Yes. 2. No. 3. Don't know/Don't remember.	
a. Birth weight < 2.5 kg ☐ b. Birth weight > 4.5 kg ☐ c. Convulsions ☐ d. Jaundice ☐ e. Infected umbilical stump ☐	
f. Signs of Respiratory distress/infection (Difficulty in breathing, High respiratory rate, Grunting, Chest in-drawing, Nasal flaring) ☐	
g. Bulging fontanelle ☐ h. Pus from ear ☐ i. Skin pustules ☐ j. Fever ☐ k. Unconsciousness ☐	
l. Malaria ☐ m. Diarrhoea/Dysentery with severe dehydration ☐ n. Failure to thrive ☐ o. No/Feeble cry ☐	
p. Difficulty in breast feeding ☐ q. Less limb movements ☐ r. Birth injury ☐ s. Congenital anomalies _____ ☐	
t. Others (specify) _____ ☐ u. t. Others (specify) _____ ☐	
3. Was the breast feeding initiated for the deceased child? 1. Yes. 2. No. 3. Don't know. ☐	4. If yes *(code 1 in G.3.)*, was the deceased child breastfed for at least 6 months? 1. Yes. 2. No. 3. Don't know. *(Leave blank if not applicable)* ☐
5. If yes *(code 1 in G.3.)*, was there any mixed feeding *(breast milk+other foods for > 2 weeks during weaning)* ever? 1. Yes. 2. No. 3. Don't know. *(Leave blank if not applicable)* ☐	6. If yes *(code 1 in G.3.)*, was the child breast feeding at the time of / 2 weeks before death? 1. Yes. 2. No. 3. Don't know. *(Leave blank if not applicable)* ☐
7. Which all immunizations were given for the deceased child? 1. Yes. 2. No. 3. No records available. *(To be recorded based on a secondary source of information only; don't consider respondent's reporting. If no records available with the mother, please contact the nearest Anganwadi or ANM for the same, without disclosing the HIV information. PVV= Pentavalent Vaccine. Multiple sources of information can be combined here. Please check for conflict of information, if any, on multiple sources of secondary data, and make a note of the same in the additional information section)*	
a. BCG-birth ☐ b. OPV-birth ☐ c. OPV-6wk ☐ d. OPV-10wk ☐ e. OPV-14wk ☐ f. OPV-18m ☐ g. DPT-birth ☐ h. DPT-6wk ☐	
i. DPT-10wk ☐ j. DPT-14wk ☐ k. DPT-18m ☐ l. DPT-5y ☐ m. HBV-birth ☐ n. HBV-6wk ☐ o. HBV-10wk ☐ p. HBV-14wk ☐	
q. PVV-6wk ☐ r. PVV-10wk ☐ s. PVV-14wk ☐ t. Measles ☐ u. MMR ☐ v. DT-5y ☐	
8. Was the child immunized for age at death? 1. Yes. 2. No. *(Leave blank if no records are available anywhere)* ☐	9. Source of secondary data 1. Immunization record with mother. 2. Immunization record with Anganwadi/ANM. 3. Thai card. 4. Both 1 & 2 above. 5. Both 1 & 3 above. 6. Both 2 & 3 above. 7. Others (specify) _____ *(Leave blank if no records are available anywhere)* ☐

10. Did the deceased child have any of the following conditions within 2 weeks before death? 1. Yes, accidental. 2. Yes, deliberately done by someone / homicidal / murder. 3. Yes, self-inflicted / suicidal. 4. No. 5. Don't know / Don't remember. *(If any, please describe in the additional information section, if not included in the narrative)*

a. Poisoning ☐ b. Fall ☐ c. Motor vehicle accident ☐ d. Other accidents ☐ e. Fire burns ☐

f. Drowning ☐ g. Breast milk/Food choking ☐ h. Foreign body ingestion ☐ i. Foreign body inhalation ☐ j. Firearm injury ☐

k. Cut injury ☐ l. Blunt injury ☐ m. Chemical burns ☐ n. Strangulation ☐ o. Insect bite ☐

p. Animal inflicted injury ☐ q. Electrocution ☐ r. Scalding ☐ s. Natural hazards (specify) _____ ☐

t. Other injury (specify) _____ ☐ u. Other injury (specify) _____ ☐

11. HIV status of the child 1. Positive. 2. Negative. 3. Not known. ☐
(If answered code 2 or 3, leave G.12-G.17 blank)

12. If positive *(code 1 in G.11)*, age at which the child was **FIRST** detected HIV+ *(YY/MM/DD) (Leave blank if not applicable)* ☐☐/☐☐/☐☐

13. If positive *(code 1 in G.11)*, was the child on ART ever? 1. Yes. 2. No. 3. Don't know. *(If answered code 2 or 3, leave G.14-G.17 blank; Leave blank if not applicable)* ☐

14. If yes *(code 1 in G.13)*, date of start of ART (DD/MM/YY; *Leave blank if not applicable)* ☐☐/☐☐/☐☐

15. If yes *(code 1 in G.13)*, was the child on ART at the time of death/2 weeks before death? 1. Yes. 2. No. 3. Don't know. *(If answered code 2 or 3, leave G.16 & G.17 blank; Leave blank if not applicable)* ☐

16. If yes *(code 1 in G.15)*, ART regimen at death/2 weeks before death *(Leave blank if not applicable)* ☐☐

17. If yes *(code 1 in G.15)*, did the child have any of the following ART side effects at death/2 weeks before death? 1. Yes. 2. No. 3. Don't know/Don't remember. *(Source of information: ART book **OR** respondent; Leave blank if not applicable)*

a. Diarrhea ☐ b. Nausea/Vomiting ☐ c. Loss of appetite ☐ d. Increased thirst ☐ e. Abdominal pain ☐

f. Tiredness/Fatigue ☐ g. Sleeplessness ☐ h. Weight loss ☐ i. Dizziness ☐ j. Anxiety ☐

k. Depression ☐ l. Mood changes ☐ m. Fever ☐ n. Muscle aches ☐ o. Sore throat ☐

p. Rash ☐ q. Losing or gaining body fat ☐ r. Lipid abnormalities ☐ s. Diabetes ☐ t. Heart attack ☐

u. Liver damage/Jaundice ☐ v. Kidney damage/increased urination ☐ w. Allergy/hypersensitivity reaction ☐

x. Peripheral neuropathy/Pain, numbness, pins in hand, feet ☐ y. Pancreatitis ☐ z. Others (specify) _____ ☐

H. Details of illness of the deceased child. *(As reported by respondent)*

Did the child have the following conditions within 2 weeks before death?	a. Present? 1. Yes. 2. No. 3. Don't know.	b. If yes, duration *(days)*	c. Whether treated? 1. Yes. 2. No. 3. Don't know.	d. Treated by (1. Traditional healer. 2. Religious leader 3. AYUSH practitioner. 4. Pvt/Co-op. allopathic clinic/ hospital/MCH. 5. Govt/ESI PHC/ CHC/TH/DH/MCH. 6. Pharmacist. 7. Others.	e. Duration of treatment *(days)*
1. Fever without chills	☐	☐☐	☐	☐	☐☐
2. Loose stools	☐	☐☐	☐	☐	☐☐
3. Vomiting	☐	☐☐	☐	☐	☐☐
4. Sunken eyes	☐	☐☐	☐	☐	☐☐
5. Abdominal skin pinch goes back slowly (> 2 seconds)	☐	☐☐	☐	☐	☐☐
6. Blood in vomit	☐	☐☐	☐	☐	☐☐
7. Running nose	☐	☐☐	☐	☐	☐☐
8. Cough with sputum	☐	☐☐	☐	☐	☐☐
9. Dry cough	☐	☐☐	☐	☐	☐☐
10. Hemoptysis	☐	☐☐	☐	☐	☐☐
11. Breathlessness/Difficulty in breathing	☐	☐☐	☐	☐	☐☐
12. Fast breathing	☐	☐☐	☐	☐	☐☐
13. Chest in-drawing	☐	☐☐	☐	☐	☐☐
14. Grunting	☐	☐☐	☐	☐	☐☐
15. Stridor	☐	☐☐	☐	☐	☐☐
16. Wheezing	☐	☐☐	☐	☐	☐☐
17. Nasal flaring	☐	☐☐	☐	☐	☐☐
18. Difficulty in having food/swallowing	☐	☐☐	☐	☐	☐☐

19. Fever with chills	☐	☐☐	☐	☐	☐☐
20. Night sweating	☐	☐☐	☐	☐	☐☐
21. Neck stiffness	☐	☐☐	☐	☐	☐☐
22. Convulsions	☐	☐☐	☐	☐	☐☐
23. Unconsciousness	☐	☐☐	☐	☐	☐☐
24. Lethargy	☐	☐☐	☐	☐	☐☐
25. Jaundice (Yellow discoloration of skin/sclera/nailbeds)	☐	☐☐	☐	☐	☐☐
26. Abdominal pain	☐	☐☐	☐	☐	☐☐
27. Protruding abdomen	☐	☐☐	☐	☐	☐☐
28. Pedal edema	☐	☐☐	☐	☐	☐☐
29. Pus from ear	☐	☐☐	☐	☐	☐☐
30. Ear pain	☐	☐☐	☐	☐	☐☐
31. Bleeding from uninjured skin	☐	☐☐	☐	☐	☐☐
32. Bleeding from orifices (Eye/Nose/Ear/Mouth/ Urethra/Anus)	☐	☐☐	☐	☐	☐☐
33. Severe headache	☐	☐☐	☐	☐	☐☐
34. Loss of weight	☐	☐☐	☐	☐	☐☐
35. Low weight for age	☐	☐☐	☐	☐	☐☐
36. Skin infections	☐	☐☐	☐	☐	☐☐
37. Pallor	☐	☐☐	☐	☐	☐☐
38. Blue/Brown skin discoloration	☐	☐☐	☐	☐	☐☐
39. Leukoplakia/White patches in mouth	☐	☐☐	☐	☐	☐☐
40. Swelling in under-arms and/or neck	☐	☐☐	☐	☐	☐☐
41. Tender swelling behind ear	☐	☐☐	☐	☐	☐☐
42. Repeated infections	☐	☐☐	☐	☐	☐☐
43. Others (specify) _____	☐	☐☐	☐	☐	☐☐
44. Others (specify) _____	☐	☐☐	☐	☐	☐☐

Did the deceased child have ever have the following chronic conditions?	a. Present? 1. Yes. 2. No. 3. Don't know.	b. If yes, duration *(YY/MM/DD)*	c. Whether treated? 1. Yes. 2. No. 3. Don't know.	d. Treated by (1. Traditional healer. 2. Religious leader 3. AYUSH practitioner. 4. Pvt/Co-op. allopathic clinic/ hospital/MCH. 5. Govt/ESI PHC/ CHC/TH/DH/MCH. 6. Pharmacist. 7. Others.	e. Duration of treatment *(YY/MM/DD)*
45. Paralytic disease (specify) _____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
46. Mental Retardation	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
47. Growth retardation	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
48. Asthma/Chronic Lung disease	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
49. Diabetes	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
50. Hypertension/High BP	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
51. Heart disease/Cyanosis	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
52. Liver disease (specify) _____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐

53. Kidney disease (specify)_____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
54. Cancer (specify) _____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
55. Blood related diseases (specify) _____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
56. History of blood transfusion	☐			☐	☐☐/☐☐/☐☐
57. Multiple sexual partners	☐				
58. STIs	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐
59. History of injection drug use	☐		☐	☐	☐☐/☐☐/☐☐
60. Others (specify) _____	☐	☐☐/☐☐/☐☐	☐	☐	☐☐/☐☐/☐☐

61. In your knowledge, was the child treated with the following during the terminal illness? 1. Yes. 2. No. 3. Don't know.

a. Hospital admission ☐ b. ICU admission ☐ c. ORS ☐ d. IVF ☐ e. Blood transfusion ☐
f. Nasogastric feeding ☐ g. IV injections ☐ h. IM injections ☐ i. Oxygen ☐ j. Nebulization ☐
k. Tepid sponging ☐ l. Ice pack application ☐ m. Acupuncture ☐ n. Reiki ☐ o. Traditional medicine ☐
p. Religious antidote ☐ q. Other (herbal) antidote ☐ r. Oral medication ☐ s. Ventilator support ☐ t. Surgery ☐
u. Gastric lavage ☐ v. Others (specify)_____ ☐ w. Others (specify)_____ ☐

62. Did a health care worker tell you that the child was seriously sick? ☐
1. Yes. 2. No. 3. Don't know/Don't remember. *(If answered code 2 or 3, leave blank H.63 & H.64)*

63. If yes *(code 1 in H.62.)*, who communicated? ☐
1. Doctor. 2. Nurse. 3. Lab technician. 4. Pharmacist. 5. Other hospital staff. 6. ANM. 7. AWW. 8. ASHA. 9. Others (specify) _____ *(Leave blank if not applicable)*

64. If yes *(code 1 in H.62.)*, what did he/she say? *(Enter in respondent's own words, first in local language with pencil, to be translated to English in pen after discussion. Leave blank if not applicable)*

65. Did a health care worker tell you the cause of death of the child? ☐
1. Yes. 2. No. 3. Don't know/Don't remember. *(If answered code 2 or 3, leave blank H.66 & H.67)*

66. If yes *(code 1 in H.65.)*, who communicated? ☐
1. Doctor. 2. Nurse. 3. Lab technician. 4. Pharmacist. 5. Other hospital staff. 6. ANM. 7. AWW. 8. ASHA. 9. Others (specify) _____ *(Leave blank if not applicable)*

67. If yes *(code 1 in H.65.)*, what did he/she say? *(Enter in respondent's own words, first in local language with pencil, to be translated to English in pen after discussion. Leave blank if not applicable)*

68. Did you have any inconvenience in any of the HCFs? 1. Yes. 2. No. 3. Don't know/Don't remember. *(If no, leave blank H.69)* ☐

69. If yes *(code 1 in H.68.)*, HCF from where the following services was delayed? 1. HCF 1 (From HCF of first referral). 2. HCF 2 (To HCF of first referral). 3. HCF 3 (To HCF of second referral). 4. HCF 4 (To HCF of third referral). 5. HCF 5 (To HCF of fourth referral). *(Leave blank if not applicable)*

a. Doctor's consultation ☐☐ & ☐ b. Treatment ☐☐ & ☐ c. Lab investigations ☐☐ & ☐
d. Anesthesia ☐☐ & ☐ e. Operation ☐☐ & ☐ f. Transport/ambulance services ☐☐ & ☐
g. Blood transfusion ☐☐ & ☐ h. Others (specify) _____ ☐☐ & ☐
i. Others (specify) _____ ☐☐ & ☐

70. Do you have any doubts on what medical care was need / provided? 1. Yes. 2. No. *(If no, leave blank H.71)* ☐

71. If yes *(code 1 in H.70.)*, what and from which HCF? *(Enter in respondent's own words, first in local language with pencil, to be translated to English in pen after discussion. Leave blank if not applicable)*

72. Was there any financial impediment to medical care required? 1. Yes. 2. No. 3. Don't know/Don't remember. *(If no, leave blank H.73)* ☐

73. If yes *(code 1 in H.72.)*, HCF and service for which money was a problem? 1. HCF 1 (From HCF of first referral). 2. HCF 2 (To HCF of first referral). 3. HCF 3 (To HCF of second referral). 4. HCF 4 (To HCF of third referral). 5. HCF 5 (To HCF of fourth referral). *(Leave blank if not applicable)*

a. Doctor's consultation ☐☐ & ☐ b. Treatment ☐☐ & ☐ c. Lab investigations ☐☐ & ☐
d. Anesthesia ☐☐ & ☐ e. Operation ☐☐ & ☐ f. Transport/ambulance services ☐☐ & ☐
g. Blood transfusion ☐☐ & ☐ h. Others (specify) _____ ☐☐ & ☐

I. Details of illness of the deceased child. *(As per hospital/treatment/discharge records, if any. Please click a photograph of each page of the available document on your mobile. Use space for additional information, if required.)*							
Was the child diagnosed with the following conditions?	a. Treatment record verified? 1. Yes. 2. No.	b. Diagnosed? 1. Yes. 2. No.	c. Treated? 1. Yes. 2. No.	d. Treated from (HCF code)	e. If code 990 in I.d., specify	f. Duration of treatment *(YY/MM/DD)*	g. Treated with
1. Severe malnutrition/ Failure to thrive	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
2. ADD/Severe dehydration	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
3. Blood dyscrasias (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
4. Meningitis	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
5. TB/TB complications	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
6. Malaria	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
7. Liver diseases (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
8. Kidney diseases (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
9. Heart diseases (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
10. Pneumonia/LRTI	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
11. URTI/ Infection of pharynx and/or larynx	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
12. Chicken pox	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
13. Bronchial asthma/ Asthmatic bronchitis	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
14. Allergy/Hypersensitivity reaction/Drug allergy	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
15. Jaundice	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
16. Stage IV HIV infection *(with OIs)*	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
17. Oral leukoplakia	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
18. Lymphadenopathy/ EBV	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
19. Measles	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
20. Acute/Chronic ear infection	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
21. UTI	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
22. STI (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
23. Skin infections (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
24. Anemia	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
25. Recurrent infections	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
26. Paralytic disease	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
27. Mental illness	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
28. Chronic lung disease	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
29. Diabetes	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
30. Hypertension/High BP	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
31. Cancer (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	
32. Others (specify) _____	☐	☐	☐	☐☐☐		☐☐/☐☐/☐☐	

33. Is the weight of the child recorded on treatment record? 1. Yes. 2. No. 3. No treatment records available. ☐

34. If yes *(code 1 in I.33.)*, weight *(kg)* ☐☐☐☐☐

35. Was the child remarked as dangerously ill in treatment records? 1. Yes. 2. No. 3. No treatment records available for verification. ☐

36. Does the treatment record say that the seriousness of the illness is communicated to the by standers? 1. Yes. 2. No. 3. No treatment records available for verification. ☐

37. Was the cause of death mentioned in treatment records? 1. Yes. 2. No. 3. No treatment records available for verification. ☐

38. Does the treatment record say that the cause of death is communicated to the by-standers? 1. Yes. 2. No. 3. No treatment records available for verification. ☐

J. Referral details. *(As reported both by respondent and hospital/treatment/discharge/referral records. Enter code 9, if institution reports are not available. Leave blank if not applicable as per instructions against each question)*		
	As reported by respondent	As per institution reports
1. Was he/she referred from one HCF to another? 1. Yes. 2. No. 3. Don't know. *(If answered no, leave J.2-J.25 blank)*	☐	☐
2. If yes *(code 1 in J.1.)*, referral 1 from *(HCF code and name)*	☐☐☐	☐☐☐
3. If yes *(code 1 in J.1.)*, date of referral 1 *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
4. If yes *(code 1 in J.1.)*, time of referral 1 *(24 hr clock)*	☐☐:☐☐	☐☐:☐☐
5. If yes *(code 1 in J.1.)*, mode of transport of referral 1 1. 108/Ambulance. 2. Bus/Train/Taxi/other local public transport. 3. Private vehicles. 4. Others (specify) _____ *(If multiple, enter the main mode)*	☐	☐
6. If yes *(code 1 in J.1.)*, referral 1 to *(HCF code and name)*	☐☐☐	☐☐☐
7. If yes *(code 1 in J.1.)*, Whether gone to the same HCF as referred to? 1. Yes. 2. No. 3. Don't know.	☐	☐
8. If yes *(code 1 in J.7.)*, date of reaching HCF where referred to *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
9. If yes *(code 1 in J.7.)*, time of reaching HCF where referred to *(24 hr clock)*	☐☐:☐☐	☐☐:☐☐
10. If no *(code 2 in J.7.)*, was the child taken to another HCF? 1. Yes. 2. No. 3. Don't know.	☐	☐
11. If yes *(code 1 in J.10.)*, where was the child taken to? *(HCF code and name)*	☐☐☐	☐☐☐
12. If yes *(code 1 in J.10.)*, date of reaching HCF where gone to *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
13. If yes *(code 1 in J.10.)*, time of reaching HCF where gone to *(24 hr clock)*	☐☐:☐☐	☐☐:☐☐
14. Was there a second referral for the sick child? 1. Yes. 2. No. 3. Don't know. *(If answered no, leave J.15-J.25 blank)*	☐	☐
15. If yes *(code 1 in J.14.)*, date of referral 2 *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
16. If yes *(code 1 in J.14.)*, time of referral 2 *(24 hr clock)*	☐☐:☐☐	☐☐:☐☐
17. If yes *(code 1 in J.14.)*, mode of transport of referral 1 1. 108/Ambulance. 2. Bus/Train/Taxi/other local public transport. 3. Private vehicles. 4. Others (specify) _____ *(If multiple, enter the main mode)*	☐	☐
18. If yes *(code 1 in J.14.)*, referral 1 to *(HCF code and name)*	☐☐☐	☐☐☐
19. If yes *(code 1 in J.14.)*, whether gone to the same HCF as referred to? 1. Yes. 2. No. 3. Don't know.	☐	☐
20. If yes *(code 1 in J.19.)*, date of reaching HCF where referred to (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
21. If yes *(code 1 in J.19.)*, time of reaching HCF where referred to (24 hr clock)	☐☐:☐☐	☐☐:☐☐
22. If no *(code 2 in J.19.)*, was the child taken to another HCF? 1. Yes. 2. No. 3. Don't know.	☐	☐
23. If yes *(code 1 in J.22.)*, where was the child taken to? *(HCF code and name)*	☐☐☐	☐☐☐
24. If yes *(code 1 in J.22.)*, date of reaching HCF where gone to (DD/MM/YY)	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
25. If yes *(code 1 in J.22.)*, time of reaching HCF where gone to (24 hr clock)	☐☐:☐☐	☐☐:☐☐
Check: If more than two referrals, please include this in additional information section answering all aspects discussed in J.3. to J.13, for all the additional referrals.		
26. Was the child discharged at request, or against medical advice? 1. Yes. 2. No. 3. Don't know.	☐	☐
27. If yes *(code 1 in J.26.)*, from which HCF(s)? 1. HCF 1 (From HCF of first referral). 2. HCF 2 (To HCF of first referral). 3. HCF 3 (To HCF of second referral). 4. HCF 4 (To HCF of third referral). 5. HCF 5 (To HCF of fourth referral).	☐, ☐ & ☐	☐, ☐ & ☐
K. Open narrative.		
Request to respondent: Please describe in your own words, what happened around the time of death of child, his/her symptoms, quality of life, any treatment taken, symptoms in order of appearance, doctor consulted or hospitalization, history of similar episodes, etc. Instruction to interviewer: Please insert notes from the oral narrative that was not recorded within the structured interview. Enter in respondent's own words, first in local language with pencil, to be translated to English in pen after discussion.		
(Attach additional white sheet if required)		

L. Information captured from treatment records, if any. *(Please click a clear photograph on your mobile and attach a print. Leave blank as per instruction against each question.)*			
1. Was the child taken to any HCF during his/her terminal illness? 1. Yes. 2. No. 3. Don't know/Don't remember. *(If answered code 2 or 3, leave L.2-L.23 blank)* ☐			
	a. HCF 1	b. HCF 2	c. HCF 3
2. If yes *(code 1 in L.1.)*, was a treatment record issued? 1. Yes. 2. No. 3. Don't know/Don't remember. *(If answered code 2 or 3, leave L.3-L.23 blank)*	☐	☐	☐
3. If yes *(code 1 in L.2.)*, was the treatment record seen by interviewer? 1. Yes. 2. No. *(If answered code 2, leave L.5-L.23 blank)*	☐	☐	☐
4. If no *(code 2 in L.3.)*, why?			
5. If yes *(code 1 in L.3.)*, is the name of the deceased child same as per study records? 1. Yes. 2. No.	☐	☐	☐
6. If yes *(code 1 in L.3.)*, is the medical record signed by a medical officer? 1. Yes. 2. No.	☐	☐	☐
Note: If answered code 2 in L.6., verify the authenticity of the record with the HCF. If genuine, continue to L.7. If not, leave L.7.-L.23 blank.			
7. If yes *(code 1 in L.6.)*, name/ designation of the medical officer who signed			
8. If yes *(code 1 in L.6.)*, date of issue of medical record *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
9. If yes *(code 1 in L.6.)*, HCF code and name	☐☐☐	☐☐☐	☐☐☐
10. If yes *(code 1 in L.6.)*, treated as IP or OP? 1. IP. 2. OP. *(If answered code 2, leave L.11. & L.12 blank)*	☐	☐	☐
11. If IP *(code 1 in L.11.)*, date of admission *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
12. If IP *(code 1 in L.11.)*, date of discharge/death *(DD/MM/YY)*	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐	☐☐/☐☐/☐☐
13. If yes *(code 1 in L.6.)*, presenting complaints			
14. If yes *(code 1 in L.6.)*, history of any sickness			
15. If yes *(code 1 in L.6.)*, findings in physical examination			
16. If yes *(code 1 in L.6.)*, laboratory investigations and results			
17. If yes *(code 1 in L.6.)*, diagnosis / impression			
18. If yes *(code 1 in L.6.)*, management / Treatment given			
19. If yes *(code 1 in L.6.)*, referral advised, if any 1. Yes. 2. No. *(If answered code 2, leave L.20. blank)*	☐	☐	☐

20. If yes *(code 1 in L.19.)*, Referred to *(HCF name and code)*	☐☐☐	☐☐☐	☐☐☐
21. If yes *(code 1 in L.6.)*, discharge advice			
22. If child died from this HCF, cause of death (If the child has not died from this hospital, leave blank)			
23. If yes *(code 1 in L.6.)*, other notes, if any.			

M. Information captured from death certificate, if any. *(Please click a clear photograph on your mobile and attach a print. Leave blank as per instruction against each question.)*

1. Was a death certificate issued? 1. Yes. 2. No. 3. Don't know/Don't remember. *(If answered code 2 or 3, leave M.2.-M.9. blank.)* ☐	2. If yes *(code 1 in M.1.)*, was the death certificate seen by interviewer? 1. Yes. 2. No. ☐	3. If no *(code 2 in M.1.)*, why?

4. If yes *(code 1 in M.2.)*, are the following particulars of the deceased child same as per our records? 1. Yes. 2. No. *(If answered code 2 in any of these particulars, verify the authenticity of the record with the issuing authority. If genuine, continue to M.5. If not, leave M.5-M.9 blank.)*

a. Name ☐ b. Age ☐ c. Sex ☐ d. Address ☐ e. Place of death ☐ f. Date of death ☐

5. If yes *(code 1 in M.2.)*, is the death certificate duly signed? 1. Yes. 2. No. *(If answered code 2, verify the authenticity of the record with the issuing authority. If genuine, continue to M.6. If not, leave M.6-M.9 blank.)* ☐	6. If yes *(code 1 in M.2.)*, name of issuing authority
7. If yes *(code 1 in M.2.)*, date of issue of death certificate *(DD/MM/YY)* ☐☐/☐☐/☐☐	8. If yes *(code 1 in M.2.)*, registration number

9. If yes *(code 1 in M.2.)*, reason for death *(as mentioned in death certificate)*

N. Cooperation of the respondent.

1. Respondent's cooperation 1. Good. 2. Medium. 3. Poor. ☐	2. Do you feel whether interview with another respondent will add to the value? 1. Yes. 2. No. ☐	3. If yes, who do you suggest?

O. Space for additional information. *(Please mention additional information Q. No.-wise)*

(Attach additional white sheet if required)

Annexure 6. Administrative and ethical approval for the research study.

1. Approval of the Committee for Advanced Studies and Research, JNU, New Delhi.

JAWAHARLAL NEHRU UNIVERSITY
SCHOOL OF SOCIAL SCIENCES

No. SSS/2013-14/887

03.03.2015

Mr/Ms. Rajeev N.S.,
Direct Ph.D.
C/o Chairperson,
CSM&CH/SSS

Subject:- Confirmation of Admission to the Ph.D. Programme.

Dear Sir/ madam,

We write to inform you that the Dean/ Chairperson Committee for Advanced Studies and Research of the School in its 422nd meeting held on 29.01.2015 has, among others, approved the confirmation of your admission to the Ph.D Programme w.e.f. 17.07.2013.

The precise topic of your research as approved by the said Committee is as under:

Health and Life Outcomes of Children Exposed to Maternal HIV Infection in Belgaum District, Karnataka

You will work under the supervision of **Prof. Rajib Dasgupta**

You will not be eligible to submit the Ph.D. thesis unless you have pursued a course of research at the University for not less than two years after your admission has been confirmed.

The Ph.D. Ordinance, among others, stipulates that the thesis will be examined by; two examiners who shall not recommend that the viva-voce examination be held unless he/ she certifies that the thesis constitutes a contribution to knowledge characterized either by the discovery of new fact or by the candidate is sound and its literary presentation satisfactory.

Kindly keep the substance of the said provision in mind while initiating the process of preparing and submitting your thesis.

Yours faithfully,

3/3

(Sanjay Kumar)
Administrative Officer

CC:
Chairperson, CSMCH
Supervisor
Confirmation file

2. Approval of the Institutional Ethics Review Board, JNU, New Delhi.

INSTITUTIONAL ETHICS REVIEW BOARD
Jawaharlal Nehru University
New Delhi-110067

Name of the Ethics Committee: IERB-JNU — IERB Ref. No.2015/Student/68

Title of the Project Proposal:"Health and life outcomes of children exposed to maternal HIV infection in Belgaum district Karnataka"

Principal Investigator:Mr. Rajeev N.S — C/o Dr. Rajib Dasgupta (Supervisor)

CSM&CH/SSS/JNU — Sponser: NA

Telephone: 9686679445 — Email: drrajeevns@gmail.com

Collaborators' Name:

FOR OFFICIAL USE

The proposal was reviewed in a meeting held on 17th March, 2015 at 4:00 PM.
The following members were present:

1. Professor Shiv K. Sarin, Chairperson
2. Professor Kusum Chopra, Member
3. Professor Vijay Kumar, Member
4. Dr. Tripti Khanna , Member
5. Advocate Rukhsana Chaoudhary , Member
6. Prof. Ashwini Pareek, Member
7. Professor Babu Thaliath, Member
8. Professor Sangeeta Bansal , Member
9. Professor Pradip Kumar Das, Member
10. Dr. Sushil Kumar Jha, Member
11. Dr. Madhav Govind, Member
12. Dr. Abha Yadav, Member
13. Professor Vaishna Narang, Member
14. Professor Amita Singh, Member Secretary

The committee resolved to

[ ] Approve - indicating that the proposal is approved as submitted;
[✓] Approve – after clarifications – indicating that the proposal is approved if the clarifications Requested are provided to the satisfaction of designated committee members;
[ ] Approve after amendment/s – indicating that the proposal is approved subject to the incorporation of the specified amendments verified by designated committee members;
[ ] Defer – indicating that the proposal is not approved as submitted but it can be reassessed after revision to address the specified reason/s for deferment;
[ ] Disapprove – indicating that the proposal is not approved for the reason specified.

Comments:

Member Secretary,
IERB, Ethics Committee

Date of Approval: 12-09-2015
*(1st part to be filled in by PI and presented at the time of Review (Periodic, Continuing, Interim)).

Annexure 7. Variables and definitions.

The variables used in the study included:

Variable	Classification/definition/codes	Type
Family related		
Religion	0=Others; 1=Hindu	Independent
Caste	0=Others; 1=SC/ST/OBC	Independent
Socio-economic status	0=APL; 1=BPL	Independent
Type of family	0=Joint/three-generation; 1=Nuclear	Independent
Family size	0=>5; 1=≤5	Independent
Education of father	0=Schooled; 1=Non-schooled	Independent
Age of mother (at baseline) (years)	0=≥25 years; 1=<25 years	Independent
Education of mother	0=Schooled; 1=Non-schooled	Independent
Occupation of mother	0=Working; 1=Non-working	Independent
Environment where child lives	0=Living with mother; 1=Living without mother	Independent
Cooking-in-charge at home	0=Mother; 1=Others	Independent
Food support for the family	0=Absent; 1=Present	Independent
Nutritional support for the child, 3-5 years, from institutions	0=Occasionally/always; 1=Never	Independent
Socio-economic crisis in family	0=Absent; 1=Present	Independent
Type of house	0=Pukka house with electricity; 1=Others	Independent
Safely managed drinking water	0=Used; 1=Lacked	Independent
Safely managed kitchen/cooking	0=Used; 1=Lacked	Independent
Safely managed sanitation	0=Used; 1=Lacked	Independent
Mother related		
Age at marriage (years)	0=≥25 years; 1=<25 years	Independent

Variable	Classification/definition/codes	Type
Age when detected HIV infection (years)	0=<25 years; 1=≥25 years.	Independent
HIV clinical stage during study period	0=HIV clinical stage 1; 1=HIV clinical stage 2 or 3 or 4	Independent
Ever initiated on ART	0=No; 1=Yes	Independent
Age at start of ART (years)	0=≥25 years; 1=<25 years	Independent
Delay in starting ART after detecting HIV infection (days)	0=31+ days; 1=≤30 days	Independent
ART status during study period	0=On ART; 1=Not on ART	Independent
Pregnancy status during study period	0=Pregnant; 1=Not pregnant	Independent
Chronic disease ever	0=Absent; 1=Present	Independent
Acute disease ever during study period	0=Absent; 1=Present	Independent
Acute disease status during study period	0=Single morbidity; 1=Multiple morbidity	Independent
Composite morbidity indicator during study period	0=Not indicated; 1=Indicated	Independent
Vitamin deficiency ever during study period	0=Absent; 1=Present	Independent
Vitamin deficiency status during study period	0=1-6 deficiency signs/symptoms; 1=>6 deficiency sign/symptoms.	Independent
BMI status during study period	0=Normal and above; 1=Underweight	Independent
Anaemia ever during study period	0=Non-anaemic; 1=Anaemic	Independent
Anaemia status during study period	0=Mild anaemia; 1=Moderate/severe anaemia	Independent
Composite nutrition indicator during study period	0=Not indicated; 1=Indicated	Independent
Psychosocial status during study period	0=Without stress; 1=With stress.	Independent

Variable	Classification/definition/codes	Type
Composite 'sick mother' ever during study period	0=Mother not sick; 1=Mother sick.	Independent
Composite 'sick mother' status during study period	0=Mother sick by any one criteria; 1=Mother sick by any two or three criteria	Independent
Composite 'sick mother' status during study period-Pregnancy factor	0=Mother sick by criteria other than pregnancy; 1=Mother sick by pregnancy criteria in isolation or combination	Independent
Composite 'sick mother' status during study period-Morbidity factor	0=Mother sick by criteria other than morbidity; 1=Mother sick by morbidity criteria in isolation or combination	Independent
Composite 'sick mother' status during study period-Morbidity factor and combinations	0=Mother sick by morbidity criteria in isolation; 1=Mother sick by morbidity criteria in combination	Independent
Composite 'sick mother' status during study period-Nutrition factor and combinations	0=Mother sick by nutrition criteria in isolation; 1=Mother sick by nutrition criteria in combination	Independent
Pregnancy related		
ANC, TT, IFA status during pregnancy	0=Full ANC received; 1=No/Partial ANC received	Independent
ART/ARV given during pregnancy	0=ARV/ART given; 1=ARV/ART not given	Independent
Duration of ART/ARV given during pregnancy (days)	0=≤30 days; 1=>30 days	Independent
Place of delivery	0=Institutional; 1=Others	Independent

Variable	Classification/definition/codes	Type
Type of delivery	0=Caesarean; 1=Normal/vaginal	Independent
CD4 count closest to the date of delivery	0=≥500; 1=<500	Independent
Any complications during pregnancy or delivery or after delivery	0=Absent; 1=Present	Independent
Any drug history during pregnancy or after delivery	0=Absent; 1=Present	Independent
Breastfeeding for child	0=Not breastfed; 1=Breastfed.	Independent
Breastfeeding duration for child	0=<29 weeks; 1=≥29 weeks	Independent
Exclusive breastfeeding	0=Not exclusively breastfed/breastfeeding not initiated; 1=Exclusively breastfed for ≥1 day	Independent
Duration of exclusive breastfeeding (Or for those who started weaning and who were not breastfed, age at other feeds)	0=≥29 weeks; 1=<29 weeks	Independent
Mixed feeding	0=Not mixed fed; 1=Mixed fed.	Independent
Duration of mixed feeding	0=≤2 weeks; 1=>2 weeks	Independent
Mixed feeding among currently mix-fed children	0=Not mixed fed; 1=Mixed fed.	Independent
Duration of mixed feeding among currently mix-fed children	0=≤2 weeks; 1=>2 weeks	Independent
Whether weaned at ≤6 months and within two weeks?	0=No; 1=Yes	Independent
Food with minimum dietary diversity for age 6-24 months	0=Ensured every time; 1=Not ensured every time	Independent
Food for minimum frequency for age 6-24 months	0=Ensured every time; 1=Not ensured every time	Independent

Variable	Classification/definition/codes	Type
Minimum acceptable food for age 6-24 months	0=Ensured every time; 1=Not ensured every time	Independent
ART or ARV given during breastfeeding	0=Breastfeeding partially/not covered with ARV/ART; 1=Breastfeeding fully covered with ARV/ART	Independent
Maternal PPTCT strategies adopted	0=At least one undertaken; 1=None undertaken	Independent
Coverage of the three maternal PPTCT strategies for the pregnancy (by group)	0=Any two or more undertaken; 1=Any one undertaken	Independent
Coverage of the three maternal PPTCT strategies for the pregnancy-ARV/ART factor	0=Strategies other than ARV/ART undertaken; 1= Strategies involving ARV/ART undertaken	Independent
Coverage of the three maternal PPTCT strategies for the pregnancy-ARV/ART factor and combinations	0=ARV/ART strategy undertaken in combination; 1=ARV/ART strategy undertaken in isolation	Independent
Coverage of the three maternal PPTCT strategies for the pregnancy-Breastfeeding factor	0=Strategies other than 'safe' breastfeeding undertaken; 1= Strategies involving 'safe' breastfeeding undertaken	Independent
Child related		
Age at baseline (months)	0=≥12 months; 1=<12 months	Independent
Gender	0=Female; 1=Male	Independent
Birth weight (kg)	0=≥2.5 kg; 1=<2.5 kg	Independent
HIV status ever during the study	0=Negative; 1=Positive	Outcome
HIV clinical stage during study period	0=HIV clinical stage 1; 1=HIV clinical stage 2	Independent

Variable	Classification/definition/codes	Type
Ever started on ART?	0=Yes; 1=No	Independent
Delay in starting ART after detecting HIV infection (days)	0=≥90 days; 1=<90 days	Independent
Percentage duration of total life on ART (longest period) during study period	0=≥50%; 1=<50%	Independent
Delay/non-achievement of milestones of language development	0=Absent; 1=Present	Independent
Coverage of any immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Coverage of OPV immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Coverage of Hepatitis B immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Coverage of DPT immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Coverage of Measles immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Coverage of MMR immunization	0=Immunized for age; 1=Under-immunized for age	Independent
Percentage coverage of any Vitamin-A supplementation for age	0=100%; 1=<100%	Independent
Acute morbidity	0=Absent; 1=Present	Outcome
Status of burden of acute morbidity (No. of acute disease reported per month of follow-up during study period)	0=<0.5 morbidity per month; 1=≥0.5 morbidity per month	Outcome
Whether attending school/ anganwadi during study period	0=Yes; 1=No	Independent

Variable	Classification/definition/codes	Type
Sickness absenteeism in school/ anganwadi institutions during study period	0=Absent; 1=Present	Independent
History of CPT ever	0=Absent; 1=Present	Independent
Ever HFA z-score ≤-2SD	0=No; 1=Yes	Outcome
Ever WFA z-score ≤-2SD	0=No; 1=Yes	Outcome
Ever HCFA z-score ≤-2SD	0=No; 1=Yes	Outcome
Ever MUACFA z-score ≤-2SD	0=No; 1=Yes	Outcome
Ever any anthropometric measurement <-2SD?	0=No; 1=Yes	Independent
Vitamin/mineral deficiency	0=Absent; 1=Present	Independent
Status of burden of vitamin/mineral deficiency (Maximum deficiencies identified ever during study period)	0=1-6 deficiency sign/symptoms; 1=>6 deficiency sign/symptoms	Independent
Status of persistence of Vitamin/mineral deficiency during the study period (Proportion of deficiency-reporting visits during study period) (%)	0=<50%; 1=≥50%	Independent
Status of vitamin A deficiency during study period	0=Absent; 1=Present	Independent
Anaemia ever during study period	0=Non-anaemic; 1=Anaemic	Outcome
Anaemia status during study period	0=Mild anaemia; 1=Moderate/severe anaemia	Independent
Death during cohort study period	0=Absent; 1=Present	Outcome

The variables deduced from multiple data fields included:

a. The socio-economic status: The source data were pooled from the baseline and the end line responses in the Form G2, Section C, Questions 4-7, 9 and 10, and classified into in the graver (disadvantaged) group. A family was classified as:

- Above Poverty Line (APL), if:
  - it possessed an APL ration card (from the public distribution system)[118], OR
  - any of the family members were reported as paying the income tax[118], OR
  - the reported per-month per capita income of family was >Rs. 975 in the rural area or Rs. 1373 in the urban area[119] AND the reported land holding was >3 hectares[118].
- Below Poverty Line (BPL), if:
  - it possessed a BPL ration card[118], OR
  - it received Anna bhagya/Anthyodaya Anna Yojana benefits[118] even if it possessed no ration card, OR
  - the reported land holding was less than 3 hectare or nil land ownership[118], OR
  - the reported per-day per capita income of family was <Rs. 975 in the rural area or Rs. 1373 in the urban area[119].

b. Food support for the family: The source data were pooled from the baseline and the end line responses in the Form G2, Section C, Questions 8, 11.f. and 11.s., and classified into in the graver (disadvantaged) group. This was regarded as:

- 'present', if the food was made available for the family from either the public distribution system OR any other sources, and
- 'absent', if no source provided a food support for the family.

c. Nutritional support for the child of age 3-5 years from institutions: The source data were pooled from the Form C, Section K, Questions 1 and 4. In every episode of data collection, it was asked that whether the child, if aged 3 years or more, was attending any institutions like anganwadi and availing any nutritional services from there. The variable responses were classified as:

- 'always', if it were reported as 'yes' during the visits to the child;
- 'never', if it were reported as 'no' during all the visits to the child; and,

- ‘occasionally’, if it were reported as ‘yes’ and ‘no’ in different visits to the same child.

d. Socio-economic crisis in the family: The source data were pooled from the baseline and the end line responses in the Form G2, Section C, Questions 12-14.a., and in the Form M1, Section I, Questions 17-23. There were nine closed-ended questions (viz. ‘Ever did the breadwinner in the family lose a job in the last one year’, ‘Ever was the family indebted to a bank/money lender in the last one year’, ‘Did the house owner throw the mother family out of their rented house’, ‘Did the employer refuse to offer the mother job / work as before’, ‘Did the family members throw the mother out of the family and house’, ‘Did the family members abandon the mother and leave the mother home alone’, ‘Did the whole family migrate to avoid public insult’, ‘Did the mother face any violence from any one’, and ‘Did the mother or any family member have any legal issues’), asked to the mother/respondent; in addition, the questions were also asked about the approximate health care expenditure on the family members. As such, the socio-economic crisis was considered as:

- ‘present’ in the family, if reported ‘yes’ for any of the nine closed-ended questions, OR if the health care expenditure of the family was catastrophic[120] during any episode of data collection in that family[11]; and,
- ‘absent’ in the family, if reported ‘no’ for all of the nine closed-ended questions, AND if the health care expenditure of the family was non-catastrophic[120] in all the episodes of data collection.

[11] The catastrophic health care expenditure was actually defined as ≥10% of the total household expenditure in the reference, but adapted here as ≥10% of the household income, for want of figures. It was logically assumed that expenditure would be less than income, for the economic stability of the family; as such the household expenditure equals a maximum of total household income. As such, a 10% share of household income would be much more than a similar share of household expenditure, and hence the adapted definition of the catastrophic health expenditure used here could be justified.

e. Safely managed drinking water, sanitation and cooking in the households: The source data were pooled from the baseline and the end line responses in the Form G2, Section D, Questions 1, 3-6, 8, 13 and 14, classified into in the graver (disadvantaged) group. The WASH monitoring criteria[121,122] was adapted for the first two (drinking water and sanitation), while the last (cooking) was an operational definition adopted in the study. All these indicators were classified as 'used' and 'lacked'.

A family was considered as 'using safely managed drinking water', if:

- the source of water was piped water OR water tanker OR deep well OR shallow well OR Shudhganga outlets; AND,
- the source of water was available at home or was available within a distance of less than 300 metres; AND,
- the water was available every time when needed so that it was not stored or stored in closed vessels/tanks; AND,
- water disinfection was attempted in the household by any reliable mechanism (filtering, chlorine, potassium permanganate, boiling etc.),

every time when the data was collected. If the above criteria was not satisfied, any time, it was considered as 'lacking safely managed drinking water'.

A family was considered as 'using safely managed sanitation', if:

- there was a latrine with a septic tank/aqua privy or a pit latrine at home; AND,
- everyone in the family used the latrine,

every time when the data was collected. If the above criteria was not satisfied, any time, it was considered as 'lacking safely managed sanitation'.

A family was considered as 'using safely kitchen/cooking', if:

- the kitchen was inside the house in a separate room; AND,
- there was a smoke outlet in the kitchen,

every time when the data was collected. If the above criteria was not satisfied, any time, it was considered as 'lacking safely managed cooking'.

f. Vitamin/mineral deficiency: The source data were pooled from the baseline and the end line responses in the Form M1, Section F, Questions 1-54, and from the baseline, follow-up and end line responses in the Form C, Section I, Questions 1-60. There were a list of 54 deficiency signs/symptoms elicited for the mothers, and 60 for the children. All these deficiency signs and symptoms, if present, were attributed to the 15 vitamins/minerals considered, as in the table below.

Vitamin/Mineral	Signs/Symptoms
Vitamin A	1,3,6,8,16,48
Vitamin B1 (Thiamine)	7,26,27,28,31,32,33,35,36,38,39,40,42,43,46
Vitamin B2 (Riboflavin)	2,12,13,14,17,43
Vitamin B3 (Niacin)	10,12,16,17,23,25,28,29,30,31,32,33,34,39,42,46
Vitamin B6 (Pyridoxine)	2,10,12,14,16,17,24,30,32,35,36,40,43
Vitamin B7 (Biotin)	16,17,22,23,24,25,26,30,32,33,34,35,43
Vitamin B9 (Folate)	10,12,13,25,28,30,31,32,33,34,35,37,38,39,40,42,43, 49 (in mothers only)
Vitamin B12 (Cobalamin)	7,12,13,19,24,25,28,29,30,31,32,33,34,35,36,37,39,41,42,43,44
Vitamin C	1,11,15,16,17,18,21,25,30,31,40,46,47,52
Vitamin D	1,2,5,15,19,24,25,26,29,30,35,36,39,45,49 (in mothers only), 51,52,53,54,59,60
Vitamin E	5,7,16,19,24,25,36,39,43,48,52
Vitamin K	9,18,21,51
Zinc	38
Iron	43,44
Calcium	54

1=Dry eyes, 2=Red eyes (corneal vascularization), 3=Night blindness, 4=Cannot look into light (Photophobia), 5=Unclear vision, 6=Color blindness, 7=Limited eye movement (Ocular paralysis), 8=White patches in eye (Bitot's spots), 9=Bleeding from nose, 10=Mouth ulcers, 11=Bleeding gums, 12=Red tongue/ Glossitis, 13=White coating on tongue (Sore tongue), 14=Scaly angles of mouth, eyes (Angular Cheilitis), 15=Premature teeth fall-out, 16=Rough dry scaly/ cracked skin, 17=Skin infection / Dermatitis, 18=Bleeding below skin, 19=Dark or light discoloration of skin, 20=Flaky paint dermatosis, 21=Easy bleeding from wounds, 22=Dry brittle hair/ nails, 23=Hair loss/alopecia, 24=Premature grey hair, 25=Excessive muscle weakness, 26=Muscle cramps, 27=Muscle wasting (muscle loss), 28=Feeling of heart beat / Palpitation, 29=Sleeplessness / Insomnia, 30=Depression, 31=Irritability, 32=Confusions/ Disorientation, 33=Forgetfulness/ Dementia, 34=Mood disorder, 35=Shooting/burning pain in feet, 36=Numbness/ Tingling in limbs, 37=Headache, 38=Loss of taste/ smell/appetite, 39=Loss of balance/ Movement disorder (Cannot walk in a straight line/Falling on walking), 40=Fits/Seizures, 41=Constipation (no regular daily toilet), 42=Diarrhea, 43=Anaemia/Pallor, 44=Cyanosis (Blue color of skin), 45=Asthma, 46=Ankle edema/ Swelling of feet, 47=Delayed wound healing, 48=Frequent infections, 49=Pinched face (Old monkey appearance), 50="Moon face" appearance, 51=Skeletal deformities (bones not in right shape), 52=Painful joints, 53=Costochondral swelling (Swollen chest), 54=Brittle bones / Frequent fractures, 55=Thin / Lanugo hair, 56=Loose skin folds (over buttock/axilla), 57=Distended abdomen, 58=Growth retardation, 59=Soft skull, 60=Knock knees.

Thus, there were more than one sign/symptom possible for one vitamin/mineral. It could also be possible that one specified deficiency sign/symptom could indicate more than one deficient vitamin/mineral. Hence, as there were 54 (60 for children) signs/symptoms and 15 vitamins/minerals considered, a minimum average of 3 signs/symptoms could indicate one vitamin/mineral deficiency. The responses were classified as 'vitamin/mineral deficiency absent', '1-6 vitamins/mineral deficiencies present', and '>6 vitamins/mineral deficiencies present'. The response '1-6 vitamin/mineral deficiency signs/symptoms present' implied 1-2 deficient vitamins/minerals, and '>6 vitamins/mineral deficiency

signs/symptoms present' implied >2 deficient vitamins/minerals; as such, the vitamin/mineral deficiency magnitude was arbitrarily measured based on this assumed rule of thumb. The mother data was elicited twice (the baseline and the end line), while the child data was elicited continuously through the follow-up data collection in addition; as such, the mothers and the children were classified into in the graver (disadvantaged) group, based on the findings ever.

In addition, for the children, the number of schedules of the data collection when a vitamin/mineral deficiency was reported were totaled, divided by the total number of data collections made for the child, to arrive at the percentage of visits (data collection schedules) which identified a vitamin/mineral deficiency. This was used as a proxy variable to study the persistence of the deficiency signs and symptoms in the children. As the maximum interval between two data collections among children was 2 months, this could be justifiable to be employed upon 6 assessments a year. Based on the percentage obtained, the variable was made categorical by classifying it into <50 and $\geq$50%.

g. Body Mass Index (BMI) of the mother: The source data were pooled from the baseline and the end line responses in the Form M1, Section J, Questions 1 and 2, and classified into in the graver (disadvantaged) group. The index was calculated as [(Weight in kilogram)/(Height in metre)^2] for the mothers. Values <18.5 were considered as 'underweight'; 18.5 to <25 as 'normal/adequate'; and $\geq$25 as 'overweight'.

h. Anaemia status by haemoglobin measurement: The source data were pooled from the baseline and the end line responses in the Form M1, Section J, Question 3, and from the baseline, follow-up and end line responses in the Form C, Section J, Question 5, and classified into in the graver (disadvantaged) group. Mothers and children were classified as 'non-anaemic', and with 'mild anaemia', 'moderate anaemia', and 'severe anaemia', based on the table below[122]. As there were more than one measurement for the child, a variable 'ever anemic' was created, to represent anaemia any time during the study.

Category	Non anaemia	Mild anaemia	Moderate anaemia	Severe anaemia
Children, 6-59 months	≥11.0	10.0-10.9	7.0-9.9	<7.0
Children 5-11 years	≥11.5	11.0-11.4	8.0-10.9	<8.0
Women, Non-pregnant	≥12.0	11.0-11.9	8.0-10.9	<8.0
Women, Pregnant	≥11.0	10.0-10.9	7.0-9.9	<7.0

i. Psychosocial status of the mother: The source data were pooled from the baseline and the end line responses in the Form M1, Section I, Question 1.i.-16.ii, and 17-23. These included 8 questions each to elicit the positive and negative relations with family members/relatives and others. In addition, there were 7 queries on the critical negative family situations. A simple weighted relative psychosocial status score was obtained by using the formula:

$S_{ps} = [(S_{pf}) + (S_{po}) + (S_{nf}) + (S_{no}) + (S_{cnf})]$, where,

- S_{ps} = Total psychosocial score;
- S_{pf} = Score of positive relations with family members/relatives; that is, the sum of the response 'Yes' in this section weighted (multiplied by) 2;
- S_{po} = Score of positive relations with others; that is, the sum of the response 'Yes' in this section weighted (multiplied by) 1;
- S_{nf} = Score of negative relations with family members/relatives; that is, the sum of the response 'Yes' in this section weighted (multiplied by) -2 ('MINUS TWO');
- S_{no} = Score of negative relations with others; that is, the sum of the response 'Yes' in this section weighted (multiplied by) -1 ('MINUS ONE'); and,
- S_{cnf} = Score of critical negative family situations; that is, the sum of the response 'Yes' in this section weighted (multiplied by) -3 ('MINUS THREE').

Based on the scores obtained, the psychosocial status was classified relatively as:

- 'distressed', if (a) S_{pf} was ≤8, OR (b) S_{po} was ≤4, OR (c) S_{nf} was <-9 ('MINUS NINE'), OR (d) S_{no} was <-5 ('MINUS FIVE'), OR (e) S_{cnf} was <0, OR (f) the total psychosocial score obtained was ≤12 [that is, ≤50% of total score for each component or the total of the psychosocial score];
- 'stressed', if the total psychosocial score obtained was between 13 and 20; and,

- ‘not stressed’, if the total psychosocial score obtained was between 21 and 24.

j. Composite indicator of ‘sickness’ of mothers: Based on the morbidity, nutrition and pregnancy and psychosocial status of the mothers, a composite indicator was constructed to identify ‘sickness’ among mothers, which would in turn influence the health of the child they took care of. The composite indicator of sickness of mothers were defined and classified as ‘sickness indicated’, if the HIV-infected mothers:

- Had presented with a composite morbidity indicator of sickness (that is, they had at least one chronic OR two acute morbidity), OR
- Had presented with a composite nutrition indicator of sickness (that is, they had (a) the signs/symptoms suggestive of at least two different vitamin/mineral deficiencies (other than iron), AND (b) a BMI <18.5, AND (c) a Hb value <12.0 g/dl.), OR
- Were pregnant, OR
- Had psychosocial distress,

anytime during the study period. If none of the above criteria was satisfied all throughout the study period, the composite indicator of sickness of mothers were classified as ‘sickness not indicated’.

This composite indicator had been stratified for analyzing the importance of each factor among others, and its importance in isolation and combination.

k. Antenatal care for mothers during pregnancy: The source data were pooled from the baseline and the end line responses in the Form M1, Section B, Questions 2-5, and were classified into in the graver (disadvantaged) group. The antenatal care during pregnancy was classified as:

- ‘full antenatal care received’, if the pregnancy was registered, AND the one/two (as per the national Universal Immunization Program recommendations) Tetanus Toxoid (TT) immunization doses AND Iron and Folic Acid (IFA) tablets were received by the mother when pregnant with the child included in the study;

- ‘nil antenatal care received’, if the pregnancy was not registered, AND no TT AND IFA were received by the mother; and,
- ‘partial antenatal care received’, if the mother reported mixed responses ‘registered but not received TT/IFA’, OR ‘received only TT’, OR ‘received only IFA’.

l. Provision of ARV/ART to the mother: Universally, prophylaxis was intended to prevent transmission. In case of the HIV infection, the mothers were given the ARV to prevent the MTCT of the HIV infection. The ARV with sdNVP had been replaced with lifelong ARV/ART between 2011 and 2017 in a phased manner. This placed two tablets (NVP, and combination of drugs Tenofovir (TDF), Lamivudine (3TC) and Efavirenz (EFV); the latter was commonly known as ‘TLE’ in the NACP program cadres), five drugs and 4 regimens (sdNVP, long term NVP, triple-drug ARV during pregnancy and lactation, and triple-drug lifelong ARV; the last one made ARV equivalent to ART) in the community. Superimposed on this were the interpretation differences of the protocol (by the health care staff), when triple-drug ARV was given during pregnancy and lactation; some pregnant mothers were not given the ARV if they had not opted for breastfeeding their child, some pregnant mothers were given for just six months despite their children were breastfed for >6 months, and some pregnant mothers were given the ARV till they stopped breastfeeding at 2+ years of the child. The issue was further complicated in real-time field, when Co-trimoxazole Prophylactic Therapy (CPT) were included in the protocol from 6 weeks’ age of the child. The adherence to all these regimens, and the provision of drugs only to either of the mother or the baby, etc. further complicated the implementation of these regimens in the field.

ART was primarily intended for the benefits (ensuring low viral count and higher immunity, prolonging life years etc.) for the recipient of the drug. There were about 7 different ART regimens[12] (as enlisted on patient record forms at ART centres) given to the

[12] The drug regimens were AZT+3TC+NVP (or ‘ZLN’), d4T+3TC+NVP (or ‘SLN’), AZT+3TC+EFV (or ‘ZLE’), d4T+3TC+EFV (or ‘SLE’), TDF+3TC+NVP (or ‘TLN’), TDF+3TC+EFV (or ‘TLE’), and Long term / Extended NVP (where ‘AZT’ was the drug

mothers in different years from 2004 to 2017, of which some where replaced (temporarily or permanently) with others during the pregnancy in lieu of toxicity, especially in the earlier years. In the earlier years, the initiation on ART was based on the lower CD4 counts (meaning higher immune deficiency of PLHIV), and the threshold of the CD4 counts were raised in a phased manner from 150 to 350 to 500 over the years, till 2017, thereby including more and more people on the ART. In 2017, anybody who tested as HIV-infected were initiated on the ART irrespective of the CD4 counts. 'TLE' was the commonest drug used in the ART centres for treatment in 2016-2017.

Against this background, it could be seen that, while more number of people were initiated on the ART, and the pregnant women on ARV, the regimen changed from 'predominantly-NVP-based' to 'TLE' based. Also, from 2014, after starting the long-term triple-drug ARV with 'TLE' for the pregnant women, sometimes it was converted to ART subsequently, and continued for life, based on the CD4 count. Moreover, there were mothers already on the ART becoming pregnant, but not to receive ARV additionally. And ultimately, irrespective of the objective of the administration (prophylaxis or treatment) of drugs, 'TLE' was given lifelong for all (including pregnant mothers); a convergence in the drugs and regimen, and of the methods adopted for prophylaxis and treatment. So, the concepts of ARV prophylaxis and ART (treatment) had converged, with the same drugs used lifelong. As such, in this study, the differentiation was not made between ARV and ART; both were seen as 'drugs to the mother', with some 'benefit for both mother and/or child'. In fact, ART for the mother, which claimed to ensure better quality and longer years of life for PLHIV, in its good sense, could be deemed as a 'social prophylaxis' to ensure that the mothers remained 'alive and healthy' to provide care for the child.

m. Coverage of PPTCT strategies: The two main stays of the PPTCT program were 'providing ARV' to the mother and child, and facilitating informed decision making on breastfeeding. As discussed above, if the mother had received the (full) ARV as per the

'Zidovudine', '3TC' was 'Lamivudine', 'NVP' was 'Nevirapine', 'd4T' was 'Stavudine', 'EFV' was 'Efavirenz', and 'TDF' was 'Tenofovir').

then-prevailing protocol OR if the mother was on ART during pregnancy, the first strategy of PPTCT was considered as undertaken, in this research study. However:

- if the mother opted out of breastfeeding, OR
- if breastfeeding duration was fully covered by ARV/ART to the mother and child as per protocol AND if the breastfeeding was stopped completely at (if the child had reached the age of) 6 months without mixed feeding >2 weeks,

the second strategy was considered as undertaken.

However, from the experience of the researcher with the Belgaum district health care facilities, it was identified that the elective caesarean section was commonly employed for the delivery of all the pregnant HIV positive women in the private HCFs and of the primi pregnant HIV positive women in the government HCFs in Belgaum district, despite that it was not a recommended strategy. In fact, a randomized trial in 1999 had identified a 50% reduction in the MTCT through elective Caesarean sections[124]. So, the Caesarean sections were promoted as a means to curb MTCT, until 2018, when the WHO refuted the claims of this study, and categorically declared a 'no' to the Caesarean sections for PMTCT[125]. However, as the study included the pregnant women delivering in the private HCFs, and as the Caesarean section was followed as a near-strategy, this had been duly included in this variable as the third strategy.

As such, the responses in this variable had been categorized as 'all the three strategies undertaken', 'any two undertaken', 'any one undertaken' and 'none undertaken'. The variable had also been analyzed differentially by the strategies undertaken in isolation and combination.

n. Percentage duration of the total and known-positive life of the child on ART: Even though ART was well tolerated as per the HIV program data, introduction of the drugs into the body of the child triggered adverse effects initially, which usually eventually got stabilized. This variable had been created by dividing the time duration for which the HIV-infected child was on ART either by the age of the child (for per cent total life), or by the difference between the age of the child and age at which the child tested as HIV-infected

(for per cent known-positive life), as on the date of closure of the study or censoring. The responses were classified as <50% and ≥50% (for total life), and as <80% and ≥80% (for known positive life) to analyze its effect on the outcome variables.

o. Status of ensuring minimum diversity, frequency and acceptability of infant feeds: The quality and quantity of feeds for children of age 6 months to 2 years were analysed using the IYCF guidelines[126] for diversity, frequency and acceptability. The cut-off of 50% were assumed as standards for each of these. The data was collected every time a child less than 2 years were visited. As such, each child's feeds on the previous day would get assessed multiple times. So, for the interpretation of results in a cohort study, the IYCF guidelines were adapted to include the time dimension. The factors (diversity, frequency and acceptability) would be assessed for the data collected each time, and then subsequently, for each child it would be cumulatively classified as:

- 'ensured every time', if the factor was ensured every time the data was collected on the child's feeds, OR
- 'unmet occasionally', if the factor was ensured in ≥50% of the episodes of data collection on the child's feeds, OR
- 'unmet most of the times', if the factor was ensured in <50% of the episodes of data collection on the child's feeds, OR
- 'unmet every time', if the factor was not ensured every time the data was collected on the child's feeds.

p. Mixed feeding of infants: One of the ways of MTCT was through the breast milk. According to UNICEF, it carried 20% additional risk of MTCT, if the child was breastfed for 2 years[127], over and above the 35% risk of in utero transmission. However, breastfeeding brought the advantages of immunity, health benefits and survival to the HIV-exposed children. Mixed feeding implied the feeding of foods other than the breast milk along with the breast milk. In the first six months of life, the practice of mixed feeding could result in the micro-damages of the intestinal epithelium, and hence higher transmission of HIV virus from breast milk to the infant. Mixed feeding was reported to have 3-4 higher risk of transmission of HIV infection from the mother to the child through

breast milk, compared to exclusive breastfeeding[127]. As such, in case of the HIV-exposed infants, the guideline instructed to exclusively breastfeed the child till 6 months of age and then quickly wean to other feeds within 2 weeks of time (unless otherwise the parent make an informed decision on withholding breastfeeding and switch to exclusive top feeding from the first day of the child's life). This implied limiting the mixed feeding to maximum of 2 weeks for the purpose of weaning. Hence, the cut-offs for studying the duration of mixed feeding in this study were adopted as '0 days' (or nil mixed feeding), ≤2 weeks (justifiable for weaning) and >2 weeks of mixed feeding. This variable had been analyzed separately for all the children in (and those 6 month-to-2 year children on mixed feeding during the course of) the study.

q. Growth and physical/social/language development of children: In the tool for children, the screening criteria was adopted from Trivandrum Development Screening Chart (TDSC)[128]. However, to be used for assessment in this cohort study, it was further adapted using a scoring system, as follows:

- First, the 31 milestones (criteria) used in the tool had been classified as 'critical' and 'non-critical'. As such, the five critical milestones of physical growth and development of children were identified as 'rolls from back to stomach', 'raises self to sitting position', 'stand up by furniture', 'walks with help' and 'walks alone'[129]. The rest of the milestones were considered 'non-critical'.
- Next, the maximum possible (threshold) score for all and 'critical' milestones for various ages of 0-5 year children were identified as in tables below, attributing the score '1' for each attainable milestone for the age of the child.
- During each visit, a score '1' was allotted to each (critical and non-critical) milestone achieved for the age of the child. This was totaled up after the last visit to generate a cumulative total growth and development score, for all and critical milestones separately.
- After the last visit:
    - a percent cumulative growth and development score for all the milestones was calculated as: (Total cumulative growth and development score

achieved among all the milestones for that child's age*100)/Total threshold score for all the milestones for that child's age); AND

- a percent cumulative growth and development score for the critical milestones was calculated as: (Total cumulative growth and development score achieved among the critical milestones for that child's age*100)/Total threshold score for the critical milestones for that child's age).

Child's age in months	Threshold score for all growth and development milestones	Child's age in months	Threshold score for all growth and development milestones
<2	0	19.5-<24.5	15
2-<3	1	24.5-<25	17
3-<3.5	2	25-<27	18
3.5-<4.5	3	27-<29	19
4.5-<5.5	4	29-<30	20
5.5-<7	5	30-<31	21
7-<11	6	31-<32	22
11-<12.5	9	32-<33	23
12.5-<13	10	33-<35	24
13-<16.5	11	35-<36	25
16.5-<17.5	12	36-<48	27
17.5-<19	13	≥ 48	31
19-<19.5	14		

Child's age in months	Threshold score for critical growth and development milestones
<5	0
5-<11.5	1
11.5-<13.5	3
13.5-<18	4
≥18	5

Based on this, the developmental delay was defined as 'present' if: (a) a percent cumulative growth and development score for critical milestones was <100%, OR (b) a percent cumulative growth and development score for all milestones was <75%.

In the tool for assessing the language development, the screening criteria was adopted from the Language Evaluation Scale Trivandrum (LEST)[130,131]. However, to be used for assessment in this cohort study, it was further adapted using a scoring system. A maximum possible (threshold) score for the age of the child for all the milestones was determined as in table below.

Child's age in months	Threshold score for all language development milestones	Child's age in months	Threshold score for all language development milestones
<1.5	0	21-<22	17
1.5-<3	1	22-<24	18
3-<5	2	24-<25	20
5-<6	3	25-<27	21
6-<9	4	27-<27.5	22
9-<12	6	27.5-<29	23
12-<14	10	29-<30	24
14-<15	11	30-<33	25
15-<16	13	33-<48	27
16-<20	14	≥ 48	30
20-<21	15		

A score of '1' was attributed for each attained milestone for the age of the child, and totaled at the end of all the visits to generate a cumulative language development score. Subsequently, a single percent cumulative language development score was calculated as: (Total cumulative language development score achieved among all the milestones for that child's age*100)/Total threshold score for all the milestones for that child's age). Based on this, the developmental delay was defined as 'present', if the percent cumulative language development score for all milestones was <75%.

Annexure 8. Categorization of the acute morbidity groups based on the combination of morbidities.

Morbidity group	Individual acute morbidity				
Fever of Unknown Origin (FUO)	1				
Acute diarrhoeal diseases (ADD)	2	3	1,2	1,2,3	1,3
	2,3				
Acute Respiratory Infections (ARI)	4	5	6	7	12
	1,12	1,4	1,4,12	1,4,5	1,4,5,12
	1,4,5,6	1,5	1,5,12	1,5,6	1,6
	4,12	4,5	4,5,12	4,5,6	4,6
	5,12	5,6	5,7	6,7	
Skin/mucosa conditions	9	10	11	13	14
	1,11	1,13	1,15	1,9	1,9,13
	9,10	9,11	9,13		
Worm infestation	16	1,16			
ADD, Skin/mucosa conditions	1,2,10	1,2,14	1,2,9	1,3,9	2,14
	2,3,9,13	2,9			
ADD, ARI	1,2,12	1,2,3,4	1,2,3,4,5	1,2,3,4,5,6	1,2,3,5
	1,2,3,5,12	1,2,3,5,6	1,2,4	1,2,4,12	1,2,4,5
	1,2,5	1,3,12	1,3,4	1,3,4,5	1,3,4,5,7
	1,3,5	2,3,4	2,4	2,4,12	2,4,5
	2,5	3,4	3,4,5	3,5	
ADD, ARI, Skin/mucosa conditions	1,2,3,5,13,14	1,2,4,5,9	1,2,4,9	1,3,4,5,9	2,3,4,9
	2,4,9,10,12,13				

ARI, Skin/mucosa conditions	1,4,13	1,4,14	1,4,5, 11	1,4,5,9	1,4,9
	1,5,9	4,10	4,11	4,13	4,5,11
	4,5,13	4,5,9	4,5,9, 12	4,9	5,9
	5,9,10	9,12			
ARI, Worm infestation	1,4,5,16	1,5,16	4,16		
ARI, Others	1,4,5,18	4,18			
ARI, Skin/mucosa conditions, Worm infestation	1,4,5,9,10, 16	1,4,5,9, 16	4,10,16	4,5,9,16	4,9,16
Tuberculosis (TB)	8	1,8			
Skin/mucosa conditions, Worm infestation	14,16	9,16			
ADD, Worm infestation	2,16				
ARI, TB	4,5,8				
TB, Skin/mucosa conditions	8,13				
TB, Worm infestation	8,16				
Others	18				

1. Fever
2. Diarrhea/dysentery
3. Vomiting
4. Rhinitis/Running nose
5. Cough
6. Sore throat
7. Breathlessness
8. Hemoptysis / TB
9. Skin rashes/ abscess/ infection/scabies
10. Seborrhoeic dermatitis / capitis
11. Eye discharge
12. Ear discharge
13. Chicken pox
14. Mouth ulcers
15. Oral candidiasis
16. Worm infestation
17. Liver disease (specify)
18. Others (specify)

Annexure 9. Inclusion of the assessments of anthropometry, Hb and morbidity in the analysis of patterns.

Criteria	Measurement	Age at baseline (months)					
		0-11	12-23	24-35	36-47	48+	Total
HFA	Measured once	54	3	7	12	83	159
	Measured twice	80	27	27	127	0	261
	Measured thrice	76	77	81	0	0	234
	Not measured	0	0	0	1	0	1
	Measured sporadically once	2	0	1	0	0	3
	Measured sporadically twice	2	0	0	0	0	2
	Total	214	107	116	140	83	660
WFA	Measured once	52	3	7	12	83	157
	Measured twice	84	27	28	128	0	267
	Measured thrice	76	77	81	0	0	234
	Measured sporadically twice	2	0	0	0	0	2
	Total	214	107	116	140	83	660
HCFA	Measured once	56	98	0	0	0	154
	Measured twice	155	0	0	0	0	155
	Not measured	1	9	0	0	0	10
	Measured sporadically once	2	0	0	0	0	2
	Not applicable	0	0	116	140	83	339
	Total	214	107	116	140	83	660
MUACFA	Measured once	57	3	7	12	83	162
	Measured twice	79	27	28	128	0	262
	Measured thrice	74	77	81	0	0	232
	Not measured	1	0	0	0	0	1
	Measured sporadically once	2	0	0	0	0	2
	Measured sporadically twice	1	0	0	0	0	1
	Total	214	107	116	140	83	660

Criteria	Measurement	Age at baseline (months)					
		0-11	12-23	24-35	36-47	48+	Total
Anaemia	Measured once	52	3	7	12	83	157
	Measured twice	83	27	28	128	0	266
	Measured thrice	79	77	81	0	0	237
	Total	214	107	116	140	83	660
Morbidity	Measured once	61	7	15	74	75	232
	Measured twice	117	76	72	56	0	321
	Measured thrice	25	21	26	0	0	72
	Not measured	4	1	2	9	8	24
	Measured sporadically	7	2	1	1	0	11
	Total	214	107	116	140	83	660

Measured once, twice, thrice or sporadically: Included in analysis of gross patterns and patterns by various age cross-sections. Measured twice and thrice: Included in the analysis of trajectory of changes. Not measured and not applicable: Not included in any analysis.

Age group	Gender	HIV status	Outliers			
			HFA	WFA	HCFA	MUACFA
<12 months	Male	HIV+	3	0	0	0
		HIV-	25	8	6	1
	Female	HIV+	2	1	2	2
		HIV-	7	0	5	2
12-23 months	Male	HIV+	1	0	0	0
		HIV-	8	0	0	2
	Female	HIV+	6	1	1	0
		HIV-	8	0	7	1
24-35 months	Male	HIV+	2	0		0
		HIV-	7	2		6
	Female	HIV+	4	1		0

Age group	Gender	HIV status	Outliers			
			HFA	WFA	HCFA	MUACFA
		HIV-	3	0		0
36-47 months	Male	HIV+	0	1		0
		HIV-	1	2		5
	Female	HIV+	0	0		0
		HIV-	0	1		0
48+ months	Male	HIV+	0	0		0
		HIV-	2	2		0
	Female	HIV+	0	0		0
		HIV-	1	0		0

All values <-6SD were considered as outliers.

Annexure 10. Matrix of unique children by age, gender, HIV status and trajectory of health parameters.

1. Anaemia status.

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age			
Age	**Gender**	**HIV status**	**Total**	**Twice measured**	**Anaemia status**	**No. of children**	**No anaemia**	**Mild anaemia**	**Moderate anaemia**	**Severe anaemia**
<12 months	Male	HIV-EI	6	3	No anaemia	0	0	0	0	0
					Mild anaemia	1	0	1	0	0
					Moderate anaemia	2	0	0	2	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	116	78	No anaemia	15	4	6	5	0
					Mild anaemia	18	5	7	6	0
					Moderate anaemia	42	12	8	22	0
					Severe anaemia	3	1	0	1	1
	Female	HIV-EI	4	1	No anaemia	0	0	0	0	0
					Mild anaemia	0	0	0	0	0
					Moderate anaemia	1	0	0	1	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	88	60	No anaemia	13	8	4	1	0
					Mild anaemia	11	2	3	6	0
					Moderate anaemia	33	6	6	19	2
					Severe anaemia	3	0	1	2	0
12-23 months	Male	HIV-EI	4	4	No anaemia	1	0	0	1	0
					Mild anaemia	0	0	0	0	0
					Moderate anaemia	3	0	0	2	1
					Severe anaemia	0	0	0	0	0
		HIV-EU	45	41	No anaemia	11	3	7	1	0
					Mild anaemia	4	2	1	1	0
					Moderate anaemia	21	5	6	10	0
					Severe anaemia	5	1	2	2	0
	Female	HIV-EI	2	1	No anaemia	0	0	0	0	0
					Mild anaemia	0	0	0	0	0

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age			
Age	Gender	HIV status	Total	Twice measured	Anaemia status	No. of children	No anaemia	Mild anaemia	Moderate anaemia	Severe anaemia
					Moderate anaemia	1	0	1	0	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	56	51	No anaemia	7	3	2	2	0
					Mild anaemia	14	3	5	6	0
					Moderate anaemia	28	5	7	14	2
					Severe anaemia	2	0	0	2	0
24-35 months	Male	HIV-EI	3	3	No anaemia	0	0	0	0	0
					Mild anaemia	0	0	0	0	0
					Moderate anaemia	3	0	1	2	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	53	41	No anaemia	13	7	4	2	0
					Mild anaemia	11	4	4	3	0
					Moderate anaemia	16	6	3	6	1
					Severe anaemia	1	1	0	0	0
	Female	HIV-EI	2	1	No anaemia	0	0	0	0	0
					Mild anaemia	0	0	0	0	0
					Moderate anaemia	1	0	0	1	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	58	53	No anaemia	15	11	2	2	0
					Mild anaemia	14	4	6	4	0
					Moderate anaemia	21	5	5	11	0
					Severe anaemia	3	1	0	2	0
36-47 months	Male	HIV-EI	7	5	No anaemia	2	0	0	2	0
					Mild anaemia	0	0	0	0	0
					Moderate anaemia	2	0	0	2	0
					Severe anaemia	1	0	0	0	1
		HIV-EU	62	23	No anaemia	7	5	1	1	0
					Mild anaemia	10	1	8	1	0
					Moderate anaemia	5	1	2	2	0

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age			
Age	**Gender**	**HIV status**	**Total**	**Twice measured**	**Anaemia status**	**No. of children**	**No anaemia**	**Mild anaemia**	**Moderate anaemia**	**Severe anaemia**
					Severe anaemia	1	0	0	1	0
	Female	HIV-EI	4	2	No anaemia	0	0	0	0	0
					Mild anaemia	1	1	0	0	0
					Moderate anaemia	1	0	1	0	0
					Severe anaemia	0	0	0	0	0
		HIV-EU	67	26	No anaemia	15	8	4	3	0
					Mild anaemia	7	4	1	2	0
					Moderate anaemia	4	2	0	2	0
					Severe anaemia	0	0	0	0	0

2. Morbidity.

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age		
Age	**Gender**	**HIV status**	**Total**	**Twice assessed**	**Morbidity status**	**No. of children**	**No morbidity**	**Single morbidity**	**Multiple morbidity**
<12 months	Male	HIV-EI	6	5	No morbidity	1	0	0	1
					Single morbidity	2	1	0	1
					Multiple morbidity	2	0	1	1
		HIV-EU	116	88	No morbidity	33	13	9	11
					Single morbidity	16	7	4	5
					Multiple morbidity	39	11	11	17
	Female	HIV-EI	4	2	No morbidity	0	0	0	0
					Single morbidity	0	0	0	0
					Multiple morbidity	2	0	0	2
		HIV-EU	88	67	No morbidity	30	11	6	13
					Single morbidity	18	8	3	7
					Multiple morbidity	19	4	5	10
12-23 months	Male	HIV-EI	4	4	No morbidity	2	1	1	0
					Single morbidity	1	0	0	1
					Multiple morbidity	1	1	0	0

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age		
Age	Gender	HIV status	Total	Twice assessed	Morbidity status	No. of children	No morbidity	Single morbidity	Multiple morbidity
		HIV-EU	45	44	No morbidity	22	8	7	7
					Single morbidity	15	4	4	7
					Multiple morbidity	7	2	2	3
	Female	HIV-EI	2	2	No morbidity	2	1	1	0
					Single morbidity	0	0	0	0
					Multiple morbidity	0	0	0	0
		HIV-EU	56	54	No morbidity	18	7	4	7
					Single morbidity	23	3	11	9
					Multiple morbidity	13	3	4	6
24-35 months	Male	HIV-EI	3	3	No morbidity	1	0	1	0
					Single morbidity	1	0	1	0
					Multiple morbidity	1	1	0	0
		HIV-EU	53	47	No morbidity	22	10	6	6
					Single morbidity	17	0	5	12
					Multiple morbidity	8	1	4	3
	Female	HIV-EI	3	3	No morbidity	1	0	1	0
					Single morbidity	1	0	1	0
					Multiple morbidity	1	1	0	0
		HIV-EU	53	47	No morbidity	22	10	6	6
					Single morbidity	17	0	5	12
					Multiple morbidity	8	1	4	3
36-47 months	Male	HIV-EI	7	6	No morbidity	2	1	1	0
					Single morbidity	2	0	0	2
					Multiple morbidity	2	0	0	2
		HIV-EU	62	58	No morbidity	29	7	8	14
					Single morbidity	18	4	4	10
					Multiple morbidity	11	2	2	7
	Female	HIV-EI	4	4	No morbidity	2	0	2	0
					Single morbidity	2	1	0	1
					Multiple morbidity	0	0	0	0

Characteristics			No. of children		At baseline		No. of children in the subsequent 12-24 months of age		
Age	**Gender**	**HIV status**	**Total**	**Twice assessed**	**Morbidity status**	**No. of children**	**No morbidity**	**Single morbidity**	**Multiple morbidity**
		HIV-EU	67	60	No morbidity	25	7	7	11
					Single morbidity	23	4	8	11
					Multiple morbidity	12	3	6	3

Annexure 11. Covariates which were not found to be significant during binary logistic regression analysis.

Outcome variable 1: Whether the child ever had inadequate HFA?

Group of children		HFA-1		HFA-2.1		HFA-4	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General					91	0.068
	SC/ST/OBC					504	
Age of the mother	>25 years	407	0.136	355	0.388	387	0.122
	<25 years	222		203		208	
Socio-economic crisis in the family	Absent	395	0.146	353	0.147	373	0.178
	Present	234		205		222	
Mother ever initiated on ART	No	27	0.214	20	0.450	24	0.192
	Yes	602		538		571	
Anaemia in the mother	Absent					56	0.060
	Present					539	
Breastfeeding of the child (ever)	Absent	106	0.071	94	0.111	101	0.128
	Present	523		464		494	
Exclusive breastfeeding of the child (ever)	Absent (including breastfeeding-not-initiated)	112	0.988	98	0.118	107	0.134
	Present	517		460		488	
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	120	0.209	90	0.886	114	0.265
	Fully covered	509		468		481	
Gender of the child	Female	311	0.963	277	0.887	294	0.804
	Male	318		281		301	
HIV status of the child (ever)	Negative	595	0.188	533	0.113	565	0.191
	Positive	34		25		30	
Coverage of any immunization	Immunized for age	425	0.559	373	0.805	401	0.530
	Under-immunized for age	204		185		194	
Coverage of OPV immunization	Immunized for age	519	0.087	461	0.154		
	Under-immunized for age	110		97			

Group of children		HFA-1		HFA-2.1		HFA-4	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of Hepatitis B immunization	Immunized for age	564	0.467	497	0.219	533	0.588
	Under-immunized for age	65		61		62	
Coverage of DPT immunization	Immunized for age	521	0.702	463	0.228	493	0.855
	Under-immunized for age	108		95		102	

Group of children		HFA-5		HFA-6		HFA-8.2	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General			95	0.054		
	SC/ST/OBC			526			
Age of the mother	>25 years	333	0.635	402	0.137	290	0.079
	<25 years	190		219		185	
Socio-economic crisis in the family	Absent	334	0.584	390	0.064	295	0.254
	Present	189		231		180	
Mother ever initiated on ART	No	24	0.586	27	0.272	12	0.490
	Yes	499		594		463	
Breastfeeding of the child (ever)	Absent			106	0.968		
	Present			515			
Exclusive breastfeeding of the child (ever)	Absent (including breastfeeding-not-initiated)	6	0.810	111	0.908	75	0.474
	Present	517		510		400	
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	98	0.119	119	0.273	81	0.812
	Fully covered	425		502		394	
Gender of the child	Female	257	0.777	308	0.986	225	0.570
	Male	266		313		250	
HIV status of the child (ever)	Negative	489	0.184	588	0.231	444	0.489
	Positive	34		33		31	
Coverage of any immunization	Immunized for age	344	0.400	419	0.361	307	0.713
	Under-immunized for age	179		202		168	

Group of children		HFA-5		HFA-6		HFA-8.2	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of OPV immunization	Immunized for age			513	0.079	390	0.487
	Under-immunized for age			108		85	
Coverage of Hepatitis B immunization	Immunized for age	466	0.719	558	0.485	426	0.077
	Under-immunized for age	57		63		49	
Coverage of DPT immunization	Immunized for age	427	0.820	514	0.719	391	0.597
	Under-immunized for age	96		107		84	

Group of children		HFA-8.4	
Characteristics	**Attributes**	**N included**	**p-value**
Caste	General	5	0.999
	SC/ST/OBC	29	
Education of father	Schooled	17	1.000
	Non-schooled	17	
Age of the mother	>25 years	21	0.994
	<25 years	13	
Socio-economic crisis in the family	Absent	19	0.996
	Present	15	
Age of the mother at the marriage	>25 years	1	0.999
	<25 years	33	
Breastfeeding of the child (ever)	Absent	0	NA
	Present	34	
Exclusive breastfeeding of the child (ever)	Absent (including breastfeeding-not-initiated)	0	NA
	Present	34	
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	12	0.994
	Fully covered	22	
Age of the child at baseline	>12 months	24	1.000
	<12 months	10	
Gender of the child	Female	13	0.996

Group of children		HFA-8.4	
Characteristics	**Attributes**	**N included**	**p-value**
	Male	21	
HIV status of the child (ever)	Negative	0	NA
	Positive	34	
Delay in starting ART to the child after detecting HIV infection	>90 days	18	0.995
	<90 days	16	
Coverage of any immunization	Immunized for age	23	1.000
	Under-immunized for age	11	
Coverage of OPV immunization	Immunized for age	25	0.998
	Under-immunized for age	9	
Coverage of DPT immunization	Immunized for age	27	0.997
	Under-immunized for age	7	

Outcome variable 2: Whether the child ever had inadequate WFA?

Group of children		WFA-1		WFA-4		WFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Family size	>5	70	0.660	70	0.824	69	0.588
	≤5	511		495		506	
Safely managed sanitation	Used	93	0.197	93	0.425	92	0.139
	Lacked	488		472		483	
Acute morbidity among mothers	Absent			383	0.557		
	Present			182			
Vitamin deficiency among mothers	Absent			202	0.053		
	Present			363			
Composite nutrition indicator of sickness among mothers	Not indicated			415	0.911		
	Indicated			150			
Composite sickness indicator among mothers	Not indicated			264	0.313		
	Indicated			301			
Exclusive breastfeeding of the child (ever)	Absent (including breastfeeding-not-initiated)	106	0.413	103	0.585	106	0.415

Group of children		WFA-1		WFA-4		WFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
	Present	475		462		469	
Mixed feeding of the child (ever)	Absent					234	0.787
	Present					341	
Age of the child at baseline	≥12 months	400	0.149	387	0.123	398	0.103
	<12 months	181		178		177	
Gender of the child	Female	290	0.070	282	0.059	288	0.096
	Male	291		283		287	
HIV status of the child (ever)	Negative	551	0.358	536	0.580	546	0.256
	Positive	30		29		29	
Coverage of any immunization	Immunized for age	399	0.310	389	0.453	395	0.241
	Under-immunized for age	182		176		180	

Group of children		WFA-7.1		WFA-8.2	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**
Family size	>5	64	0.405	54	0.558
	≤5	464		383	
Education of father	Schooled			300	0.100
	Non-schooled			137	
Safely managed sanitation	Used	85	0.077		
	Lacked	443			
Breastfeeding of the child (ever)	Absent			66	0.999
	Present			371	
Exclusive breastfeeding of the child (ever)	Absent (including breastfeeding-not-initiated)	99	0.983	70	0.999
	Present	429		367	
Age of the child at baseline	≥12 months	400	0.149	284	0.565
	<12 months	128		153	
Gender of the child	Female			209	0.825
	Male			228	
HIV status of the child (ever)	Negative	501	0.105	410	0.345
	Positive	27		27	

Group of children		WFA-7.1		WFA-8.2	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**
Coverage of any immunization	Immunized for age	368	0.175	285	0.369
	Under-immunized for age	160		152	
Coverage of MMR immunization	Immunized for age	404	0.114		
	Under-immunized for age	124			
Anaemia status of the child (ever)	Mild anaemia			138	0.071
	Moderate/severe anaemia			299	

Outcome variable 3: Whether the child ever had inadequate HCFA?

Group of children		HCFA-1		HCFA-2.1		HCFA-3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Age of the mother	≥25 years	418	0.720	365	0.922	388	0.970
	<25 years	224		205		214	
Whether mother working?	Yes	210	0.503	176	0.569	185	0.971
	No	432		394		417	
Mother ever initiated on ART	No	29	0.456	21	0.655	0	NA
	Yes	613		549		602	
Delay in starting ART for the mother after detecting HIV infection	31+ days					334	0.424
	<30 days					268	
Antenatal care among mothers	Full ANC received	391	0.113	343	0.313	363	0.131
	No/Partial ANC received	251		227		239	
Place of delivery of mother	Health care facility	612	0.172	546	0.185	573	0.159
	Others	30		24		29	
Breastfeeding of the child (ever)	Absent	112	0.072	100	0.296	106	0.083
	Present	530		470		496	
Provision of ARV/ART to the mother during breastfeeding period	Partially/not covered	122	0.214	91	0.993	86	0.424
	Fully covered	520		479		516	
Gender of the child	Female	315	0.054	281	0.105	296	0.066
	Male	327		289		306	

Group of children		HCFA-1		HCFA-2.1		HCFA-3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
HIV status of the child (ever)	Negative	608	0.269	545	0.432	569	0.514
	Positive	34		25		33	
Coverage of any immunization	Immunized for age	430	0.272	377	0.415	399	0.280
	Under-immunized for age	212		193		203	
Coverage of OPV immunization	Immunized for age	524	0.451	465	0.986	489	0.515
	Under-immunized for age	118		105		113	
Coverage of Hepatitis B immunization	Immunized for age	572	0.840	504	0.527	533	0.824
	Under-immunized for age	70		66		69	
Coverage of DPT immunization	Immunized for age	527	0.292	468	0.772	493	0.318
	Under-immunized for age	115		102		109	
Anaemia in the child	Absent	155	0.106	135	0.139	136	0.127
	Present	487		435		466	
Death of the child during study	Absent	638	0.168	566	0.206	598	0.172
	Present	4		4		4	

Group of children		HCFA-4		HCFA-4.4		HCFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General			25	0.998		
	SC/ST/OBC			139			
Age of the mother	≥25 years	393	0.696	118	0.287	412	0.585
	<25 years	211		46		220	
Whether mother working?	Yes	199	0.466	57	0.837	206	0.844
	No	405		107		426	
Type of house	Pukka house with electricity			15	0.135		
	Others			149			
Mother ever initiated on ART	No	28	0.490	7	0.768	29	0.486
	Yes	576		157		603	

Group of children		HCFA-4		HCFA-4.4		HCFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
ART status of mother	On ART	501	0.827				
	Not on ART	103					
Composite sickness indicator among mothers	Not indicated	280	0.312				
	Indicated	324					
Composite sickness indicated among mothers involving nutrition criteria	Nutrition criteria in isolation			89	0.342		
	Nutrition criteria in combination			75			
Antenatal care among mothers	Full ANC received	363	0.139	105	0.716	385	0.138
	No/Partial ANC received	241		59		247	
Place of delivery of mother	Health care facility	575	0.154	156	0.999	602	0.165
	Others	29		8		30	
Breastfeeding of the child (ever)	Absent	103	0.076	29	0.427	112	0.576
	Present	501		135		520	
Provision of ARV/ART to the mother during breastfeeding period	Partially/not covered	112	0.353	36	0.327	121	0.194
	Fully covered	492		128		511	
Gender of the child	Female	80	0.078				
	Male	84					
HIV status of the child (ever)	Negative	572	0.288	148	0.136	599	0.146
	Positive	32		16		33	
Coverage of any immunization	Immunized for age	400	0.538			424	0.263
	Under-immunized for age	204				208	
Coverage of OPV immunization	Immunized for age	492	0.832	135	0.781	518	0.332
	Under-immunized for age	112		29		114	
Coverage of Hepatitis B immunization	Immunized for age	537	0.747	147	0.092	564	0.826
	Under-immunized for age	67		17		68	

Group of children		HCFA-4		HCFA-4.4		HCFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of DPT immunization	Immunized for age	495	0.618	134	0.837	520	0.292
	Under-immunized for age	109		30		112	
Anaemia in the child	Absent	141	0.166	31	0.212	150	0.123
	Present	463		133		482	
Death of the child during study	Absent	600	0.160	164	NA	628	0.149
	Present	4		0		4	

Group of children		HCFA-7		HCFA-7.1		HCFA-8.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Age of the mother	≥25 years	404	0.512	387	0.714	178	0.741
	<25 years	210		186		113	
Whether mother working?	Yes	204	0.487	194	0.682	101	0.936
	No	410		379		190	
Type of house	Pukka house with electricity					24	0.112
	Others					267	
Mother ever initiated on ART	No	29	0.995	29	0.680	11	0.379
	Yes	585		544		280	
Antenatal care among mothers	Full ANC received	377	0.180	357	0.231	187	0.791
	No/Partial ANC received	237		216		104	
Place of delivery of mother	Health care facility	586	0.544	546	0.578	277	0.077
	Others	28		27		14	
Breastfeeding of the child (ever)	Absent	109	0.064	106	0.123	47	0.514
	Present	505		467		244	
Provision of ARV/ART to the mother during breastfeeding period	Partially/not covered	121	0.066	118	0.162	61	0.861
	Fully covered	493		455		230	
Gender of the child	Female	304	0.087	283	0.283	149	0.916

Group of children		HCFA-7		HCFA-7.1		HCFA-8.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
	Male	310		290		142	
HIV status of the child (ever)	Negative	582	0.311	542	0.246	271	0.529
	Positive	32		31		20	
Coverage of any immunization	Immunized for age	417	0.214	392	0.202	198	0.751
	Under-immunized for age	197		181		93	
Coverage of OPV immunization	Immunized for age	511	0.351	483	0.317	253	0.821
	Under-immunized for age	103		90		38	
Coverage of Hepatitis B immunization	Immunized for age	559	0.799	531	0.903	270	0.918
	Under-immunized for age	55		42		21	
Coverage of DPT immunization	Immunized for age	513	0.281	485	0.235	251	0.739
	Under-immunized for age	101		88		40	
Coverage of Measles immunization	Immunized for age	561	0.804				
	Under-immunized for age	53					
Coverage of MMR immunization	Immunized for age			433	0.129		
	Under-immunized for age			140			
Anaemia in the child	Absent	141	0.171				
	Present	473					
Death of the child during study	Absent	612	0.999	572	1.000	289	0.358
	Present	2		1		2	

Group of children		HCFA-8.2		HCFA-8.3		HCFA-8.4	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General					3	0.659
	SC/ST/OBC					20	
Age of the mother	≥25 years	300	0.725	325	0.783	15	0.495
	<25 years	187		188		8	

Group of children		HCFA-8.2		HCFA-8.3		HCFA-8.4	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Whether mother working?	Yes	148	0.417	166	0.360	3	1.000
	No	339		347		20	
Type of house	Pukka electrified house					2	1.000
	Others					21	
Mother ever initiated on ART	No	13	0.420	20	0.998	1	1.000
	Yes	474		493		22	
Antenatal care among mothers	Full ANC received	298	0.290	303	0.376	11	0.998
	No/Partial ANC received	189		210		12	
Place of delivery of mother	Health care facility	462	0.795	489	0.528	21	1.000
	Others	25		24		2	
Breastfeeding of the child (ever)	Absent	76	0.098	90	0.309	0	NA
	Present	411		423		23	
Provision of ARV/ART to the mother during breastfeeding period	Partially/not covered	82	0.127	97	0.571	8	0.212
	Fully covered	405		416		15	
Age of the child at baseline	≥12 months					17	0.998
	<12 months					6	
Gender of the child	Female			255	0.136	9	0.495
	Male			258		14	
HIV status of the child (ever)	Negative	456	0.778	485	0.224	0	NA
	Positive	31		28		23	
Duration of total life of the child on ART	≥50%					10	0.350
	<50%					13	
Coverage of any immunization	Immunized for age	311	0.451	348	0.304	18	1.000
	Under-immunized for age	176		165		5	
Coverage of OPV immunization	Immunized for age	394	0.728	430	0.730	19	0.998
	Under-immunized for age	93		83		4	

Group of children		HCFA-8.2		HCFA-8.3		HCFA-8.4	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of Hepatitis B immunization	Immunized for age	433	0.899	463	0.853	22	1.000
	Under-immunized for age	54		50		1	
Coverage of DPT immunization	Immunized for age	396	0.710	432	0.580	19	0.998
	Under-immunized for age	91		81		4	
Acute morbidity events among children per month of follow-up	<0.5 per month			407	0.112		
	≥0.5 per month			106			
Anaemia in the child	Absent			111	0.127	3	0.495
	Present			402		20	
Death of the child during study	Absent	484	0.999	511	0.999	23	NA
	Present	3		2		0	

Outcome variable 4: Whether the child ever had inadequate MUACFA?

Group of children		MUACFA-1		MUACFA-4		MUACFA-6	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Family size	>5	70	0.119	70	0.104	69	0.089
	≤5	513		497		506	
Education of father	Schooled	394	0.164	384	0.160	390	0.447
	Non-schooled	189		183		185	
Place of delivery of mother	Health care facility	561	0.473	546	0.379	553	0.554
	Others	22		21		22	
Age of the child at baseline	≥12 months	402	0.127	389	0.160	398	0.118
	<12 months	181		178		177	
Gender of the child	Female	290	0.168	282	0.235	288	0.167
	Male	293		285		287	
Death of child during study period	Absent	581	0.314	565	0.231	573	0.273
	Present	2		2		2	

Group of children		MUACFA-8.1		MUACFA-8.2	
Characteristics	**Characteristics**	**N included**	**p-value**	**N included**	**p-value**
Family size	>5	36	0.294	54	0.053
	≤5	224		385	
Education of father	Schooled	171	0.483	301	0.198
	Non-schooled	89		138	
Place of delivery of mother	Health care facility	250	0.411	422	0.847
	Others	10		17	
Age of the child at baseline	≥12 months	181	0.983	286	0.351
	<12 months	79		153	
Gender of the child	Female			209	0.104
	Male			230	
Persistence of vitamin/mineral deficiency among ever deficient children	<50% of time	205	0.133		
	≥50% of time	55			
Vitamin A deficiency in the child	Not indicated			372	0.177
	Indicated			67	
Anaemia status of the child (ever)	Mild anaemia			138	0.185
	Moderate/severe anaemia			301	
Death of child during study period	Absent	259	1.000	438	1.000
	Present	1		1	

Outcome variable 5: Whether the child ever had anaemia?

Group of children		Hb-1		Hb-2.1		Hb-3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Whether mother working?	Yes	205	0.137	176	0.218	181	0.216
	No	428		394		413	
Mother ever initiated on ART	No					0	NA
	Yes					594	
Age of mother at start of ART (years)	≥25 years					219	0.771
	<25 years					375	
Mother's ART/ARV status during pregnancy	On ARV/ART	570	0.255			541	0.549
	Not on ARV/ART	63				53	

Group of children		Hb-1		Hb-2.1		Hb-3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Duration of ART/ARV given to the mother during pregnancy	<30 days			148	0.281		
	31+ days			422			
Breastfeeding of the child (ever)	Absent	108	0.097	100	0.094		
	Present	525		470			
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	120	0.565	91	0.585	85	0.865
	Fully covered	513		479		509	
Age of the child at baseline	≥12 months	429	0.340	372	0.582	391	0.598
	<12 months	204		198		203	
Gender of the child	Female	310	0.068	281	0.111	292	0.058
	Male	323		289		302	
HIV status of the child (ever)	Negative	599	0.078	545	0.148	561	0.140
	Positive	34		25		33	
Inadequate WFA among children (ever)	Absent	235	0.307	213	0.529	222	0.573
	Present	398		357		372	
Inadequate HCFA among children (ever)	Absent	479	0.247	427	0.389	443	0.377
	Present	154		143		151	
Any inadequate anthropometric measurement for age among children (ever)	Absent	112	0.943	102	0.685	104	0.901
	Present	521		468		490	

Group of children		Hb-4		Hb-5		Hb-7.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Age of the mother	≥25 years					381	0.083
	<25 years					186	
Whether mother working?	Yes	188	0.280	171	0.060	190	0.163
	No	410		344		377	
BMI of mothers	Normal and above	278	0.463				
	Underweight	320					
	Not indicated	436	0.493				

Group of children		Hb-4		Hb-5		Hb-7.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Composite nutrition indicator of sickness among mothers	Indicated	162					
Mother's ART/ARV status during pregnancy	On ARV/ART	541	0.525	460	0.333	505	0.164
	Not on ARV/ART	57		55		62	
Breastfeeding of the child (ever)	Absent	103	0.115			103	0.091
	Present	495				464	
Breastfeeding duration for the child	<29 weeks			217	0.887		
	≥29 weeks			298			
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	113	0.414	98	0.738	116	0.855
	Fully covered	485		417		451	
Age of the child at baseline	≥12 months	402	0.444	340	0.556		
	<12 months	196		175			
Gender of the child	Female	293	0.054	253	0.087	280	0.234
	Male	305		262		287	
HIV status of the child (ever)	Negative			482	0.200	536	0.061
	Positive			33		31	
Coverage of any immunization	Immunized for age			338	0.261		
	Under-immunized for age			177			
Coverage of MMR immunization	Immunized for age					427	0.368
	Under-immunized for age					140	
Acute morbidity among children (ever)	Absent					99	0.320
	Present					468	
Inadequate WFA among children (ever)	Absent	221	0.355	174	0.227	215	0.656
	Present	377		341		352	
Inadequate HCFA among children (ever)	Absent	454	0.323	380	0.258	451	0.243
	Present	144		135		116	

Group of children		Hb-4		Hb-5		Hb-7.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Any inadequate anthropometric measurement for age among children (ever)	Absent	108	0.606	79	0.846	106	0.979
	Present	490		436		461	

Outcome variable 6: Whether the child ever had acute morbidity?

Group of children		AMP-1		AMP-4		AMP-4.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General					61	0.438
	SC/ST/OBC					335	
Environment where child lives	With mother	593	0.053	590	0.166	372	0.385
	Without mother's care	42		30		24	
Socio-economic crisis in the family	Absent			392	0.092	238	0.451
	Present			228		158	
HIV clinical stage of mother	Stage 1			157	0.106	97	0.136
	Stage 2 or more			463		299	
Acute morbidity among mothers	Absent			421	0.198		
	Present			199			
BMI of mothers	Normal and above			290	0.484		
	Underweight			330			
Composite sickness indicator among mothers	Not indicated			286	0.493		
	Indicated			334			
Any drug history during pregnancy or after delivery	Absent	618	0.998	604	0.998	382	0.998
	Present	17		16		14	
Age of the child at baseline	>12 months	428	0.861	416	0.955	277	0.978
	<12 months	207		204		119	
Gender of the child	Female	312	0.680	303	0.726	198	0.860
	Male	323		317		198	
HIV status of the child (ever)	Negative	602	0.857	588	0.958	372	0.126
	Positive	33		32		24	

Group of children		AMP-1		AMP-4		AMP-4.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of OPV immunization	Immunized for age	519	0.950	509	0.646	317	0.377
	Under-immunized for age	116		111		79	
Coverage of DPT immunization	Immunized for age					318	0.279
	Under-immunized for age					78	
Vitamin A deficiency in the child	Not indicated	542	0.089	529	0.088	322	0.290
	Indicated	93		91		74	

Group of children		AMP-4.3		AMP-4.4		AMP-5	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Caste	General	23	0.611	25	0.615		
	SC/ST/OBC	176		138			
Type of family	Joint/three-generation	85	0.155	53	0.336	227	0.421
	Nuclear	114		110		289	
Environment where child lives	With mother	185	0.630	157	0.873		
	Without mother's care	14		6			
Socio-economic crisis in the family	Absent	104	0.886	100	0.885	331	0.255
	Present	95		63		185	
HIV clinical stage of mother	Stage 1			36	0.491		
	Stage 2 or more			127			
Any drug history during pregnancy or after delivery	Absent	191	0.539	157	0.999	501	0.998
	Present	8		6		15	
Age of the child at baseline	>12 months	131	0.770	121	0.363	340	0.298
	<12 months	68		42		176	
Gender of the child	Female	104	0.326	80	0.268	255	0.617
	Male	95		83		261	
HIV status of the child (ever)	Negative	187	0.599	147	0.353	484	0.849
	Positive	12		16		32	
	Immunized for age	163	0.876	135	0.097	421	0.526

Group of children		AMP-4.3		AMP-4.4		AMP-5	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of OPV immunization	Under-immunized for age	36		28		95	
Coverage of DPT immunization	Immunized for age			134	0.118		
	Under-immunized for age			29			
Vitamin A deficiency in the child	Not indicated	156	0.957	129	0.714	440	0.066
	Indicated	43		34		76	
Anaemia in the child	Absent	46	0.062	31	0.469		
	Present	153		132			

Group of children		AMP-7	
Characteristics	**Attributes**	**N included**	**p-value**
Type of family	Joint/three-generation	272	0.085
	Nuclear	336	
Environment where child lives	With mother	566	0.083
	Without mother's care	42	
HIV clinical stage of mother	Stage 1	153	0.058
	Stage 2 or more	455	
Any drug history during pregnancy or after delivery	Absent	591	0.998
	Present	17	
Age of the child at baseline	>12 months	428	0.553
	<12 months	180	
Gender of the child	Female	302	0.677
	Male	306	
HIV status of the child (ever)	Negative	577	0.873
	Positive	31	
Coverage of OPV immunization	Immunized for age	506	0.259
	Under-immunized for age	102	
Coverage of DPT immunization	Immunized for age	508	0.187
	Under-immunized for age	100	

Group of children		AMP-7	
Characteristics	**Attributes**	**N included**	**p-value**
Vitamin A deficiency in the child	Not indicated	515	0.107
	Indicated	93	

Outcome variable 7: Whether the child ever had acute morbidity ≥0.5 per month?

Group of children		AMB-1		AMB-2		AMB-2.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Type of family	Joint/three-generation					228	0.063
	Nuclear					241	
HIV clinical stage of mother	Stage 1	126	0.279	116	0.143	109	0.198
	Stage 2+	397		376		360	
Gender of the child	Female	257	0.710	246	0.871	234	0.829
	Male	266		246		235	
HIV status of the child (ever)	Negative			470	0.061		
	Positive			22			
Coverage of OPV immunization	Immunized for age	438	0.897	409	0.968	391	0.931
	Under-immunized for age	85		83		78	
Inadequate HCFA among children (ever)	Absent	396	0.275	370	0.307	350	0.388
	Present	127		122		119	
Vitamin/mineral deficiency among children	Absent	253	0.202	238	0.296	224	0.517
	Present	270		254		245	

Group of children		AMB-4		AMB-4.1		AMB-4.3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Type of family	Joint/three-generation	233	0.055	141	0.479	77	0.996
	Nuclear	276		191		101	
HIV clinical stage of mother	Stage 1	119	0.496	74	0.061	24	0.288
	Stage 2+	390		258		154	

Group of children		AMB-4		AMB-4.1		AMB-4.3	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Composite morbidity indicator of sickness among mothers	Not indicated	413	0.053				
	Indicated	96					
Gender of the child	Female	251	0.577	167	0.573	95	0.130
	Male	258		165		83	
HIV status of the child (ever)	Negative			308	0.065	165	0.335
	Positive			24		13	
Coverage of OPV immunization for age	Immunized for age	426	0.855	270	0.751	152	0.216
	Under-immunized for age	83		62		26	
Inadequate HCFA among children (ever)	Absent	384	0.270	261	0.126	133	0.267
	Present	125		71		45	
Vitamin/mineral deficiency among children	Absent	248	0.192	156	0.291	80	0.558
	Present	261		176		98	

Group of children		AMB 4.4		AMB-8.1		AMB 8.3.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Type of family	Joint/three-generation	125	0.833			131	0.083
	Nuclear	158				169	
Safely managed drinking water	Used	140	0.117	143	0.077		
	Lacked	143		127			
HIV clinical stage of mother	Stage 1			60	0.142	78	0.375
	Stage 2+			210		222	
Age of the child at baseline	≥12 months					290	0.859
	<12 months					10	
Gender of the child	Female	145	0.704	136	0.636	156	0.400
	Male	138		134		144	
Coverage of OPV immunization	Immunized for age	228	0.375	236	0.057	282	0.578
	Under-immunized for age	55		34		18	
	Absent					261	0.052

Group of children		AMB 4.4		AMB-8.1		AMB 8.3.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Sickness absenteeism at an institution	Present					39	
Inadequate HCFA among children (ever)	Absent	205	0.205	200	0.453	279	0.622
	Present	78		70		21	
Vitamin/mineral deficiency among children	Absent	139	0.595			139	0.209
	Present	144				161	
Maximum no. of deficient vitamins/minerals ever indicated in the child	1-6			140	0.419		
	>6			130			
Vitamin A deficiency in the child	Not indicated	227	0.174	178	0.646		
	Indicated	56		92			

Outcome variable 8: HIV infection in the child ever.

Group of children		HIV-1		HIV-2		HIV-2.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Education of father	Schooled	395	0.809	389	0.671	380	0.866
	Non-schooled	183		170		157	
Antenatal care among mothers	Full ANC received	346	0.614	334	0.218	319	0.359
	No/Partial ANC received	232		225		218	
Mother's ART/ARV status during pregnancy	On ARV/ART	532	0.587	532	0.539	529	0.328
	Not on ARV/ART	46		27		8	
CD4 count of mother closest to the date of delivery	≥500					232	0.059
	<500					305	
Breastfeeding of the child (ever)	Absent	97	0.996	97	0.996	89	0.996
	Present	481		462		448	
Maternal PPTCT strategies during the pregnancy	Undertaken	559	0.068				
	Not undertaken	19					

Group of children		HIV-1		HIV-2		HIV-2.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Coverage of maternal PPTCT strategies during the pregnancy	Any two or more strategies			296	0.708		
	Any one strategy			263			
Coverage of maternal PPTCT strategies involving ARV/ART during the pregnancy	Undertaken in combination					292	0.681
	Undertaken in isolation					245	
Age of the child at baseline	≥12 months	385	0.487	367	0.390	350	0.384
	<12 months	193		192		187	
Gender of the child	Female	282	0.694	274	0.962	262	0.747
	Male	296		285		275	
Acute morbidity among children (ever)	Absent	112	0.439	108	0.595	103	0.361
	Present	466		451		434	
Inadequate HFA ever	Absent	150	0.100	147	0.272	144	0.281
	Present	428		412		393	
Inadequate WFA ever	Absent	211	0.222	201	0.080		
	Present	367		358			
Inadequate HCFA ever	Absent	435	0.885	418	0.831	400	0.755
	Present	143		141		137	
Ever any inadequate anthropometry score for age	Absent	101	0.806	98	0.996	95	0.996
	Present	477		461		442	
Vitamin/mineral deficiency among children	Absent	312	0.571	304	0.625	291	0.676
	Present	266		255		246	
Anaemia in the child	Absent	135	0.995	130	0.995	125	0.995
	Present	443		429		412	
Death of child during the study	Absent	574	0.269	555	0.157	533	0.131
	Present	4		4		4	

Group of children		HIV-3		HIV-4		HIV-5.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Education of father	Schooled	384	0.735	368	0.491	235	0.932

Group of children		HIV-3		HIV-4		HIV-5.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
	Non-schooled	168		172		109	
Delay in starting ART for the mother after detecting HIV infection	31+ days	298	0.271				
	≤30 days	254					
ART status of mother	On ART			464	0.093		
	Not on ART			76			
Composite morbidity indicator of sickness among mothers	Not indicated			455	0.637		
	Indicated			85			
BMI of mothers	Normal and above			253	0.555		
	Underweight			287			
Composite sickness indicator among mothers	Not indicated			243	0.495		
	Indicated			297			
Antenatal care among mothers	Full ANC received	327	0.652	320	0.262	206	0.902
	No/Partial ANC received	225		220		138	
Mother's ART/ARV status during pregnancy	On ARV/ART	509	0.629	500	0.132	318	0.771
	Not on ARV/ART	43		40		26	
Breastfeeding of the child (ever)	Absent	93	0.996	88	0.996	0	NA
	Present	459		452		344	
Duration of mixed feeding	≤2 weeks					58	0.907
	>2 weeks					286	
Maternal PPTCT strategies during the pregnancy	Undertaken	535	0.075	523	0.183	328	0.066
	Not undertaken	17		17		16	
Age of the child at baseline	≥12 months	359	0.516	352	0.806	209	0.478
	<12 months	193		188		135	
Gender of the child	Female	273	0.591	262	0.862	169	0.372
	Male	279		278		175	
	Absent	106	0.476	108	0.772	68	0.503

Group of children		HIV-3		HIV-4		HIV-5.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Acute morbidity among children (ever)	Present	446		432		276	
Inadequate HFA ever	Absent	140	0.113	143	0.114	70	0.152
	Present	412		397		274	
Inadequate WFA ever	Absent	202	0.253	198	0.584	113	0.379
	Present	350		342		231	
Inadequate HCFA ever	Absent	410	0.826	404	0.773	243	0.589
	Present	142		136		101	
Ever any inadequate anthropometry score for age	Absent	95	0.843	97	0.481	44	0.213
	Present	457		443		300	
Vitamin/mineral deficiency among children	Absent	298	0.550	294	0.371	183	0.645
	Present	254		246		161	
Vitamin A deficiency in the child	Not indicated			462	0.052		
	Indicated			78			
Anaemia in the child	Absent	122	0.996	122	0.995	64	0.996
	Present	430		418		280	
Death of child during the study	Absent	548	0.305	536	0.216	342	0.109
	Present	4		4		2	

Group of children		HIV-5.2		HIV-6		HIV-6.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Education of father	Schooled	145	0.203	389	0.707	206	0.445
	Non-schooled	56		182		74	
Antenatal care among mothers	Full ANC received	119	0.072	343	0.516	162	0.084
	No/Partial ANC received	82		228		118	
Mother's ART/ARV status during pregnancy	On ARV/ART	189	0.590	525	0.547	265	0.618
	Not on ARV/ART	12		46		15	
Breastfeeding of the child (ever)	Absent	0	NA	97	0.996	29	0.997
	Present	201		474		251	

Group of children		HIV-5.2		HIV-6		HIV-6.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Mixed feeding of the child (ever)	Absent			227	0.634		
	Present			344			
Mixed feeding of the child during the study	Absent					79	0.631
	Present					201	
Duration of mixed feeding during the study	≤2 weeks	27	0.597				
	>2 weeks	174					
Provision of ARV/ART to mother during breastfeeding period	Fully covered	197	0.290			272	0.563
	Partially/not covered	4				8	
Maternal PPTCT strategies during the pregnancy	Undertaken	198	0.296	552	0.073	277	0.347
	Not undertaken	3		19		3	
Age of the child at baseline	≥12 months	69	0.983	383	0.662	96	0.974
	<12 months	132		188		184	
Gender of the child	Female	90	0.222	279	0.812	128	0.625
	Male	111		292		152	
Acute morbidity among children (ever)	Absent	40	0.516	110	0.856	53	0.380
	Present	161		461		227	
History of CPT for the child (ever)	Present	161	0.272			222	0.365
	Absent	40				58	
Inadequate HFA ever	Absent	25	0.301	147	0.124	41	0.335
	Present	176		424		239	
Inadequate WFA ever	Absent	59	0.810	208	0.397	89	0.559
	Present	142		363		191	
Inadequate HCFA ever	Absent	104	0.775	432	0.739	146	0.819
	Present	97		139		134	
Inadequate MUACFA ever	Absent	135	0.191			199	0.062
	Present	66				81	
Ever any inadequate anthropometry score for age	Absent	17	0.391	100	0.794	27	0.516
	Present	184		471		253	

Group of children		HIV-5.2		HIV-6		HIV-6.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Vitamin/mineral deficiency among children	Absent	109	0.727	305	0.417	155	0.944
	Present	92		266		125	
Vitamin A deficiency in the child	Not indicated					248	0.065
	Indicated					32	
Anaemia in the child	Absent	21	0.322	132	0.995	32	0.998
	Present	180		439		248	
Death of child during the study	Absent			567	0.230		
	Present			4			

Group of children		HIV-6.2		HIV-7		HIV-8.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Education of father	Schooled	205	0.573	377	0.653	176	0.488
	Non-schooled	72		176		90	
Antenatal care among mothers	Full ANC received	159	0.090	334	0.540	172	0.738
	No/Partial ANC received	118		219		94	
Mother's ART/ARV status during pregnancy	On ARV/ART	262	0.683	507	0.590	242	0.381
	Not on ARV/ART	15		46		24	
Breastfeeding of the child (ever)	Absent	27	0.998	94	0.996	40	0.997
	Present	250		459		226	
Food with minimum dietary diversity	Ensured every time	33	0.998				
	Not ensured every time	244					
Food with minimum dietary frequency	Ensured every time	71	0.266				
	Not ensured every time	206					
Minimum acceptable food	Ensured every time	18	1.000				
	Not ensured every time	259					
	Fully covered	269	0.442				

Group of children		HIV-6.2		HIV-7		HIV-8.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Provision of ARV/ART to mother during breastfeeding period	Partially/not covered	8					
Maternal PPTCT strategies during the pregnancy	Undertaken	274	0.372	534	0.083	255	0.095
	Not undertaken	3		19		11	
Age of the child at baseline	≥12 months	96	0.926	385	0.533	187	0.783
	<12 months	181		168		79	
Gender of the child	Female	125	0.871	272	0.746	137	0.604
	Male	152		281		129	
Coverage of Measles immunization	Immunized for age			502	0.243		
	Under-immunized for age			51			
Acute morbidity among children (ever)	Absent	51	0.426	102	0.843	22	0.692
	Present	226		451		244	
History of CPT for the child (ever)	Present	219	0.416				
	Absent	58					
Inadequate HFA ever	Absent	41	0.321	145	0.115	65	0.500
	Present	236		408		201	
Inadequate WFA ever	Absent	88	0.604	204	0.406	94	0.618
	Present	189		349		172	
Inadequate HCFA ever	Absent	143	0.995	424	0.632	197	0.474
	Present	134		129		69	
Inadequate MUACFA ever	Absent	198	0.054				
	Present	79					
Ever any inadequate anthropometry score for age	Absent	27	0.517	99	0.838	47	0.821
	Present	250		454		219	
Vitamin/mineral deficiency among children	Absent	156	0.710	291			
	Present	121		262			
	1-6					138	0.066

Group of children		HIV-6.2		HIV-7		HIV-8.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Maximum no. of deficient vitamins/minerals ever indicated in the child	>6					128	
Persistence of vitamin/ mineral deficiency among ever deficient children	<50%					207	0.655
	≥50%					59	
Vitamin A deficiency in the child	Not indicated	245	0.071			181	0.126
	Indicated	32				85	
Anaemia in the child	Absent	30	0.286	123	0.238	44	0.997
	Present	247		430		222	
Death of child during the study	Absent			551		264	0.792
	Present			2		2	

Group of children		HIV-8.2		HIV-8.3		HIV-8.3.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Education of father	Schooled	302	0.809	316	0.896	204	0.109
	Non-schooled	141		150		114	
Antenatal care among mothers	Full ANC received	265	0.614	271	0.882	206	0.583
	No/Partial ANC received	178		195		112	
Mother's ART/ARV status during pregnancy	On ARV/ART	410	0.587			286	0.921
	Not on ARV/ART	33				32	
Breastfeeding of the child (ever)	Absent	65	0.996	78	0.994	69	0.996
	Present	378		388		249	
Maternal PPTCT strategies during the pregnancy	Undertaken	429	0.068	451	0.514	302	0.055
	Not undertaken	14		15		16	
Age of the child at baseline	≥12 months	282	0.487	313	0.473	309	0.422
	<12 months	161		153		9	

Group of children		HIV-8.2		HIV-8.3		HIV-8.3.1	
Characteristics	**Attributes**	**N included**	**p-value**	**N included**	**p-value**	**N included**	**p-value**
Gender of the child	Female	206	0.694	232	0.407	167	0.699
	Male	237		234		151	
Acute morbidity among children (ever)	Absent	75	0.439			57	0.901
	Present	368				261	
Sickness absenteeism at an institution	Absent					283	0.521
	Present					35	
History of CPT for the child (ever)	Absent			99	0.135		
	Present			367			
Inadequate HFA ever	Absent	97	0.100	116	0.111	105	0.475
	Present	346		350		213	
Inadequate WFA ever	Absent	151	0.222	167	0.717	127	0.848
	Present	292		299		191	
Inadequate HCFA ever	Absent	322	0.885	353	0.716	297	0.403
	Present	121		113		21	
Inadequate MUACFA ever	Absent			337	0.053		
	Present			129			
Ever any inadequate anthropometry score for age	Absent	66	0.806	79	0.618	74	0.345
	Present	377		387		244	
Vitamin/mineral deficiency among children	Absent	221	0.571	222	0.604		
	Present	222		244			
Vitamin A deficiency in the child	Not indicated					261	0.113
	Indicated					57	
Anaemia in the child	Absent			98	0.996	91	0.996
	Present			368		227	
Anaemia status of the child (ever)	Mild anaemia	140	0.459				
	Moderate/severe anaemia	303					
Death of child during the study	Absent	440	0.269	464	0.995	318	NA
	Present	3		2		0	