Understanding Nutritional Deprivation in the state of Jharkhand: Facts and Interpretations

Understanding Nutritional Deprivation in the state of Jharkhand: Facts and Interpretations

Dissertation submitted in partial fulfilment of the requirements for the award of the degree of Master of Philosophy in Economics of the Jawaharlal Nehru University

Nutan Shashi Tigga
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CENTRE FOR DEVELOPMENT STUDIES
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I hereby affirm that the work for this dissertation, ***"Understanding Nutritional Deprivation in the State of Jharkhand: Facts and Interpretations"****, being submitted as part of the requirements of the M.Phil Programme in Applied Economics of the Jawaharlal Nehru University, was carried out entirely by myself. I also affirm that it was not part of any other programme of study and has not been submitted to any other Institution/University for the award of any Degree.*

June 30, 2012

Nutan Shashi Tigga

Certified that this study is the bona fide work of Nutan Shashi Tigga, carried out under our supervision at the Centre for Development Studies.

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Dedicated to
Almighty father and
My parents-
Lawrence and Felecitas

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Abstract of the Dissertation

Understanding Nutritional Deprivation in the state of Jharkhand: Facts and Interpretations

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Under-nutrition is an ugly face of deprivation witnessed in the developing world that is experienced by adult and children alike. While undernourishment is a typical feature of poorer regions such as Sub-Saharan Africa, it is also prevalent in developing regions at large including the South Asian region. This deprivation is in contrast with the experience of economic growth in recent times in countries of this region. India and Bangladesh are the two nations with the infamous persistence of undernourishment among children. In fact, the phenomenon of under nutrition has a regional divide within nations and makes population groups of specific characteristics and identity more vulnerable than others. With this pretext, the present study is a modest attempt at understanding the dynamics of the nutritional deprivation in the state of Jharkhand with the dual distinction of poverty and predominance of tribal population.

The prime objective is to entangle the role of food inadequacy as well as lack of access to health care in shaping undernourishment in a deprived setting. According to the third round of the National Family Health Survey, it was observed that under-nutrition rates are relatively higher among the tribal population and those belonging to the lower wealth quintile group. The persistence of levels of undernourishment undoubtedly points towards the failure of the numerous governmental schemes targeted at addressing this menace. Such failure may be due to the absence of adequate monitoring mechanism in place, lack of accountability in its execution and governance and shortcomings arising out of the backwardness of the state and corruption.

While the role of food and health care were found to be equally important in explaining undernourishment, it is not mere food adequacy that could guarantee well-nourishment but the feeding practices and age and stage of food supplementation that shaped childhood nourishment. Further, the intake of food could not be absorbed

equally by all children irrespective of their health condition. Hence, poor access to health services and inappropriate sanitation practices rendered children vulnerable to frequent morbidities resulting in their undernourishment despite adequacy of food. Therefore, it can be said that under-nutrition in Jharkhand is high due to the co-existence of inadequate food intake and health care. This calls for more focused and concentrated intervention by the government and policy makers to break the vicious cycle of undernourishment for a healthy life.

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CHAPTER ONE

INTRODUCTION

"The science is clear that the first 1,000 days after conception are the most important. Intervening within this period will have life-long and life-changing impacts on educational attainment, labour capacity, reproductive health and adult earnings. If we wait until a child is two years old, the effects of under-nutrition are already irreversible".

Victoria C G, et al.

1.1 Overview

The term "malnutrition" refers to under-nutrition and over-nutrition. The former includes stunting, wasting, and underweight, while the latter includes obesity or over-consumption of specific nutrients (Shetty, 2003). The developing countries in general are characterised by the low human development and socio-economic indicators, where under-nutrition is one of the major problems which has severe consequences on child mortality. It has been widely argued by various scholars that the impact of under-nutrition is manifold. *First,* under-nutrition causes many health disorders such as low-birth weights, 60 per cent of neonatal deaths, irreparable mental and physical impairment to infants, reduction in immunity power, susceptibility to fatal childhood ailments like diarrhoeal diseases and respiratory infections (Allen and Gillespie, 2001; Hungama Report, 2011). *Secondly,* it is argued that under-nutrition limits intellectual growth and development, which will result in late enrolment in school, leading to 15-point decrease in IQ level thereby dropping the earnings by 10 per cent (Hunt, 2005). Similarly, Grantham (2007) argues that undernourished adults earn almost 20 per cent less than their counterparts, therefore contributing for the loss of 3 per cent India's GDP annually. Thus adequate nutrition is considered to be indispensable not only in reducing child mortality but also for

development of the nation as a whole as it is correlated with other functions *inter alia* education and job market.

Notwithstanding the paramount issue of under-nutrition, the welfare centric developmental policies seem to have remained silent in addressing the issue. However, the recent strategy for Millennium Development Goals (MDGs) initiated by United Nations stressed upon various developmental problems. Presently, most of the countries are on the way to achieve the MDG's by 2015; however there are nations like the Sub-Saharan Africa (SSA, hereafter) and South Asia (SA, hereafter) which still lag behind in achieving the goals related to poverty and hunger. Not surprisingly, India is one amongst the SA countries which scores worse than the SSA despite its high economic growth.

According to Hungama Report 2011, India's position in under-nutrition is worse compared to the most disadvantageous countries in the SSA, where only 22 per cent of children under five years of age are underweight i.e. 50 per cent lower than that of India[1]. This phenomenon is often called the 'Asian Enigma'[2]. Despite the vast prevalence of under-nutrition in India, the literature on the factors and determinates of under-nutrition is rather scant. Therefore, the present study is an attempt to understand the prevalence of under-nutrition across age, household status and social groups and factors that contribute for the under-nutrition.

1.2 Under-nutrition in India: An Overview

In India, the figures provided by the National Family Health Survey (NFHS) rounds have substantiated the above phenomenon. The prevalence of child under-nutrition varied considerably across different states of India. During 1992-1993 i.e. the

[1] The India's precarious situation can be better understood from the Global Hunger Index (GHI) developed by the International Food Policy Research Institute (IFPRI) in 2006, which shows that India stands in the 96th place out of 119 countries; however, it stands almost in the last (117 among 119 countries) when ranked in child under-nutrition (Braun, Ruel, & Gulati, 2008).

[2] The Asian enigma was termed by Ramalingaswami, Jonson and Rhode, in 1996. According to them, despite improvements made in the determinants of child and women's nutritional status, SA suffers higher malnutrition rates than the most disadvantageous SSA countries.

first round of the NFHS survey shows that, except Kerala which had significantly low under-nutrition rates, majority of the states such as Bihar, Madhya Pradesh, Uttar Pradesh, West Bengal, Orissa, Gujarat, Maharashtra and Karnataka had high prevalence of under-nutrition; where more than 50 per cent of the children were underweight[3] (see Table 1). However, under-nutrition rates have improved in few states by 1998-99, while there are many states *viz.* Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar and Orissa where underweight rates continued to be 50 per cent or more. Further, by 2005-06, the performance of many states had improved while for few states its condition remained *status quo*. For states like Bihar, Madhya Pradesh, Jharkhand (earlier, part of Bihar), Uttaranchal (earlier, part of Uttar Pradesh) and Chhattisgarh (earlier, part of Madhya Pradesh) the problem seemed stagnant. On the other hand, states like Kerala and Goa which had better nutritional status in the 1992-93 showed higher under-nutrition rates in 2005-06.

TABLE 1: PERCENTAGE OF CHILDREN STUNTED, UNDERWEIGHT AND WASTED ACROSS THE THREE NFHS ROUNDS FOR SELECTED STATES

	NFHS I			NFHS II			NFHS III		
State	S	U	W	S	U	W	S	U	W
Bihar	61	63	22	54	54	21	56	56	27
Goa	33	35	15	18	29	13	26	25	14
Jharkhand	na	na	na	49	54.3	25.4	50	57	32
Kerala	27	29	12	22	27	11	25	23	16
Madhya Pradesh	na	57	na	51	55	20	50	60	35
Orissa	48	53	21	44	54	24	45	41	20
Tamil Nadu	na	48	na	29	37	20	31	30	22
Uttar Pradesh	60	59	16	56	52	11	57	42	15
India	53	52	18	47	46	16	48	43	20

Source: NFHS Reports

 # S-Stunting, U-Underweight and W-Wasting

The Table 1 provides the nutritional status of children for the three time points for selected states of India. Thus, from the table it is evident that there is growing differences in the inter-state nutritional status of children leading to a clear regional divide. The central and eastern region has the highest percentage of undernourished

[3] Due to absence of information on height, many states (Orissa and Madhya Pradesh) did not have data on stunting and wasting.

children observed across the three rounds. Also, these regions are found to have relatively poor economic and demographic parameters (Bhat and Zavier, 1999; Bose, 1991; Dyson and Moore, 1983; Kurian, 2000 as cited in Pathak et al, 2011).

Likewise the Humgama surveyed 100 districts from the poor states of Bihar, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh to study the extent of under-nutrition. Further, best six districts from these 100 districts were selected to compare with the best six districts of best performing states such as Himachal Pradesh, Kerala and Tamil Nadu. Their findings reveal that in the 100 districts from poor states, 59 per cent of children are moderately or severely stunted, 42 per cent are moderately or severely underweight and 11 per cent are moderately or severely wasted. The comparison of six best districts from six poor states with six best districts of best performing states reveal that in poor states, the prevalence of stunting, underweight and wasted is 43 per cent, 33 per cent, and 12 per cent respectively, whereas in rich counter parts it is 33 per cent, 22 per cent, and 14 per cent respectively. It can be observed from the findings of the survey that there is significant difference in the prevalence of under-nutrition between rich and poor states. Therefore, it is plausible to infer that prevalence of under-nutrition in India is majorly contributed by its prevalence in poor states.

The extent of destitution can be better understood with the help of findings from Indian States Hunger Index, published in 2008, which compares the variability in the score of Indian states vis-à-vis other countries. The findings show that many states in India perform below other developing countries. In particular, the performance of states like Bihar, Jharkhand and Madhya Pradesh was found to be worse than world's poorest countries in the Global Hunger Index (GHI) list. The rank of both Bihar and Jharkhand is lower than Zimbabwe and Haiti, while Madhya Pradesh falls between Ethiopia and Chad. In the studies by Himanshu (2010) and Jose (2011), they argue that, most of the states in India which remain at the top of the under-nutrition pyramid such as Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh and Orissa, have much higher incidence of poverty. Therefore it can be argued that, states like Bihar,

Jharkhand, and Madhya Pradesh are those states of India which require more concentrated focus by researchers, policy makers and government.

1.3 Contextualising Jharkhand in the Study

From the discussion thus far, it is evident that Jharkhand's position in under-nutrition is worse than other poor Indian states. Jharkhand was carved out of southern Bihar as a new state of India in November 2000. Jharkhand was initially plagued by adverse conditions of low average income, very high incidence of poverty, and poor social development. It has 24 districts, 211 blocks and 32, 620 villages of which only 45 per cent are electrified while only 8,484 are connected by roads. The Net domestic Product (at factor cost) was Rs. 70309 crore for the year 2009-10 and a growth rate of 6 per cent (UNDP, 2011). The contribution of the primary sector, secondary sector and tertiary sector was 24.6 per cent, 37.9 per cent and 37.5 per cent in the year 2009-10 respectively.

According to the Census 2011, the population of Jharkhand is 32.96 million, consisting of 16.93 million males and 16.03 million females; spread over an area of 79,714 sq. Km. The sex ratio is 947 females per '000 males. The percentage of population below poverty line is 39.1 per cent as estimated for 2009-10, with 31.1 per cent of the population below poverty line in the urban areas and 41.6 per cent for rural areas (Planning Commission, 2012). The infant mortality rate was 46 per '000 live birth (2010-11), while the maternal mortality rate was 3.1 per '000 live birth (ibid.). In Jharkhand only 28 per cent women have safe delivery; 19 per cent women have institutional delivery and only 50vper cent full immunization (DLHS-3). Of the total population, 28 per cent belong to Schedule Tribe, 12 per cent Scheduled Castes and 60 per cent others. Hinduism is followed by 68.5 per cent of the population while 13.8 per cent of the population are Muslims and 13 per cent of the population follow animistic Sarna religion, which is different from Hinduism, Christianity and Muslim. Sarna religion is mainly followed by the tribals of Jharkhand. Only 4.1 per cent of the population follow Christianity. Jainism, Buddhism and Sikhism are also practiced making few, less than 1 per cent (Census, 2011). The literacy rate in Jharkhand is 67.6

per cent (2011) with male literacy rate of 78.4 per cent and female of 56.2 per cent (Mehta, 2001).

Jharkhand has been a health resort with the availability of many medical institutions. However in some pockets of the state, poverty and under-nutrition is dominant. Apart from under-nutrition, Jharkhand also suffers from public health problem due to excess fluoride in groundwater. A Survey conducted by the Birla Institute of Technology, Mesra, Ranchi in collaboration with UNICEF in the north-west districts of Palamau and Garhwa found fluoride levels in excess of the WHO drinking water guidelines. Excessive amounts of fluoride in drinking water causes dental fluorosis, prevalent bone fractures, and skeletal fluorosis, an irreversible disabling condition (Khandare et al, 2005).

The above discussion projects that the nutritional status in Jharkhand is a cause of worry. According to the statistics published by the National Family Health Survey 2005-06, half of the children under five years of age are stunted or in other words too short for their age, one third of them are wasted or too thin for their age, 57 per cent are underweight and 77.7 per cent children are anaemic (NFHS 2005). Therefore considering the three anthropometric indices of nutritional status i.e. height-for-age, weight-for-height, and weight-for-age, Jharkhand remains as one of the states with worst nutritional status of children.

In spite of implementation of various health measures, the state has shown only slight improvement since its formation. Another major concern is with regard to nutrition level of adults–both men and women. It has been observed that 43 per cent of women and 39 per cent of men in the state are underweight and 70 per cent of the women and 37 per cent men in the state are anaemic. The NFHS-III figures show that the nutritional status of women in Jharkhand is worse than all other states except for Bihar and Chhattisgarh. While for adult men, it is worse except for Rajasthan and Madhya Pradesh. The problem of under-nutrition existed mainly in the rural areas among the lower wealth quintiles or specifically among the disadvantageous groups. Therefore, there is a need for intervention by the policy framers to identify the pattern

of under-nutrition which exists in the state. This could further help in narrowing down and focussing on specific measures to eradicate under-nutrition in Jharkhand.

1.4 Statement of Problem

Under-nutrition can be understood in two dimensions- firstly, the food under-nutrition, which generally means the food and calorie intake of individuals. Secondly, the health under-nutrition, which describes the health care or rearing habits.

Under-nutrition due to food intake would result due to lack of availability of proper micronutrients, iodized salt etc. While improper access to health care, immunization, lack of prevention from diseases would cause health under-nutrition.

In Jharkhand, 80 per cent of the population who are rural dwellers have very less or no access to rich nutrient food. Additionally, though, health care facilities are available, complete access to such facilities will require further government intervention. In the absence of such facilities and catering from the government bodies in the rural Jharkhand, the problem of under-nutrition still predominantly persists. Thus, it becomes very interesting to investigate and explore the degree to which under-nutrition is caused, both due to low food or calorie intake and lack of health care among the population of Jharkhand. This study would definitely facilitate the government and policy makers to concentrate in the areas of concern.

1.5 Research Questions

- Is Under-nutrition in Jharkhand due to lack of food or lack of health care?

- Do food and health care influence nutritional make-up differentially across age, sex and social groups in the state of Jharkhand?

- Is the current state of ill-nourishment in Jharkhand cyclical more than contextual?

1.6 Objectives

- To explore whether under-nutrition among children and adults of different age, sex and social group is induced by lack of food or lack of health care.

- To discover the unique reasons (if any) responsible for sustained undernourishment remote from the usual factors.

- Analyse the reasons behind the slow progress in the bettering nutritional levels in Jharkhand despite various interventions undertaken by the state.

1.7 Methodology

1.7.1 Data Sources

The study would be carried out using the secondary data sources. There are various sources of data which provide information about the nutritional status of children and women in India namely- The National Nutrition Monitoring Bureau (NNMB), National Family Health Survey (NFHS), District Level Household Survey (DLHS), Reproductive and Child Health (RCH) and National Sample Survey Organisation (NSSO). However, the present study draws data from various rounds of NFHS.

The NFHS is the most popularly used data source which provides information on under-nutrition of children and adults in India. The data is collected through survey across nations on maternal and child health characteristics by the International Institute of Population Sciences (IIPS). The structure and format of the NFHS data collection is conducted in sync with the Demographic and Health Survey (DHS) which is conducted across many developing countries. The NFHS III is the third in the series of these national surveys conducted before. This round was preceded by the

first round of survey conducted in 1992-93 and second round in 1998-99 under the stewardship of Ministry of Health and Family Welfare (MoHFW). The MoHFW designated IIPS as the nodal agency for the surveys in collaboration with Macro International, United States Agency for International Development (USAID), United Kingdom Department for International Development (DFID) and many other agencies.

NFHS III surveyed approximately 124,000 ever married women which belonged to age group of 15-49. Height and weight measurements of women, men and children provided in the data set can be used to analyse the nutritional status of adults and children. The NFHS III, for the first time provides information on men and unmarried women. Along with this it also provides estimates of HIV prevalence for India as a whole based on blood samples collected in every state in the country.

For the state Jharkhand, the survey was based on a sample of 2,483 households that is representative at the state level and within the state at the rural and urban level. A total of 2, 983 women aged 15-49 were and 996 men aged 15-54 were interviewed to obtain information on population, health and nutrition. Since, the first and the second round of NFHS does not provide data for the state of Jharkhand (since Jharkhand came into existence in 2000), the analysis would be done solely from the third round of NFHS. The empirical analysis carried on for the study was performed using the SPSS Statistics 20.0 software.

1.7.2 Assessment of Nutritional status

i. Anthropometry approach

The three anthropometric measurement used by WHO standards (WHO, 1995) are height-for-age, weight-for-age, weight-for-height and body mass index. For each of these anthropometric indicators of under-nutrition mentioned above, a cut-off point of -2 standard deviations (-2 SD) below the median of the WHO reference population was used. The cut-off point -2SD refers to moderate under-nutrition, while -3SD is severe under-nutrition.

i. ***Height-for-age:*** It means low height as per age or stunting of a child resulting from chronic under-nutrition or genetic factors. It can also be associated to a number of other long-term factors such as insufficient protein and energy intake, frequent infection, inappropriate feeding practices and poverty.

ii. ***Weight-for-age:*** It indicates thinness for age or underweight reflecting chronic and acute under-nutrition. Generally associated with reasons such as infant mortality rate, energy intake per capita, mother's education, governmental social support, level of income, access to safe water and region.

iii. ***Weight-for-height:*** This shows thinness as per height or wasting due to acute starvation, disease or dietary deficiency. It is an indicator of acute under-nutrition.

The above discussed Anthropometric measures were used to evaluate the nutritional status of children. While for the adults the nutritional status can be assessed by using the following indicators.

i. ***BMI:*** The BMI is defined as weight in kilograms divided by height in metres squared (kg/m). BMI level below18.5 is used to define thinness or acute under-nutrition, and a BMI of 25 or above indicates overweight or obesity.

ii. ***Height:*** An adult's height is an outcome of several factors, including nutrition during childhood and adolescence. Women's having short stature has risk during difficulty due to small pelvic size. The cut-off point for height, considered in the study is 145 cm, i.e. women of height below 145 cm can be identified as nutritionally at risk.

iii. ***Anaemia:*** Anaemia is characterized by a low level of haemoglobin in the blood. Three levels of severity of anaemia are distinguished: mild anaemia (10.0-10.9 grams/decilitre for pregnant women, 10.0-11.9 g/dl for non-pregnant women, and 12.0-12.9 g/dl for men), moderate

anaemia (7.0-9.9 g/dl for women and 9.0-11.9 g/dl for men), and severe anaemia (less than 7.0g/dl for women and less than 9.0 g/dl for men).

1.7.3 Statistical Analysis

In this study both bivariate and multivariate methods are employed to detect the determinants and pattern of under-nutritional status of children and adults in the state of Jharkhand. In the bivariate analysis, the chi-square test was employed to analyse the association between each of the independent variables considered in the study. The nutritional status of children is measured by stunting, wasting and underweight for children. For measuring under-nutrition among adults the Body Mass Index (BMI) and anaemia levels are tested. The acceptance and rejection of the null hypothesis was decided at p-values at less than 0.10 (10 per cent), 0.05 (5 per cent) and 0.01 (1 per cent).

Since the bivariate analysis fails to capture the confounding effects, the net effect of each independent variable is estimated after controlling the other variables using logistic regression analysis. The model significance has been tested using the log likelihood ratio test. The models have also been corrected for hetroscedasticity and multi-collinearity. The odds ratio (OR) which is determined by the logistic regression is used to interpret the results. The OR represents the changes in likelihood of outcomes to that of changes in predictors. OR greater than one implies that the risk of under-nutrition is more likely to happen in relation to the reference category. While OR less than one would indicate that the risk of is less likely than the projected reference category.

Apart from analysing the outcome indicators of child under-nutrition using the three anthropometric measures, it becomes equally essential to address the input indicators. The three input indicators commonly used are household food security; quality of care; resources for health, including access to health services; and a healthy environment.

1.8 Chapter Scheme

The present study is divided into six chapters. The first chapter outlines the need and importance of study, along with describing the methodology and data sources employed in the study.

Chapter Two emphasises on the existing studies primarily focusing on the data and variables used in the analysis. In this section, studies on the policy interventions adopted by the state have also been discussed with special reference to the Integrated Child Development Services and the Mid-Day Meal Program.

The Third chapter deals with the dietary and health pattern of children in the state of Jharkhand. The anthropometric indices are used to determine the nutritional status of children.

Chapter four discusses similar analysis for men and women in separate section using the unit level data.

Chapter five briefly discusses the main nutritional programs adopted by the state and assesses the impact of these programs in the nutritional status of the children and adults.

Finally, the last chapter provides the summary of the findings in the study and recommendation for further research.

CHAPTER TWO

EVIDENCE FROM THE LITERATURE

One of the most widely prevalent health problem most of the developing countries facing today are under-nutrition and infectious diseases. Approximately 800 million individuals are reported to be undernourished worldwide, of which around less than under one-third (258 million individuals) are concentrated in South Asia (Gaiha 1997, as cited in Mondal and Sen, 2010). As said by many (Gordon, Ascoli, Mata et al 1968, Chandra and Newberne 1977, Chen, Huq and Huffman 1981, Chandra 1981, 1983, Martorell and Ho 1984, Mitra 1985, Mascie-Taylor 1991, Edmundson, Sukhatme and Edmundson, 1992, as cited in Khongsdier, 2000), under-nutrition can be considered a major curse of adverse effects on growth and health of individuals. Further, it continues to be the principal reason for ill-health and premature mortality and morbidity among children mainly in the developing counties (Nandy et al. 2005; Uthman and Aremu 2008; Mondal and Sen, 2010). Poverty, illiteracy, unavailability of proper health care has been considered as the basic causes of under-nutrition (Ramachandran 2007; Antony and Laxmaiah 2008). However, these causes differ from region to region. Studies on nutritional status of population have gathered attention not only from nutritionist and biological scientists but also from other researchers, economics and social science background.

In this chapter, the literature on nutrition has been discussed under the following heads.

i. Measurement issues
ii. Causes and Determinants- Framework
iii. Policy Intervention and Impact

2.1 Child Under-nutrition- A Review

A child's nutritional status can be assessed by the growth of a child in terms of height and weight, which is directly influenced by the food intake and occurrence of infections. When talking about food intake, it simply does not mean the availability of food, instead the dietary quality and quantity and feeding practices.

Under-nutrition is often seen to be contributing as both direct and underlying cause of child mortality by making the immune systems less resistant to infection which as a result weakens the efficacy of immunization, thereby worsening the disease condition and slowing recovery. Although, identifying under-nutrition and stunting are difficult, yet almost 80 per cent of under-nutrition deaths can be attributed to mild or moderate under-nutrition[4].

The effects of under-nutrition are intergenerational, maternal under-nutrition is often characterised by low birth weight child, contributing 60 per cent of neonatal deaths and irreparable mental and physical impairments among new-borns who survive. Children under age two who are malnourished, suffer from irreversible brain damage, retard normal growth and less resistant to chronic disease later in life. These further contribute to lower productivity levels in adults and higher costs of health care.

Under-nutrition not only undermines health and well-being but also limits intellectual potential and weakens economic development. Moreover, undernourished children are enrolled late in school as they suffer from intellectual impairments due to nutritional deficiencies. Additionally, under-nutrition in the early stages of life is associated with a 15-point decrease in IQ, which is further associated with a fall of 10 per cent in earnings.

[4] https://childhealthnow.com/under-nutrition-and-stunting

2.1.1 Measurement issues

Initially information on health was restricted to aggregate measures which made difficult to study the distribution pattern of health in the population, but the advent of NFHS data has made easier to comprehend variations in health outcomes across the country. (Joe et al, 2008).

Moreover, studies conducted after the survey confirms the high quality data collected for NFHS (Singh, 1999).

i. Anthropometry vs. Calorie intake

The two approaches in analysing nutritional deprivation are.

i. Calorie/nutrition intake approach- Sukhatme (1971, 1977); Gopalan (1977); Beherman and Deolalikar (1987, 1988); Strauss and Thomas (1990); Srinivisan (1991)
ii. Anthropometric approach- Strauss and Thomas (1996); Kakwani (1993); Svedberg (1991 and 1999); Pal (2000); Osmani (1993); Levin et al (1999).

The average daily intake of food according to the physiological status was calculated and was compared with those of suggested levels (ICMR, 1981). These average daily intakes of nutrients were calculated using food consumption tables (Gopalan et al 1990) and compared with daily allowances (ICMR, 1990).

The anthropometric approach has been accepted as a better measurement over the calorie approach. As argued by many nutritionists, nutritional status cannot be assessed in terms of nutrient intake alone as it also depends on non-nutrient food attributes, privately, and publicly provided inputs and health status (Radhakrishna and Ravi, 2004).

Deaton and Drèze (2009) too believed average calorie intake per se to be a poor indicator to measure the nutritional status of the population for reasons like calorie requirement is highly context-specific to the population; it depends on activity levels,

the epidemiological environment, the composition of the population, and other factors.

Moreover, there are various complexities involved in measuring food energy intake and hence it has been suggested that the under-nutrition be measured on the basis of outcome measures alternative to income measures. Few outcome measures include, anthropometry, clinical signs of malnutrition, biochemical indicators and physical activity. Of all the outcome measures, anthropometric measures are considered to have an advantage over other indicators since body measurements, which are sensitive to even minor levels of under-nutrition whereas, biochemical and clinical indicators proves to be useful in cases of extreme under-nutrition (Mercedes de Onis, 2000 and Radhakrishna and Ravi, 2004).

Also the use of anthropometric indices to evaluate child nutritional status is a well-established practice suggested by many (Waterlow et al. (1977), WHO Working Group (1986) and Gorstein et al. (1994)) since the 1980s. Moreover, anthropometric measures has been successfully and widely utilized by many researchers to analyse nutritional status of different communities and groups in India (Sharma and Sharma 1992; Bailey and Ferro-Luzzi 1995; Deurenberg-Yap et al. 2000; Mehta and Shringarpure 2000; Misra et al. 2001; Khongsdier 2002; Rao et al. 2006; Zerfu and Mekasha 2006; Bharati et al. 2007; Semproli and Gualdi-Russo 2007; Bisai et al. 2008; Bose et al. 2008; Chowdhury et al. 2008; Olivieri et al. 2008 as cited in Mondol and Sen).

Furthermore the nutritional status of infants and small children can be estimated much easily with the anthropometric measure than through calorie intake approach (Sen, 1984; Svedberg, 2000 as cited in Chandran 2009).

Based on the three anthropometric measures already discussed in the previous chapters, it has been observed that nutrition in India for children and adults are among the worse in the world and moreover the pace of improvements of these

measures is very sluggish despite of India's high growth rates (Deaton and Drèze, 2009).

These anthropometric measurements used in this study are based on the new international reference population released by WHO in April 2006 (WHO Multicentre Growth Reference Study Group, 2006). However, until 2006, the commonly used reference population, (also used in NFHS-1 and NFHS-2), was the U.S. National Centre for Health Statistics (NCHS) standard, which was recommended at that time by the World Health Organization (Dibley et al., 1987a; 1987b as cited in NFHS India Report).

However, in the recent years, the use of WHO standards has been challenged, particularly in its application in assessing the growth of breastfed infants. Studies by WHO suggest that the growth of healthy breastfed infants were different from the international growth reference (Chhabra and Roxx, 2004). This led to faulty interpretations of growth of child. Despite this drawback, most of the studies still favour the international standard measurements.

A study conducted by Bhandari et al (2002) on anthropometric indicators, said that children from higher socio-economic household compare better to the WHO reference population.

2.1.2 Causes and Determinants- Conceptual Framework

The framework employed in the present study had been adapted from the UNICEF. According to the framework, the causes of under-nutrition among children are complex, varying from biological and social to environmental factors (Wamani et al, 2006; Engle and Haddad, 1999; Mosley and Chen, 1984; Smith and Haddad, 2000).

These are discussed in detail in the subsequent sections.

i. Basic Influences:

Rural-Urban Residence

Under-nutrition differs in rural and urban household due to differences in some of the more proximate influences. Such differences could be explained by the fact that availability of food and health services is better in the urban areas as compared to their counterparts. Additionally, differences in educational status of mothers, availability of water and sanitation facilities, socio economic status, decision making power of women, access and utilization of antenatal and delivery care, quality of supplementation and feeding practices and immunization rates, all contribute to a better nutritional status of children in the urban areas (Smith et al, 2004).

ii. Underlying social and economic influences:

To measure the social and economic influences on child nutritional, the following variables are taken as proxy variables. They are- mother's education and work status, house flooring, sanitation facilities and drinking water source.

Mother's Education

Mother's education and work status apart from reflecting her economic status, demonstrates her knowledge and ability to adequately up bring her child. Factors such as house flooring, sanitation facilities etc. reflect the household living conditions and the family's economic influences. To add on, these reflect environmental conditions that may influence illness and undernourishment.

Pandey, (2007) proves maternal education to be an important determinant of the nutritional status of children.

Mothers work status

Mukuria (2005b) found that mother's working status has an impact on the nutritional status of children. For many countries showed that under nutrition was higher among children whose mothers were working (ibid). This was attributed to the existence of high levels of poverty in those countries which was reflected in the women's need to work and its relationship to children's nutritional status.

However if poverty was to be a major influence on nutritional status of children then it would also affect the quality of alternative child care a working mother is able to access (Mukuria, 2005b). Begin et al (1998), as cited in (Mukuria, 2005b) found that characteristics of a caregiver have a strong influence on child nutrition. It has also been observed that mother's working outside home with inadequate alternative child care has a negative impact on the nutritional status of children (Lamontagne et al, 1998).

Sanitation Facilities and Source of Drinking water

In households with poor sanitation facilities children often suffer from diarrhoea and parasitic infections, particularly intestinal (hookworms and round worms). Also the type of sanitation facilities available in a household reflects its economic status. Poor households are more likely to have poor sanitation facilities which as a result increase risk of diarrheal diseases thereby contributing to under nutrition.

Among the Gond tribe of Madhya Pradesh, it was found that open air defecation was the rule in the villages and children often defecate in the open space around the houses (Rao et al. 2005).

Studies have shown that inadequate water and sanitation facilities increase the chances of infectious diseases, indirectly leading to under-nutrition (UNICEF, 1990; Engle, 1992). Comparative studies in some developing countries (Sommerfelt et al.,

1994) and in Jimma, Ethiopia (Getaneh et al., 1998) have attributed unprotected water source and non-availability evidence as reasons for low child stature.

iii. Underlying Biological and Behavioural Influences

i. Maternal Characteristics

Nutritional status of mothers

Nutritional status of a mother has important implications both for her and her child. Poor nutrition mother have a greater risk of giving birth to a low birth child. Low birth child is further associated with Intrauterine Growth retardation (IUGR) which accounts for more than two third of these low birth child in developing countries (Black 1999).

Antenatal Care

For improved birth outcomes, adequate, timely and regular antenatal care is essential. This would often indicate improved availability and access to health services along with the mother's willingness or ability to practice healthy behaviours. As defined by WHO, antenatal care implies one or more visits to a skilled attendant during the pregnancy (WHO and UNICEF, 2003). This highly contributes in reducing under nutrition as proper antenatal care which would mean improved birth outcomes and higher birth weight. It was reported in (Mukuria, 2005b) that, children whose mothers had at least one or more antenatal visits faced less chances of being stunted or underweight than those children whose mothers had no antenatal visit. Mothers' having proper antenatal care indicates availability of proper health care services and awareness towards healthy behaviour.

Age at delivery

Mother's age of delivery also indicates status of mother's health. Undernourishment is comparatively higher among young mother's which in turn leads to high rates of low birth weight babies. It is often observed that young mothers

have a lower BMI compared to the older women and they are more risk prone to deliver low birth infants (Karim and Mascie-Taylor, 1997).

ii. Child Characteristics

Size at birth

Low birth weight speaks not only about undernourished mothers but also undernourished child throughout its life. At a low birth weight child would face higher risk of illness and death compared to normal weight infants.

Sex

Discrimination against female child is a predominant issue which exists in India, more likely when related to under-nutrition (Kishor 1993 and Bose et al. 2007). Tarozzi and Mahajan (2005), in their paper found that although child nutrition improved substantially, gender inequality in nutritional status also increased more for boys than girls. Numerous other studies have also reported discriminations in diet and basic amenities against the girl child (Ghosh 1990; Devendra 1995; Borooah 2004; Singh et al. 1996; Yadav and Singh 1999; Vashisht et al. 2005). As a result of such discrimination, rates of under-nutrition were found to be increasing along with the age in the case of girls (Bhat et al. (1997); Choudhary (2001); Bose et al. (2007) and Mondal and Sen (2010). Gender discrimination has also been prevalent in other developing countries such as Cambodia (Fuse, 2008).

Birth order

Study by Sommerfelt et al, (1994) has shown that stunting is rare in birth order (2-3), whereas it is found to be higher in (5+) (Jeyaseelan, 1997).

Preceding Birth interval

Birth interval is considered to be an important variable in understanding under-nutrition among children (Mozumder et al., 2000; Rafalimanana and Westoff, 2000; Sharmanov et al., 1997; Boerma and Bicego, 1992, as cited in Mukuria, 2005b). Mothers having short birth intervals are more likely to give birth to children having low birth weight and with intrauterine growth retardation. Rutstein (2002) justifies the role of educated mothers, as studies reveal that mothers residing in the urban areas and having secondary or more education levels are less likely to have short birth interval as compared to mothers living in rural areas and having low education level.

Feeding practices

Proper feeding practices such as breast feeding and supplementation contribute to the food intake level of children (Brown et al, 1998). For a child's nutritional status nutrient intake is an essential correlate, which in turn depends on the nature and duration of feeding practices. Breastfeeding is an essential component in deciding the nutritional status of a child, further reducing morbidity and mortality. Apart from providing essential nutrients necessary for the growth of the infants it also prevents the child from various infections and diseases. Timely provided supplementary nutrition also significantly effects the child's health.

Additionally, acute and chronic infection severely affects nutritional status as this leads to impairment of growth by limiting macro and micronutrient intake and utilization (Stephenson, 1999). Under-nutrition hinders child growth, making him/her more vulnerable towards illness and death. There exists a synergistic relation between under nutrition and infection which has been widely recognized by many (Scrimshaw et al, 1968, Tomkins and Watson, 19930 as cited in Mukuria, 2005b). The result of this infectious diseases and neonatal deaths cause under-five mortality in most of the developing nations and this is related to the availability and accessibility of health services (Mahy, 2003 as cited in Mukuria, 2005b).

iv. **Immediate Influences:**

Infection to children is a major cause of mortality and morbidity. The most common prevalent infection which children face is Acute Respiratory Infection (ARI) and diarrhoea.

De Onis and Blossner, (1997), argued that under-nutrition can be due to poor food quality, insufficient food intake and severe and repeated infectious diseases. Apart from these there exist studies which have observed that there are various other socio-demographic variables which have a significant influence on child under-nutrition, such as social group, household status and religion (Pathak et al, 2011).

2.2 Adult Under-nutrition- A Review

India is one of the countries where under-nutrition among women remains highest in the world. As per Smith (2004), there has been ample research going on the causes of under-nutrition and the ways to eliminate it. However, one important aspect while analysing under-nutrition among children often left behind is the role played by the child's care taker usually mothers. Therefore, this chapter becomes important and useful in understanding child under-nutrition while analysing women's status i.e. women status relative to men both within the household and in their communities. Therefore both men and women contribute in under-nutrition among children.

2.2.1 Measurement issues

i. ***Anthropometric measurement***

Nutritional status of adults is based on anthropometric and micronutrients indicators. The two indicators to measure nutritional status of adults are height and BMI. An adult's height is an outcome of several factors, including nutrition during childhood and adolescence. The BMI (as defined in the introductory chapter) is a widely used measurement to access the under-nutritional status of adults. Evident from the NFHS III, in India more than one-third or 36 per cent of adult women (15-49

years) have a BMI below 18.5, which indicates chronic energy deficiency (usually indicated by a BMI below 18.5). This is higher than most of the countries of Sub-Saharan Africa. Of the 23 Sub-Saharan African countries, except for Eritrea, all the other countries have a lower incidence of CED as compared to India (Mukuria, 2005a).

For women, anthropometric measurements of height and weight are used to determine their height and body mass index (BMI) while, micronutrient status is assessed for anaemia and vitamin A deficiency. The BMI which measures the weight to squared height below 18.5 is normally referred to as 'thinness' or chronic energy deficiency (CED). Also women's height is an essential indicator of risks during delivery. For short stature or body is often related to small pelvic size; which in turn increase the risk of delivering a low birth weight child.

Women and men having haemoglobin count in the blood below 12g/dec and 13g/dec respectively is considered as anaemic in terms of deficiency of iron in the blood (Jose 2011).

Since long the use of anthropometry measures have been considered as an efficient indicator of nutritional and health status of individuals (Banik et al, 2007; WHO, 1995). The BMI indicates overall adiposity of adults and widely used because it is inexpensive, non-invasive, and it's suitability for large-scale surveys. As cited in Citied from Banik et al, 2007. It is also accepted as one of the most reliable and best indicator of socio-economic condition of adult population in developing countries. Also it does not suffer from estimation errors encountered in energy intake method (with diet surveys) and energy expenditure methods (James et al 1988, Ferro-Luzzi et al, 1992, Shetty and James 1994, Khongsdier, 2002).

However, literature on BMI of adult Indian is limited to certain geographical regions of India, mainly south India (Shetty 1984; Ferro-Luzzi et al 1982; Shetty and James 1994; Naidu and Rao 1994; Visweswara Rao et al 1990; Visweswara Rao et al

1995); few in eastern India (Rao et al. 2005; Bose and Chakraborty (2005), Mittal and Srivastava (2006); Bharti (1989), and Khongsdier (1997) in North eastern India.

2.2.2 Causes and Determinants- Conceptual Framework

Several factors are found to be significant in contributing under-nutrition among female. These are- dietary intakes, illness, early and frequent childbearing, strenuous work or physical activity, and women's status in household decision making (Leslie, 1991; Tinker, 2000), area of residence, economic status of the household, antenatal care, use of health services and woman's education level and her work status (Rutstein, 1996 and 1999). For ease of understanding, the indicators of women heath is discussed under the following heads-

Social factors include education, media exposure, employment, marital status, and female-headed households.

Behavioural factors measured are fertility practices, breastfeeding practices, birth interval, antenatal care, delivery care, and awareness of HIV/AIDS.

Environmental factors measured place of residence and household status such as finished flooring, safe drinking water and adequate sanitation facilities.

These have been discussed individually in the subsequent section.

i. Social Factors

Education

Income has always been a dominant factor of education levels. Despite various intervention adopted by the government to provide free and compulsory education to girl child, low income hampers such an attempt by the families of girl child. Thus preventing girls from attaining education who would in future turn to be uneducated

mothers, thereby contributing to undernourishment of their children and to the state as a whole (Murugkar and Pal, 2004).

Literacy among women is of utmost importance as these effects the reproductive behaviour, contraception use, health and nurturing of the children, proper hygiene practices, access to employment and status of women in a family and society (Rao et al, 2010).

Many studies have shown linkages between mother's education and proximate determinants like fertility factors, environmental hazards, feeding practices, injury, and utilization of health services (Behrman and Wolfe 1987, Sandiford et al. 1995, Guilkey and Riphahn 1998, as cited in Miller and Rogers 2009).

Rajan and Navaneetham (1994), in their study in three districts of Kerala assessed the impact of mother's education on utilization of maternal and child health services and found that educated mothers have a better access to antenatal and post-natal care, resulting in better health outcomes.

Marital status

Women's marital status is related with household headship and social and economic status of women. A study in the region of Ethiopia indicated women's malnutrition was significantly associated with marital status. Further it showed higher incidence of under-nutrition among unmarried rural and divorced/separated urban women compared to married ones (Teller and Yimar, 2000).

Status of women in household/Female-headed households/ Employment

In the words of Ramalingaswami, Jonsson, and Rohde, (1996) as citied in Smith et al (2003), "The exceptionally high rates of malnutrition in South Asia are rooted deep in the soil of inequality between men and women". Low status of women often is seen

as a compromise to women's own health, which directly affects the subsequent birth weight of their children, and the quality of care provided to such children.

There exist several studies which specify that social norms restricting women's freedom and autonomy and discriminatory practices in the intra household resource allocation against women are relatively higher in the northern region of India (Jose 2011). It is further argued that these social norms and discriminatory practices are the usual determinants of high incidence of under-nutrition among women in the South Asia (Ramalingaswamy et al (1996), Osmani and Bhargava (1998), Osmani and Sen (2003) as citied in Smith et al, 2003).

In many developing countries, such as Jamaica, Indonesia, and Philippines, female headship is one of the important factors associated with birth outcomes, child survival rates, and nutritional status (Bronte-Tinkew and DeJong 2004, Heaton et al. 2005).

Studies on Africa have indicated that households with similar income levels and greater control of women are more food secure (Kennedy and Haddad, 1992).

Father's educational levels had strong association with their occupation and household income. Educational levels therefore influenced attitudes and preferences in choice of consumption goods, including child care services. This was more evident when fathers were married to less educated mothers (Mosley and Chen, 1984).

ii. Behavioural factors

Fertility Practices

For women, early marriage and child birth is an important determinant of their health status. Evidently, poor health affects not only the women but also their families. Further, women with poor health and nutritional status would give birth to low weight infants and would be less likely to provide adequate food and health care for their children. Therefore, poor health of women affects the household economic

well-being and also makes her less productive in the labour force. Desai (1994) and Chatterjee (1990) asserted that although under-nutrition existed among all sections of the population, for women it would start at infancy and continue throughout their life.

Breastfeeding Practices

Infant breast feeding has significant effects on both mother and child. For mother's it impacts through the influence of breastfeeding on the period of postpartum infertility and on fertility levels and the length of birth intervals, varying by duration and intensity of breastfeeding. As in case of infants, breastfeeding soon after birth is essential for the physical and mental development of children (NFHS-III).

A study on the Gond tribe of Madhya Pradesh revealed that, despite the traditional belief regarding breastfeeding practices, colostrum was not given to majority of the children and exclusive breast-feeding up to 4 months was absent among one-fourth of the children (Rao et al 2005).

Antenatal Care

As per WHO recommendations a minimum of four antenatal care visits is necessary for normal pregnancies (NFHS-III).

Rajan and Navaneetham (1994), in their study asserted that educated mothers use better antenatal or post-natal care, these results in better health status of both mother and child.

A study done by Pallikadavath et al (2004) as cited in Jat et al (2011) in Madhya Pradesh, showed high levels of association between mother's antenatal care practices with women's education, household's status, cast and religion.

iii. Environmental factors

Place of residence

Women residing in the rural areas have a much lower standard of living than those residing in the urban areas. As rural areas often are left out in receiving aids of economic and social progress, experienced in the urban areas (Sahn and Stifel, 2003).

Studies conducted show that rural women are more likely to suffer from chronic energy deficiency as compared to women in the urban areas (Loaiza, 1997; Teller and Yimar, 2000).

Wealth Index

From the existing literature, it is evident that low economic status of households was more prone to nutritional deprivation (Ravishankar, 2002; Susmitha Bharati et al, 2008; Elangovan and Shanmugan, 2003 as cited in Chandran, 2009). Another way of representing the social and economic influences on child nutrition is the recently developed wealth index (Rutsein and Johnson, 2004).

The wealth index was estimated using the possession of 33 household durables and assets to derive the wealth status of household, divided all the households into five wealth groups or quintiles (Jose 2011). Mishra and Dillip (2008), however, argued such a measure is insensitive towards differences between both rural-urban and states in India.

Household wealth status has a direct influence as it determines the ability to purchase nutritious foods, access to safe drinking water and other basic amenities and health services (Boyle et al. 2006, Hong et al. 2006).

Studies (Nandy et al, 2005) have found that children who belong to poorest households have a higher risk of being undernourished with multiple anthropometric failures when compared to richer households.

Social Groups

Tribal population in India accounts to 8 per cent of the population, which probably is the largest number of tribal communities of any country in the world as cited in Bose (2006c).

Studies carried out reveal that socioeconomic conditions and nutritional status of tribes were influenced by the eco-system they live in (Rao and Rao, 1994). It has been clearly observed by many that the incidence of under-nutrition is highly prevalent among women from poor and disadvantaged groups in India. However, refuting to what many said, these disadvantaged groups are found to be less strictly adhered to the rigid norms and practices against women (Bardhan (1993), Derze and Sen (1995) and Miller (1997) cited in Jose 2011).

There exist studies focussing on the tribal population of states in India (Khongsdier 2005, Mittal and Srivastava (2006).

Various studies like, Bose and Chakraborty (2005); Bose et al (2006a); Bose et al (2006b) suggest that there is an urgent need to assess the nutritional status of adult tribes in India to have a sense of the severity of the existing problem among the tribal, underprivileged and unreserved population of India (Banik et al, 2007). Truly, the nutritional status has intricate linkages with dietary habits as well as the ecology of the population; hence further research in this context is essential (ibid).

A study done by Griffiths and Bentley (2001) in Andhra Pradesh found that women belonging to lower socioeconomic groups were more likely to have a low BMI and that socio-economic status is an important predicator of under-nutrition.

The results obtained by Mondal and Sen, (2010) strengthen the fact that under-nutrition was more prevalent among the tribal communities.

There exists evidence to prove discrimination in accessing primary health services among SC women and children communities, leading to poor health outcomes in such communities (Sangamitra's study (2010) as cited in Sabharwal, 2011.

Studies reveal discrimination based on social groups such as SC/ST's are matters of serious concern as they contribute significantly to under-nutrition (Sabharwal, 2011).

According to Desai et al. (2010) STs are the most deprived followed by the SCs and then OBCs. Radhakrishna and Ravi (2004), found that most of the poor states which had higher proportions of disadvantageous groups like the schedule caste and schedule tribe showed worst performance of child nutrition.

Macinko et al (2003), observed that the burden of ill health is borne disproportionately by different population subgroups and that people of lower socio-economic status consistently experience poor health outcomes.

There is abundance of literature which provides evidence of a close relationship between the tribal ecosystem and their nutritional status. Rao et al (2006) carried out a study on the Saharia tribe in Kishanganj and Shahbad blocks of Baran district in Rajasthan to assess the diet and nutritional status of the Saharia tribal population. The study revealed that the prevalence of under-nutrition among children of age group 1-5 years were significantly higher (72 per cent) than that reported for the State of Rajasthan (48 per cent). Illiteracy was a major problem which was as high as 81 per cent and 96 per cent for male and female respectively. Among the tribal, the breast-feeding practices were initiated only after the third day and most of the mothers, about 85 per cent would discard the colostrum because of reasons such as belief that it was not good for the new born, on the advice of elders or traditional practice.

Religion

Children belonging to Christian and Sikh communities score better in nutritional status as compared to Hindus and Muslims (Sabharwal, 2011).

The subsequent section reviews the literature on the policy interventions in the state of Jharkhand.

2.3 Policy Interventions

Serious efforts have been made to reduce the disparities in health outcomes, but most of them proved ineffective. Schemes such as Integrated Child Development Services (ICDS) which has been launched over three decades and Mid-Day Meal have failed to meet expectations.

2.3.1 Integrated Child Development Services

Integrated Child Development Services introduced in 1974 by the Indian Government is one of the early child development and nutrition intervention, expanded progressively across the nation during the 30 years of its existence and has been addressing underlying causes of under-nutrition in India (Gragnolati et al, 2006).

ICDS program is inherently performing poorly in states where child under-nutrition is most serious, which includes Jharkhand (Midterm appraisal of the Tenth Five Year Plan: Extracts of overview and priority areas for action, 2005).

One of the challenges of ICDS was that although there was increase in the ICDS coverage both in terms of geographical area and number of persons benefitted; these were without expansion of resources (Gragnolati, 2005).

ICDS gave disproportionate attention to older children instead children below age three and pregnant mothers to curb under-nutrition (Dubowitz et al, 2007).

In other words it can be said that the three operational mismatches related to the ICDS is the kind of services prioritized by ICDS; the characteristics of the beneficiaries; and the geographic areas targeted by ICDS (Gragnolati et al, 2006).

The utilization of any services provided by ICDS varies significantly across economic status of households (Pathak et al 2011)

Studies also reveal that the coverage of the ICDS program in Jharkhand did not provide any supplementary nutrition to the adolescent girls.

There existed huge variations in the access to the ICDS which could be obviously seen from worst nutritional outcomes reported by different states (Deolalikar, 2004; Gragnolati et al., 2005).

Evidence from studies (Bhatia et al, 2001) on the long-term nutritional effects of ICDS by indicated that attending an anganwadi center had no significant effect on the under-nutritional status. On the other hand there are studies like Vaid and Vaid (2005), which show positive improvements among the children from the ICDS areas and non-ICDS areas.

Lokshin et al., (2005), have found that the major problem the ICDS suffers of is the program placement. He said it was 'regressive across states' as there were states which direly needed the program has low coverage and low budgetary allocation while it was 'progressive within states' as there was a high probability of having an ICDS in a poor and large village.

A very recent study done by (Kandpal, (2011) using the NFHS round three data analyzed the impact of ICDS. The author although found that there were positive effects of the ICDS, it most often failed to properly target areas which were below the average levels of education and unequal sex ratios.

As a response to the many challenges which the ICDS was facing and also to improve the delivery and utilization of the ICDS services, the UNICEF and the Government of Bihar launched a scheme in 1999 called "Dular" (Dubowitz et al, 2007).

After many efforts the scheme was launched in Jharkhand on 2001 soon after it became a separate state. One of the positives of the scheme was additional outreach by the neighborhood-based volunteers (Dubowitz et al, 2007).

Not only did the coverage and utilization of ICDS vary across regions, the allocation of budget followed the pattern (Lokshin et al., (2005). Deolalikar, (2004) found that the states of Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan which had worst nutritional outcomes were seen spending Rs. 30 to 50 only per child. While states like Gujarat, Punjab, Haryana, and Tamil Nadu having better nutritional rates spent Rs. 90/- to Rs. 170/- per child.

Such an approach proves beneficial as the volunteers are locals and disseminate information on the practices and beliefs followed, for instance in the state of Jharkhand one very common practice among tribal mothers is commencing a fast soon after the child-birth, affecting both mother's and the infants health (Ibid).

Their study showed variations among the villages which had the normal ICDS activities, the villages which had ICDS activities and village contact drive and those villages which had ICDS activities, village contact drive and actively working LRP's. Children belong to age one or more were severely underweight in the villages having the ICDS activities only (Non-Dular villages) as compared to children who belonged to villages with ICDS activities and village contact drive (Dular village). Also Dular mothers were 82 per cent more likely to give colostrums to their infant child than mothers in the regular ICDS program (Dubowitz et al, 2007).

As a result of such an initiative, the prevalence of severe underweight in Dular areas in the state of Jharkhand dwindled to roughly half than in areas with the regular

ICDS program after three years of program operation. Similarly in Bihar, the prevalence of severe underweight dropped by more than two-thirds in 3 years i.e. from 19.6 per cent to 4.3 per cent, while wasting rates among children from Dular village was less than two-thirds of those from normal ICDS program (Abbott et al, 2005) as cited in Levinson et al, 2007.

The success rates of Dular program in Bihar and Jharkhand has motivated the Government of India and UNICEF responding to which a three-year project in 2009 was inaugurated to further extend it to 22 million children across India (UNICEF, India, 2005).

2.3.2 *Mid-Day Meal Scheme*

Another nationally implemented scheme is the Mid-Day Meal scheme.

The school lunch programme marks its history since 1885 when it was first introduced by Victor Hugo in France in 1885. After which, the school lunch practice was adopted across the globe, e g, US (1946), UK (1945), Japan (1947), China (1964-69), Australia (1950), Switzerland (1946), Singapore (1975), Indonesia (1967), Thailand (1970), and Korea (1973). It reached India in 1925 in the city of Madras. It reached to other cities- in 1928 it was started in Calcutta, Kerala (1941) and Bombay 1942. The present school lunch program was launched in 1995, aiming to provide elementary education and improving nutritional status of school children. However, it was only after the Supreme Court order in 2001 the number of states providing mid-day meal rose up in which it directed the launch of the program by all state governments. Today it covers 11 crore primary and upper primary children from the initial number of 12 lakhs. Certainly the Mid-day meal program has impacted the education attainments in almost all the states of the nation.

Studies conducted prove that the MDM has succeeded in increasing the enrollment, retention and attendance among school children. A study done by Sen's study (Pratichi Research Team), 2005 reveals the success of the MDM in the Birbhum

district of West Bengal. Moreover, the number of enrollment was higher among girl against boys belonging to ST/SC categories.

In Rajasthan, (University of Rajasthan and UNICEF, 2005) MDM apart from positively impacting enrollment and attendance, irrespective of caste and class has also provided employment opportunity to women.

Similar study conducted in Madhya Pradesh marks an improvement of 15 per cent in enrollment of students from general categories and 43 per cent from ST/SC categories.

Likewise is the case in Karnataka, which succeeded in reducing teacher absenteeism. In Khudra district of Orissa, MDM brought children to school reducing absenteeism and improving the performance of children along with providing employment opportunities to those from the underprivileged societies.

A study done in Andhra Pradesh (Sinha 2008), found that the MDM has been effective in removing class room hunger, as one of its objectives. Apart for reducing social discrimination it has also been successful in generating livelihood opportunities for rural women.

In Madhya Pradesh (Jain and Mihir, 2005b), the MDM was eagerly accepted by parents as they felt this reduced the burden of feeding their children one time meal. The attendance and drop outs have been impacted positively specially among girl child (Dreze and Goyal 2003). For studies conducted have shown effective enrolment of girls, such as Lok Adhikar Network study (2002) in the Barmer district of Rajsathan records a 36 per cent increase, while according to the Centre for Equity Studies (CES) survey conducted in 2003, 19 percent increase in enrollment for girls children in schools as cited in Ghatak (u.d.).

Apart from the state, independent organisations are also taking initiative to aim towards the universalization of the elementary education.

The Akshaya Patra Foundation (TAPF), launched a new privately funded programme named Akshaya Patra School Meal Initiative, now a national programme in the states of Karnataka, Andhra Pradesh, Uttar Pradesh, Rajasthan, Gujarat, and Orissa providing meals to almost 9.1 lakh children. Similarly the Naandi Foundation provides mid-day meal to more than a thousand government schools in the state of Andhra Pradesh and almost to thousand schools in Madhya Pradesh and Rajasthan (SSMI, 2008) as cited in Ghatak (u.d.).

The MDMS, like other schemes of the government, has also been a victim of corruption and leakages. A study by Gangadharan (2006) in Kerala showed the poor performance of the MDM where only 50 per cent of the schools had proper physical facilities, the expenditure was far less than the government grant for the scheme, the panchayati raj institutions showed little interest and demand to make the MDM full-fledged for teachers also.

A study of MDMS in Delhi by De et al (2005) as cited in Ghatak (u.d.) found the low quality food items were served to children. There has been much evidence of children failing ill after consuming the mid-day meal. Other problems faced were lack of adequate infrastructure such as toilet facilities and insufficient quantity of food served.

Apart from the quality of food, there were also concerns raised on the quality of food provided depending on the requirements of different age groups (Jain and Shah (2005a).

A study conducted by Thorat and Lee (2004) in the states of Rajasthan, Uttar Pradesh, Bihar, Andhra Pradesh and Tamil Nadu, showed the Dalit children were discriminated as most mid-day meals were served in the dominant caste localities i.e. non dalit population areas. Apart from exclusion from the mid-day meal they even faced discrimination in terms of seating arrangement etc. For instance in Bihar, plates were named by the child's caste, while in in Rajasthan, children belonging to the lower caste were not allowed to self-serve water.

Reports were also found on discrimination against appointment of cooks belonging to lower castes (Jain and Shah (2005a).

Moreover, it was seen that in the state of Andhra Pradesh, which had the highest percentage of dalit cooks, dalit organizers and mid-day meals in dalit localities, reported less percentage of caste discrimination which was otherwise in Rajasthan having lower participation of dalits in the mid-day meal scheme.

One of the essential objectives of the MDM is providing nutritious meal depending on the menu and cooking practice, which was often ignored by the states. In Madhya Pradesh and Rajasthan, under the mid-day meal 'dalia' and 'ghooghri' were served (Khera 2006). Afridi (2005) in his study has tried to assess the nutritive content in the mid-day meal served in the state of Madhya Pradesh in the Chindwara block. On the basis of the study done, it was found that meals like dalia provides only 11 per cent of a child's RDA, in terms of actual intake provide while varied menu meals such as Suruchi Bhojan Program are much better providing 22 per cent of calorie.

A study CUTS (2007) in Rajasthan found that initially students were being distributed boiled wheat supplemented with groundnut and jaggery (Gur) under the MDMS.

Also parents preferred lifting dry rations instead of the dalia meal program mainly because of the dissatisfaction towards the cooked meal in terms of quality, taste, nutritive content and quantity served (Afridi 2005).

Another issue in regard to the serving mid-day meals in schools was disruption in the school. Teachers were often found spending most of their precious time in arranging or cooking mid-day meal instead of teaching. Also there often occurs disruption in absence of proper kitchen shed in schools (Dreze and Goyal, 2003).

Few schools also lacked proper facilities, as a result children were asked to bring plates and tumblers from their houses. In Rajasthan, children belonging to poor

families due to unaffordability of utensils were found eating on pieces of paper (Dhananjayan and Chandran, 2003).

However, most of the issues of the Mid-day meal are been addressed and the scheme is growing coverage in terms of number of students across the states.

2.4 Research Gap

The above review of various research studies certainly gives an important insight into the different factors which has an influence on the child nutritional status. From the above study we clearly see that factors like household economic status, education of mother, employment status of parents, source of water and availability of toilet facility, child morbidity, age of child, birth order, birth interval of child, maternal nutritional status and availability of medical facility significantly influence the nutritional status of child and adults. Also the policies targeting in the areas where special attention is required such as pre and post pregnancy initiatives has significant effects on the nutritional status of children.

Very few studies emphasized on the influence of the type of family on child nutritional status.

1. Studies dealing with under-nutrition in Jharkhand are very few in number.
2. Few studies have dealt with differences in under-nutrition based on sex for adults

Given the above gaps, this study aims to make a modest contribution in the field of under-nutrition with special reference to the state of Jharkhand.

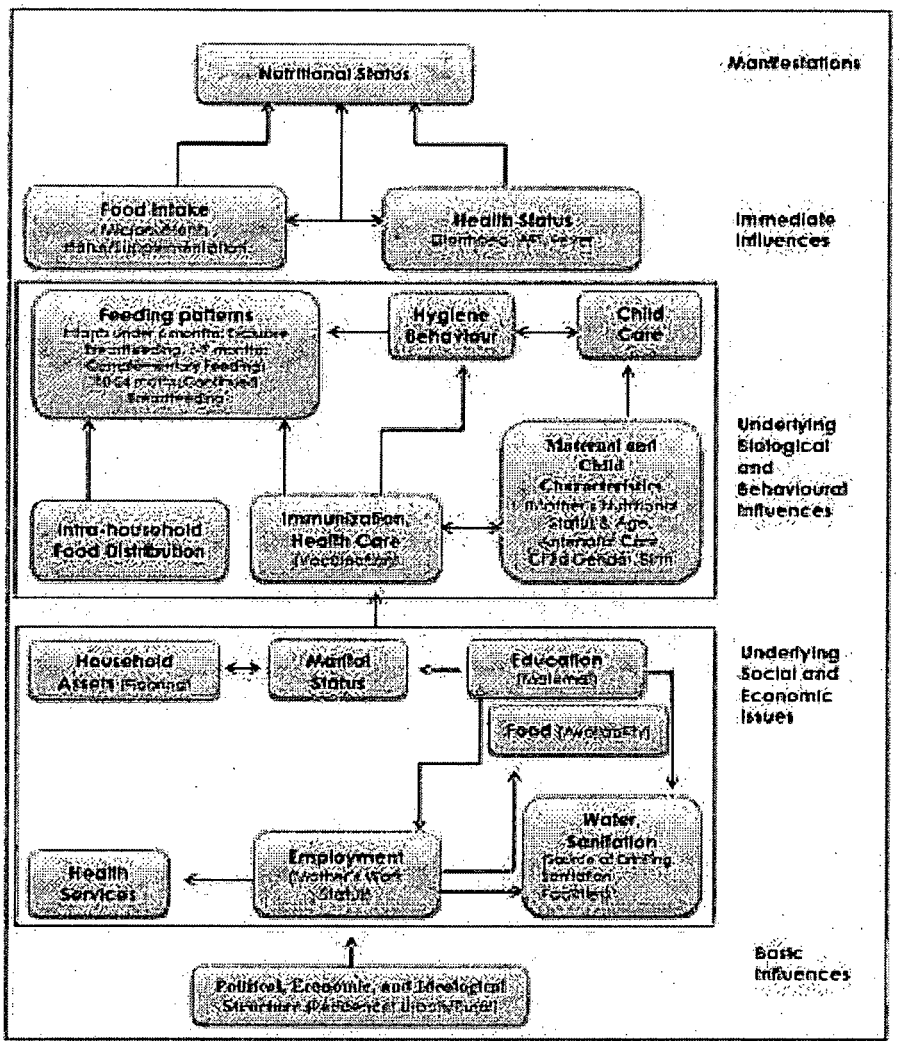
2.5 Basic Framework for determinants of child under-nutrition

The UNICEF conceptual framework of the determinants of child nutritional status provides a generalized understanding of how under-nutrition is the outcome of specific development issues which directly influences the dietary intake and the health status of the individual.

To start with, immediate influences which cause under nutrition include dietary intake and health status, is determined by the underlying determinants i.e. household food security, quality of care and healthy environment and health services. However, it is of equal importance to note whether the food available is effectively utilised through proper caring practices. The three underlying issues together are of equal importance and either if it cannot be ignored.

These underlying determinants are not limited to the availability of food but also to the physical and economic access to food a child or his/her care giver-generally father or mother has, their knowledge of utilization of the available resources in proper manner, his or her own health and finally his/her control over household.

FIGURE 1: CONCEPTUAL FRAMEWORK OF CHILD NUTRITIONAL STATUS



Source: Adapted from Mukuria (2005b)

Additionally, information on services for proper maintenance of health and presence of a healthy environment which includes safe drinking water, sanitation facilities and household flooring status, contribute to the nutritional status of an individual.

These underlying determinants are further influenced by a set of basic determinants.

Availability of food, access to healthcare services, health related behaviour and environment are supported by the political economic and ideological structures in a country (Mukuria, 2005a).

Availability and access to food and dietary quality is different dimension from which food security can be assessed. Most common measure to analyse food security is by seeing the proportion of the population who meet the daily energy requirements. Also by using the household surveys, the dietary quality assessment could be useful in analysing the food security status. Although, these estimates are widely employed, they are criticised to be imprecise in nature.

Similarly, it is difficult to directly measure quality of care. Proxies such as female education are used. Many studies have shown a child's nutritional status varies with parents' education levels specially mothers. Other indicators are availability of public health services for providing prenatal and post natal care is essential. Finally mother's control over resources and decision making is highly correlated with the nutritional status of a child. Other measure to assess the care provided by health services is by considering the availability health professionals, health facilities, immunizations, care given to pregnant mothers, safe drinking water, and sanitation.

CHAPTER THREE

PATTERNS AND DETERMINANTS OF CHILD UNDER-NUTRITION IN JHARKHAND

3.1 Introduction

Malnutrition is associated with more than half of all child deaths worldwide (Pelletier et al. 1995). It is also considered as the source of major wastage of resources and lost productivity because children who are malnourished are less physically and intellectually productive as adults (Gillespie and Haddad 2001). The burden of under-nutrition is highest in India, despite impressive economic growth achieved in the recent years. Hence, reduction of child under-nutrition is one of the major challenges the country is facing today. Therefore, to cut down the under-nutritional rates cannot be viewed as economic issue alone, but can be seen from a broader perspective of welfare, social protection and human rights issue (Pathak et al, 2011). As seen from the national figures, under-nutrition is a prime concern in almost all states; however it is more prominent in some of the states *viz.* Bihar, Jharkhand, Uttar Pradesh, Madhya Pradesh and Rajasthan as discussed in the introductory chapter.

In this regard, the present chapter attempts to investigate the nutritional pattern of children in Jharkhand. Thus, much emphasis is given to understand the effect and size of under-nutrition, using the anthropometric measures already discussed in the previous chapters. In order to achieve the first objective, we would analyse the determinants using the bivariate and multivariate analysis.

3.2 Assessing Child under-nutrition using anthropometric measure:

3.1.1 Bivariate Analysis

Using the unit level data provided by NFHS III on different background characteristics, the following table (Table 3.1) was compiled which presents the under-nutritional status of children from 0-59 months. The nutritional status of children have been reported based on the three standard indices of physical growth: stunting, wasting and underweight by different socio-economic and demographic characteristics[5]. The three indicators are expressed in standard deviation units (z-scores). According to the WHO standards, a child having a Z-score below -2SD is considered stunted, wasted or underweight and a Z-score below -3SD is considered as severely stunted, severely wasted or severely underweight. However, in the analysis below, the figures for severely stunted, wasted or underweight has not been shown separately.

The table below (Table 3.1) highlights that almost one half of the child population are stunted (49 per cent), while more than half of them are underweight (57 per cent) and 33 per cent are wasted. Apart from Jharkhand, few other states which suffer from high under-nutrition levels are Madhya Pradesh and Bihar while states like Goa, Mizoram, Sikkim, Kerala, Punjab and Manipur are comparatively in a much better position (NFHS, 2005).

Further, the pattern of under-nutrition among children varies across age. Of the total number of children less than six months of age only 14.3 per cent were stunted. Similarly for underweight and wasted, it was 30 per cent and 41 per cent respectively. However, at higher ages the rates of stunting increased though, not very significantly. In the age group of 12-23 months almost 60 per cent of the total children were stunted. Similar was the underweight (61 per cent) and wasted (42 per cent) figures. Nutritional status of children did not differ much across sex.

[5] The total number of children under each category is 1390.

Among the total number of children, 52 per cent males were stunted, while 58 per cent were underweight and 33.4 per cent wasted. However, it is notable that the nutritional rates for girl child were better than those of boys.

A child's weight at birth indicates its susceptibility towards illness and survival. As this information is not captured in the NFHS data, a proxy was used by obtaining information regarding the size of the child at birth. It has been observed that a child who is reported as 'very small' or 'smaller than average' faces greater risk of infant deaths (NFHS, 2005). From the Table 3.1 we observe, children who were of very small size during birth witnessed high underweight rates as well.

Birth interval and birth order indicates the child's well-being. Short birth intervals, being associated with low birth weight and with intrauterine growth retardation, increases the levels of stunting and underweight among children. It also has adverse effects on mother's health and risks child survival. As seen in table 3.1, preceding birth interval of less than 24 months is related to poor nutritional outcomes, whilst intervals of 48 months or longer are associated with better nutrition rates (Mukuria, 2005b). Studies have revealed that the optimal interval between two live births should be 3-5 years, which reduces neonatal and infant mortality (Rutstein, 2005).

Contradictory to the above, higher birth orders indicate poor nutritional status. In Table 3.1, birth of first child represents lower under-nutrition rates compared to higher birth orders, since the first birth is more likely to be delivered in an institution. This implies increase in under-nutrition rates with subsequent births orders. Not surprising, institutional birth is common only in the case of urban areas in Jharkhand, with 19 per cent of births delivered in a health facility of which 54 per cent in urban areas and only 11 per cent in rural areas (NFHS, 2005).

Children's health is closely related with maternal health characteristics. Children whose mothers are underweight i.e. have a BMI of less than 18.5 are more likely to be undernourished as compared to children of mothers having a BMI above 18.5. Mothers having a BMI less than 18.5 had 52 per cent of the total children stunted, 70 per cent of the total underweight and only 40 per cent of the total children as wasted.

Likewise in reference to mother's educational attainment, it is observed that uneducated mothers have undernourished children for the fact that their child bearing and rearing practices would be different from the educated mother. Moreover, uneducated mothers often have little information about the best practices for their child. Her educational status in turn is linked with the higher household income, thereby strengthening her abilities to handle uncertainty either economic or environmental. Analysis reveals (not shown) that almost 70 per cent of children who are stunted, wasted or underweight belong to unemployed mothers.

Father's education although does not directly influence the child's nutritional status like the mother's but does in terms of household income (Mosely and Chen 1984).

Mother's employment status indicates her economic well-being. It has been found that mother's employment status has a direct impact on the nutritional status of children. Table 3.1 shows higher under-nutrition rates for children whose mothers are working than unemployed mothers. This could be due to poor affordability of resources in the household which necessitates mothers to undertake work. However, income alone cannot be blamed for high under-nutritional status of children if the family can afford proper food and health care. Time constraint on the part of mother who has to work to supplement the family income, can be an important factor. The role of care givers is seen to have a significant relationship with the nutritional outcomes, which again depends on the household's economic status (Begin et al, 1998).

Moreover, mother's exposure in terms of education or employment influences her decision making behaviour in regard to her antenatal care, child's health and hygiene. Almost 44 per cent of children whose mother had no antenatal care were either found to be stunted, wasted or underweight. Moreover, of the total children whose mothers received antenatal care, 44 per cent were stunted, 64 per cent were underweight and 32 per cent wasted. As recommended by the WHO, during pregnancy mothers should have one or more visits with a skilled medical attendant (WHO and UNICEF, 2003) as this contributes to improved birth outcomes.

In Jharkhand, the median age at first marriage for women between 20-49 years of age is 16.2 years and it is 20.8 years for men aged 25-49 years. It is observed that, 63 per cent of women who belonged to the age category of 20-24 years (at the time of the survey), had actually married before attaining the legal minimum age of 18 years. Whereas for men belonging to 25-29 years of age, around 47 per cent of them had married before attaining the legal minimum age of 21 years. It is thus observed that, at the age between 15-19 years, more than one-quarter (28 per cent) of women already started childbearing. This is very high and prevalent in the rural areas compared to urban areas.

Additionally, Jharkhand has the highest prevalence of teenage motherhood in India. These young and undernourished mothers have a high chance of delivering low birth weight babies. Younger women usually have low BMIs compared to older women and tend to have higher risk of low birth weight infants (Karim and Mascie-Taylor, 1997). In the case of Jharkhand, 52 per cent, 58.8 per cent and 32.8 per cent children were stunted, underweight and wasted respectively born to mothers who were less than 20 years of age during delivery.

Huge differences exist in the rural-urban under-nutritional rates for children. The reasons for such differences could be because of the immediate causes which include improved accessibility to food in all seasons and health care in urban areas, women's educational attainment, availability of water and sanitary facilities, socioeconomic status, women's decision making power, access and utilization of antenatal and delivery care, quality of complementary feeding and immunization (Smith et al., 2004).

Variations also exist in the levels of under-nutrition across broad caste categories. Jharkhand is inhabited by 28 per cent of the tribal population, of which 65 per cent is underweight, 52 per cent are stunted and 40 per cent are wasted. Existing studies (Desai et al., 2010 and Radhakrishna and Ravi, 2004) have revealed that under-nutrition outcomes are higher among these disadvantageous groups than the other groups.

One of the main religions followed in the state is Hinduism; but the tribal populations mainly follow Christianity or Sarna. Analysing the groups based on religion, it is observed that, in the case of children belonging to Christian population, 61 per cent were stunted, 67 per cent underweight and 44 per cent wasted. Whereas, among the children from the Hindu population, 48 per cent were stunted, 56 per cent were underweight and 31 per cent wasted. Results reveal that when under-nutrition is examined using the three measures, Hindu population with better household status seems to have better nutritional level than the Christian population. A study by Sabharwal (2011) for India found that among the SC population, Christian had better nutritional outcomes relative to those from Hindu and Muslim groups.

Next we move on to examine the association between the variables and the measures of under-nutrition. Employing the Pearson Chi-Square value, we analysed the association between the independent variables used in the study and the dependent variable i.e. the three measures of nutritional status. The chi-square values were taken to be significant at p value less than 0.05 (5 per cent level of significance). Based on this significance level, we accept or reject the hypothesis.

In the case of stunting, under all categories-demographic, maternal, social and economic, all variables show significant contribution to the under-nutritional status of a child except for sex of child and employment status of mother. Likewise, in the case of underweight, excluding sex of child and preceding birth interval, all other variables are significant. The variables sex of child, birth interval, birth order, religion of child, employment status of mother and delivery age have no influence on the weight-for-height of a child.

TABLE 3.1 PERCENTAGES OF CHILDREN STUNTED, UNDERWEIGHT AND WASTED

Variables	Category	Stunted (SD)	Underweight (SD)	Wasted (SD)	Total
Demographic Characteristics					
Age of child in months	< 6	14.3*	30.3*	40.8*	98
	6-12	31.1*	48.2*	35.2*	164
	12-23	59.9*	60.6*	42*	269
	24-35	57*	62*	28.1*	256
	36-47	56.4*	62.3*	27.4*	321
	48-59	49.1*	57.8*	29.4*	282
Sex of child	Male	52.1	58.4	33.4	664
	Female	47.7	55.8	31.8	726
Birth order	1	46.5*	54.9*	34.2	357
	2 to 3	46.9*	53.1*	29.8	557
	4 to 5	55.3*	62.8*	33.7	309
	6+	55.7*	64.1*	36.5	167
Size at birth	Average or Larger	48*	55*	31.1*	1075
	Small	50.5*	58.9*	33.3*	214
	Very Small	66.7*	74.5*	46.2*	93
Preceding Birth interval	<24	57.9*	60	27.6	280
	24-47	48.8*	56.7	32.2	541
	48+	47.2*	57.7	37.7	212
Maternal Characteristics					
Body-Mass-Index of mother	Less than 18.5	51.7*	62.9*	40*	638
	18.5-24.5	49.2*	53.2*	26.8*	708
	25 or >	25.7*	28.6*	11.4*	35
Mother's Education in Years	No Education	54.2*	62.9*	35.5*	912
	< 5	46.6*	57.3*	28.1*	89
	5 to 9	49.8*	50.8*	30.2*	258
	10+	21.4*	28.2*	19.8*	131
Employment status of mother	Not Employed	48.8	54.8*	32.7	985
	Employed	52.6	62.9*	32.2	399
Antenatal Visits	None	53.8*	63.8*	38.2*	390
	1-3	43.9*	50.1*	32.1*	601
Age at Delivery	<20	52*	58.8*	32.8	1128
	20-34	40.1*	49.6*	31.9	263
Socio-Economic Characteristics					
Type of place of residence	Urban	35.1*	39.6*	24.6*	265
	Rural	53.2*	61.2*	34.5*	1126
Type of caste or tribe	SC	53.4*	56.9*	29.7*	174

Table 3.1 contd.

	ST	55.2*	65.5*	40.1*	406
	OBC	49*	55.7*	30*	619
	Other	38.1*	43.9*	27*	189
Religion	Hindu	47.8*	56.3*	31.7	952
	Muslim	46.3*	50.4*	31.4	242
	Christian	61.8*	67.3*	43.6	55
	Others	64.5*	69.7*	36.9	141
Wealth Index	Poorest	55.4*	64.5*	35.4*	260
	Poorer	56.6*	65.2*	38.7*	279
	Middle	53*	61*	32.6*	282
	Richer	52.6	57.5	33.8	287
	Richest	32*	37.6*	22.8*	281
Total		49.8	57.1	34.6	

Source: Compiled from NFHS III 2005-06

Note: The total percentage figures of children S, W and U slightly differ from that of the published figures in the India and Jharkhand Report mainly because of the variations in reporting the total number of children in different files used.

However, from the above analysis only the gross differentials can be seen hence in the subsequent section of the study, multivariate analysis has been used to see the net effect of individual predictor on the dependant variables.

3.1.2 Multivariate analysis

As discussed above the limitations of the bivariate analysis, this section deals with the multivariate analysis which is one of the most common and widely used applications in the field of public health and nutritional research. Multivariate analysis is employed to understand the net effects of each predictor variables or background factors on dependent variables after controlling for other independent variables in the model. Of the many techniques, logistic regression has been used to understand the effects of the predictor variable on the dependent variable.

Logistic regression is used when the dependent variable is dichotomous i.e. value 1 or 0. In this study, the dependent variable is stunting, underweight and wasted which has the value 0 or 1 in case of not stunting or stunting respectively.

Various studies have proved the use of logistic regression in the understanding the net effects of health outcomes (Poluru and Mukherjee, 2010; Jose and Navaneetham, 2010; Parasuraman and Rajaretnam 2011; Das and Sahoo, 2011). Hence, given the nature of data used in this study, logistic regression proves to be the most appropriate form of analysis technique.

To perform this multivariate analysis, indicators have been used from the UNICEF framework (refer to Chapter Two). The framework presents a generalized understanding of how under-nutrition is the outcome of specific development problems which in turn has direct relation to the dietary intake and the health status of the individual. The factors which influence the nutritional status of a child can be divided into four heads *viz. basic influence, underlying social and economic issues, underlying biological* and *behavioural influences and immediate influence.* In this study, 16 proxy variables are included for different categories as presented in the table below.

TABLE 3.2: INDICATORS IN THE FRAMEWORK

Factors		Variables selected
Basic Influences	Residence	Rural-Urban
Underlying social and economic influences	Education	Mothers education
	Employment	Mothers employment status
	Household Assets	House flooring status
	Water Sanitation	Sanitation facilities and Source of drinking water
Underlying biological and behavioural influences	Maternal Characteristics	Maternal nutritional status, Antenatal care, Age at delivery
	Child Characteristics	Sex of child, Size at birth, Birth order, Preceding Birth Interval
	Feeding Practices	Initiation of breastfeeding practices and Supplementary Nutrition
	Vaccination History	Immunization
Immediate Influences	Recent Illness	Acute Respiratory Infection Symptoms and Diarrhoea

As already mentioned in the introductory chapter, the three anthropometric indicators capture different aspects of a child's growth and development, hence they

have been estimated separately. For these models, the dependent variable is taken as stunting, wasting and underweight. The independent variables included in the model are- *age of child, sex of child, birth order, size of birth, BMI status of mother, education status of mothers, employment status of mothers, age at delivery, initiation of breastfeeding, ever had diarrhoea, ARI symptoms-cough, ever had fever, place of residence, caste, religion and wealth index.* Although few variables have proved to be significantly contributing to under-nutritional status of children (as seen in the bivariate analysis section), we have excluded them to avoid problems in the model fit. The variables dropped[6] were *antenatal visit, preceding birth interval, vaccination history, ARI symptoms-short and rapid breaths, safe drinking water, sanitation facilities, flooring status, sought treatment for diarrhoea, sought treatment for fever.* Apart from the variables mentioned in the framework employed in this study, we also include certain variables, *viz.* wealth index, religion, caste and age. Existing studies (Rao and Rao, 1994; Derze and Sen, 1995; Ravishankar, 2002 and Susmitha Bharati et al, 2008) already discussed in Chapter Two justify the importance of these variables while understanding the causes of under-nutrition among children.

The model significance has been provided by the log likelihood ratio test. It is a test of significance of the difference between the likelihood ratios for the model fitted with predictors minus the likelihood ratio for model with the constant only. At 5 per cent level of significance, we reject the hypothesis for the three models estimated, which implies the model with the predicators is different from model with constant only. Hence the models estimated are a perfect fit.

From the logistic regression estimated, odds ratio (OR) are reported. The odds ratio indicates the changes in likelihood outcomes to changes in predictors. In other words, it would show the increased or decreased chance of under-nutrition given a set level of the independent variable while controlling for the effects of other variables used in the model. If the value exceeds 1 then the odds of an outcome occurring is more likely compared to the reference category. On the other hand the value less than 1 implies the chance of the outcome is less likely. However, an OR equal to one means there is no change.

[6]The number of missing values was close to the number of valid cases.

We estimate both unadjusted and adjusted odds of each of the 16 predictor variables on the three measures-stunting, underweight, and wasting. The 'unadjusted odds' for categories of a predictor variable are estimated from different logistic regression wherein, only that predicator variable is considered. The 'adjusted odds' implies that, the other demographic and socioeconomic variables, selected for the study are statistically controlled. On the other hand unadjusted odds do not include control for any other confounding predictor variable, since the logistic regression considers only one predictor.

Hence for each predictor variables separate logistic regression is run. While for the adjusted odds, all the 16 predictor variables are included in one single logistic regression. Theoretically it can be defined as the odds of a dichotomous event being true not adjusted for other variables whereas, the adjusted ratios is the odds of a dichotomous event being true adjusted for other possible contributions from other variables in the model. Often there exists great discrepancy between unadjusted and adjusted odds ratio. So this implies that there is little confounding of the effects of one predicator (say, sex of child) as a result of the other predictors (say, place of residence, mother's education etc.) in the adjusted model.

The results of the three logit model performed in the SPSS package are detailed below in Table 3.3 for stunted, Table 3.4 for underweight and Table 3.5 for wasted. The three models have been shown separately for the reason that the three anthropometric measures have different effects on the nutritional status of children. Stunting is a deceleration or cessation of growth, which has a long-term effect; while wasting is a short-term response to inadequate intakes, commonly assessed by weight relative to height. Under-weight could be low because of stunting (short stature) and/or wasting (recent weight loss).

i. Results of Logistic Regression for *Stunting*

The results indicate that several variables have significant influence in determining whether a child is stunted, wasted or underweight. As explained earlier there exist

conflicts between the unadjusted and adjusted odds ratio for place of residence, mother's employment, sex of child, initiation of breastfeeding, ARI symptoms and birth order.

Results show that most of the demographic characteristics had significant influence on the height-for-age of children. Children who belong to age group 12-23 months were almost 1.5 times more likely to be stunted than children who belonged to age group 48-59 months.

Studies have shown that, the rates of stunting are seen to be higher in the age group 18-23 months (Mukuria, 2005b and NFHS, 2005-06). It decreases with increase in the age. This can probably be attributed to the feeding pattern of the children.

Mother's education did have an important role to play in deciding the child's nutritional status which is evident from the high odds ratio. The unadjusted odds ratio reported for mother's education exceeds that of the adjusted odds ratio for all sub-categories. This can be explained by the absence of other confounders which makes the unadjusted odds ratio more pronounced. Children of mothers who were not educated were almost 4 times more likely to be stunted than children whose mothers were educated for more than 10 years. The adjusted odds ratio for mother's educational status also stands highly significant with high odds ratio. As can be seen from the Table 3.3, children of mothers who were not educated were almost 3 times more likely to be stunted when compared to those who had education above ten years.

TABLE 3.3 LOGISTIC REGRESSION ESTIMATES FOR STUNTING

Variables		STUNTED	
		Unadjusted Odds Ratio	Adjusted Odds Ratio
AGE	48-59	1	1
	<6	0.17*(0.09-0.32	0.13* (0.07-0.26)
	6-12	0.46*(0.31-0.7)	0.35* (0.22-0.55)
	12-23	1.54**(1.1-2.17)	1.49** (1.03-2.16)
	24-35	1.37***(0.98-1.93)	1.38*** (0.95-2.0)
	36-47	1.33***(0.97-1.84)	1.28 (0.87-1.74)
PLACE OF RESIDENCE	RURAL	1	1
	URBAN	0.47*(0.36-0.63)	0.92 (0.62-1.38)
MOTHER'S EDUCATION	10+	1	1
	NO EDUCATION	4.41*(2.85-6.86)	2.99* (1.69-5.31)
	<5	3.27*(1.81-5.91)	2.27** (1.14-4.53)
	5-9	3.70*(2.28-6.03)	3.28* (1.88-5.74)
CURRENTLY EMPLOYED	EMPLOYED	1	1
	NOT EMPLOYED	0.86 (0.68-1.09)	1.1 (0.84-1.45)
BMI	25 OR MORE	1	1
	<18.5	3.32 (1.51-7.3)	1.83 (0.71-4.74)
	18.5-24.5	3 (1.37-6.59)	1.83 (0.72-4.68)
DELIVERY AGE	20-34	1	1
	<20	1.62 (1.24-2.13)	1.41** (1.01-1.98)
SIZE AT BIRTH	VERY SMALL	1	1
	AVERAGE OR LARGER	0.46 (0.3-0.73)	0.40* (0.24-0.67)
	SMALL	0.51(0.31-0.85)	0.39* (0.22-0.70)
SEX	FEMALE	1	1
	MALE	1.19 (0.96-1.47)	1.34** (1.06-1.71)
INITIATION OF BREAST FEEDING	WITHIN ONE DAY	1	1
	IMMEDIATELY/WITHIN HALF AN HOUR	0.9 (0.63-1.29)	0.98 (0.65-.49)
	WITHIN ONE HOUR	1.18 (0.95-1.5)	1.34** (1.04-1.75)
DIARRHOEA	YES	1	1
	NO	0.9 (0.66-1.23)	0.86 (0.60-1.25)
ARI SYMPTOMS COUGH	YES	1	1
	NO	0.99 (0.76-1.29)	1.04 (0.71-1.54)
RELIGION	OTHERS	1	1
	HINDU	0.5 (0.35-0.73)	0.41* (0.26-0.66)
	MUSLIM	0.46(0.31-0.72)	0.38* (0.22-0.67)
	CHRISTIAN	0.89 (0.47-1.7)	0.97 (0.47-2.04)

Table 3.3 contd.

BIRTH ORDER	6+	1	1
	1	0.68 (0.48-1)	0.85 (0.56-1.32)
	2-3	0.69 (0.49-0.99)	0.81 (0.55-1.22)
	4-5	0.98 (0.67-1.43)	0.95 (0.63-1.46)
TYPE OF CASTE	OTHERS	1	1
	SCHEDULED CASTE	1.85(1.22-2.82)	1.47 (0.89-2.45)
	SCHEDULED TRIBE	1.98 (1.4-2.83)	0.95 (0.59-1.54)
	OTHER BACKWARD CLASS	1.55 (1.11-2.17)	1.21 (0.82-1.81)
FEVER	YES	1	1
	NO	0.86 (0.66-1.12)	0.9 (0.62-1.32)
WEALTH INDEX	RICHEST	1	1
	POOREST	2.63*(1.86-3.74)	1.62***(0.98-2.71)
	POORER	2.75*(1.95-3.89)	1.72**(1.06-2.81)
	MIDDLE	2.38*(1.7-3.37)	1.50***(0.94-2.41)
	RICHER	2.35*(1.67-3.31)	1.51***(0.99-2.32)

*p<0.01, **p<0.05 and ***p<0.10

Odd Ratio 1.00 denotes reference category

Figures in bracket indicates Confidence Interval

The unadjusted odds ratio for the place of residence being less than one implies that children belonging to the urban areas are 0.47 times less likely to be stunted when compared to the children from the rural areas. The adjusted odds ratio for place of residence becomes insignificant after including control variables; hence it is not an important determinant of stunting.

Higher education is often a driving factor for better employment opportunities. In such cases, where mothers are away for work, the children often suffer from nutritional failures in the absence of any other care givers. However, in the case of stunting, mother's employment status has no effect on the under-nutritional status of children.

Delivery age of mother was also seen significantly contributing to the under-nutritional status.

The unadjusted odds ratio against the household status shows that children belonging to poorer group are more likely to be stunted than those belonging to the

richest class (reference category). Similar reasoning can be provided for the adjusted odds ratio.

From the above analysis, we see that in the case of unadjusted odds ratio, age of child, place of residence, mother's education and wealth status were significant. While the adjusted odds ratio for age of child, age at delivery, size at birth, mother's education level, sex of child, initiation of breastfeeding, religion and wealth status were significant.

On the other hand, there were few variables which did not show any significant effect on stunting both in the case of adjusted and unadjusted odds ratio such as, mother's employment status, BMI status, ARI symptoms, diarrhoea, caste, birth order, and fever. Thus, the variables including age, mother's education level and wealth status had more pronounced unadjusted and adjusted odds ratio as compared to other factors. This implies these variables were important determinants as they remain significant with the inclusion of control variables.

ii. Results of Logistic Regression for *Underweight*

Next we move on to discuss the underweight status of children in the state (Table 3.4). As already discussed, underweight reflects chronic or acute under-nutrition; hence often believed to express the overall nutritional status of a child (Rahman et al, 2008). From the table below (Table 3.4), we find almost similar results for children belonging to urban areas (OR=0.41).

Similarly, the unadjusted OR for educational status was higher than the adjusted OR. In other words, the effect of mother's education has reduced after controlling other variable, but it still remains significant, implying mother's education remains a dominant determinant of underweight among children.

Mother's employment status which was significant when a separate regression was run (i.e. unadjusted odds ratio), was no more significant after inclusion of other factors. The unadjusted and adjusted OR of BMI was high and significant. In the case

of adjusted OR, children born to mother's having a BMI less than 18.5 were 2.1 times more likely to be underweight than the reference category.

The unadjusted OR for delivery age infers that children delivered at the age less than 20 were 1.45 times more likely to be under-weight than those delivered between age group 20-34. However, this variable does not remain significant after controlling for other variables, hence not important.

The lower OR (both unadjusted and adjusted) for size at birth less than one shows the little importance the variable has in determining the nutritional status of children. The unadjusted odds ratio for religion holds significant, however, loses significance once it is controlled for other variables.

The unadjusted odds ratio for household status is significant while the adjusted odds ratio is insignificant. The presence of other predictors causes the household status to be insignificant. Similarly it was seen for caste.

The unadjusted odds ratio for age of child, place of residence, age at delivery, BMI, size at birth, mother's education level, mother's employment status, diarrhoea, religion, caste, birth order, fever and wealth status were significant. Conversely for the adjusted odds ratio, only few variables *viz.* age of child, mother's education level, BMI, size at birth, diarrhoea, fever, religion, and wealth status were left significant. Again, the odds ratio for mother's education level and BMI are more pronounced, hence considered as important determinants of underweight.

TABLE 3.4 LOGISTIC REGRESSION ESTIMATES FOR UNDERWEIGHT

Variables		UNDERWEIGHT	
		Unadjusted Odds Ratio	Adjusted Odds Ratio
AGE	48-59	1	1
	<6	0.31* (0.19-0.51)	0.26* (0.15-0.440
	6-12	0.68** (0.46-1)	0.49** (0.32-0.76)
	12-23	1.12 (0.8-1.59)	1.02 (0.70-1.48)
	24-35	1.18 (0.84-1.68)	1.16 (0.79-1.68)
	36-47	1.21 (0.87-1.68)	1.05 (0.73-1.50)
PLACE OF RESIDENCE	RURAL	1	1
	URBAN	0.41* (0.32-0.55)	0.84 (0.57-1.24)
MOTHER'S EDUCATION	10+	1	1
	NO EDUCATION	4.24* (2.84-6.35)	2.72* (1.58-4.67)
	<5	3.36* (1.91-5.992)	2.28** (1.18-4.41)
	5-9	2.58* (1.64-4.05)	2.10** (1.25-3.55)
CURRENTLY EMPLOYED	EMPLOYED	1	1
	NOT EMPLOYED	0.71* (0.56-0.91)	0.96 (0.72-1.26)
BMI	25 OR MORE	1	1
	<18.5	4.38* (2.06-9.35)	2.11*** (0.89-.00)
	18.5-24.5	2.95* (1.39-6.29)	1.56 (0.66-3.65)
DELIVERY AGE	20-34	1	1
	<20	1.45* (1.11-1.9)	1.13 (0.81-1.57)
SIZE AT BIRTH	VERY SMALL	1	1
	AVERAGE OR LARGER	0.41* (0.26-0.67)	0.37* (0.22-0.63)
	SMALL	0.48* (0.28-0.84)	0.38** (0.2-0.68)
SEX	FEMALE	1	1
	MALE	1.11 (0.9-1.38)	1.25 (0.98-1.58)
INITIATION OF BREAST FEEDING	WITHIN ONE DAY	1	1
	IMMEDIATELY/WITHIN HALF AN HOUR	0.78 (0.54-1.12)	0.96 (0.63-1.44)
	WITHIN ONE HOUR	1.09 (0.87-1.38)	1.18 (0.90-1.52)
DIARRHOEA	YES	1	1
	NO	0.70*** (0.52-0.98)	0.65** (0.45-0.94)
ARI SYMPTOMS COUGH	YES	1	1
	NO	0.96 (0.74-1.25)	1.26 (0.85-1.85)
RELIGION	OTHERS	1	1
	HINDU	0.56* (0.38-0.82)	0.64*** (0.40-1.04)
	MUSLIM	0.44* (0.29-0.69)	0.47 (0.26-0.83)
	CHRISTIAN	0.90* (0.46-1.77)	1.07 (0.51-2.25)
BIRTH ORDER	6+	1	1

TABLE 3.5 LOGISTIC REGRESSION ESTIMATES FOR WASTED

Variables		WASTED	
		Unadjusted Odds Ratio	Adjusted Odds Ratio
AGE	48-59	1	1
	<6	1.67**(1.04-2.70)	1.66**(1.00-2.76)
	6-12	1.3(0.86-1.96)	1.02 (0.65-1.60)
	12-23	1.74*(1.23-2.48)	1.55**(1.06-2.26)
	24-35	0.94 (0.65-1.37)	0.83 (0.56-1.23)
	36-47	0.9 (0.64-1.30)	0.77 (0.53-1.12)
PLACE OF RESIDENCE	RURAL	1	1
	URBAN	0.62*(0.46-0.84)	0.93 (0.62-1.41)
MOTHER'S EDUCATION	10+	1	1
	NO EDUCATION	2.19*(1.40-3.43)	1.53 (0.85-2.75)
	<5	1.54 (0.82-2.90)	1.2 (0.58-2.48)
	05-Sep	1.71**(1.04-2.83)	1.44 (0.81-2.56)
CURRENTLY EMPLOYED	EMPLOYED	1	1
	NOT EMPLOYED	1.02 (0.80-1.31)	1.29***(0.97-1.72)
BMI	25 OR MORE	1	1
	<18.5	4.56*(1.67-12.48)	3.50**(1.21-10.13)
	18.5-24.5	2.51***(0.92-6.88)	1.97 (0.68-5.68)
DELIVERY AGE	20-34	1	1
	<20	1.04 (0.78-1.39)	0.85 (0.60-1.19)
SIZE AT BIRTH	VERY SMALL	1	1
	AVERAGE OR LARGER	0.53*(0.35-0.81)	0.51* (0.32-0.82)
	SMALL	0.59**(0.36-0.97)	0.52**(0.31-0.89)
SEX	FEMALE	1	1
	MALE	1.07 (0.86-1.35)	1.18 (0.93-1.51)
INITIATION OF BREAST FEEDING	WITHIN ONE DAY	1	1
	IMMEDIATELY/WITHIN HALF AN HOUR	0.72 (0.49-1.07)	0.79 (0.51-1.22)
	WITHIN ONE HOUR	0.77**(0.61-1.00)	0.74**(0.57-0.97)
DIARRHOEA	YES	1	1
	NO	0.73***(0.53-1.01)	0.82 (0.57-1.17)
ARI SYMPTOMS COUGH	YES	1	1
	NO	0.85 (0.65-1.13)	0.96 (0.66-1.42)
RELIGION	OTHERS	1	1
	HINDU	0.79 (0.55-1.15)	1.08 (0.69-1.71)
	MUSLIM	0.78 (0.51-1.21)	1.14 (0.65-1.99)
	CHRISTIAN	1.33 (0.71-2.51)	1.51 (0.76-3.00)

Table 3.4 contd.

	1	0.69** (0.47-1.01)	0.97 (0.62-1.50)
	2-3	0.64* (0.45-0.92)	0.82 (0.54-1.21)
	4-5	0.95 (0.65-1.42)	1.02 (0.66-1.56)
TYPE OF CASTE	OTHERS	1	1
	SCHEDULED CASTE	1.68** (1.22-2.82)	1.17 (0.71-1.93)
	SCHEDULED TRIBE	2.44* (1.4-2.83)	1.25 (0.77-1.99)
	OTHER BACKWARD CLASS	1.62* (1.11-2.17)	1.14 (0.77-1.67)
FEVER	YES	1	1
	NO	0.74** (0.57-0.98)	0.71*** (0.48-1.05)
WEALTH INDEX	RICHEST	1	1
	POOREST	3.01* (2.12-4.28)	1.32 (0.8-2.17)
	POORER	3.10* (2.2-4.39)	1.51*** (0.94-2.44)
	MIDDLE	2.58* (1.84-3.63)	1.34 (0.84-2.11)
	RICHER	2.23* (1.6-3.13)	1.28 (0.82-1.94)

*p<0.01, **p<0.05 and ***p<0.10

Odd Ratio 1.00 denotes reference category

Figures in bracket indicates Confidence Interval

iii. Results of Logistic Regression for *Wasting*

Table 3.5 reports the results of logistic regression to analyse the effects of various predictors on wasting of a child. As can be observed, the odds ratio of age groups is large, however not all categories are significant in both the cases-unadjusted and adjusted OR. A child of age group less than 6 years is almost 1.7 times more likely to be wasted compared to a child who is 48-59 months old.

Mother's education which had been a dominant determinant of stunting and underweight was seen to be insignificant in the case of wasting i.e. as other variables were included; mother's education lost its significance. It was statistically significant and the risk of low birth decreased with increase in educational status as shown in the unadjusted odds ratio column.

Table 3.5 contd.

BIRTH ORDER	6+	1	1
	1	0.91 (0.62-1.34)	1.08 (0.70-1.67)
	2-3	0.74 (0.52-1.07)	0.81 (0.54-1.21)
	4-5	0.89 (0.60-1.32)	0.89 (0.58-1.37)
TYPE OF CASTE	OTHERS	1	1
	SCHEDULED CASTE	1.13 (0.72-1.79)	0.91 (0.53-1.54)
	SCHEDULED TRIBE	1.80*(1.24-2.64)	1.62**(0.99-2.65)
	OTHER BACKWARD CLASS	1.15 (0.80-1.66)	0.92 (0.61-1.39)
FEVER	YES	1	1
	NO	0.86 (0.66-1.14)	1.01(0.69-1.58)
WEALTH INDEX	RICHEST	1	1
	POOREST	1.84*(1.27-2.69)	1.17 (0.69-2.00)
	POORER	2.12*(1.47-3.08	1.45 (0.87-2.41)
	MIDDLE	1.63*(1.13-2.38)	1.08 (0.66-1.78)
	RICHER	1.72*(1.19-2.50)	1.43 (0.91-2.24)

*p<0.01, **p<0.05 and ***p<0.10

Odd Ratio 1.00 denotes reference category

Figures in bracket indicates Confidence Interval

However, mother's nutritional status strongly influences the nutritional status of children as can be seen from the high unadjusted and adjusted OR. Mothers having BMI less than 18.5, have children who are almost 4 times more likely to be wasted than mothers, having BMI more than 18.5. Birth size does matter when we see the wasting rates (less than one) for children i.e. it is less likely to affect children's nutritional status.

Breastfeeding within one hour although significant was less likely to influence wasting as compared to the breastfeeding within one day (reference category). The unadjusted OR is high and significant for one category of caste i.e. Schedule Tribe. Further, it remains to be insignificant when controlling for other variables. The household status for wasting although proves to be a significant determinant of wasting, loses significance when controlling for other variables.

Thus for wasting, the unadjusted OR for age, place of residence, mother's education, BMI, size at birth, diarrhoea, type of caste and wealth index were

significant. However, when other predicators were included most of the variables lost significance. Other variables influencing wasting were age of child, BMI, caste and size at birth.

Therefore from the foregoing analysis it can be concluded that based on the unadjusted OR all variables excluding employment, sex of child, initiation of breastfeed, prevalence of diarrhoea, ARI symptoms and fever were significant. While for the adjusted OR, mother's education, BMI, delivery age and initiation of breast feed, sex of birth, birth order, religion, type of caste are significant at p-value <0.01, 0.05 and 0.10. The variables strongly contributing to the under-nutritional status were age (less than 6 and 12-23 months category), employment status, BMI and type of caste (ST category).

3.3 Summary

The nutritional status of children below age five years is distributed disproportionately in the states across different background characteristics. From the above analysis we found that 50 per cent children are stunted, 57 per cent are underweight and 35 per cent are wasted. The analysis indicated that the under-nutrition in Jharkhand is grave and is contributing largely to the severe public health problem and as a result the country suffers.

The results of the multivariate analysis reveals that the age (although mildly influencing), mother's education status and household wealth status determined stunting among the children in Jharkhand. Whereas, the important indicators for underweight as found in the logistics regression, which ominously contributes were mother's education status, her nutritional status and household status. Finally for wasted we found, it was mother's nutritional status, Schedule Caste category and her employment status had severe influence. Apart from this age (less than 6 and 12-23 months category) also had considerable influence on the wasting of a child.

Thus we can conclude that the dominant determinants for a child's nutritional status, controlling for other predictors, are the mother's education status, her nutritional status, her work status and the household wealth status. Evident from the existing studies, it is disquieting to find certain variables like caste, place of residence etc. insignificant. The probable reason behind such unexpected results is the small sample size for the state of Jharkhand.

In the absence of studies solely focusing in the under-nutritional status of Jharkhand, the findings of this study could be useful in understanding and identifying categories of children who face higher risks of under-nutrition. Findings also suggest that prevalence of under-nutrition can be evaded by improving the condition of mother's in Jharkhand by bringing awareness and improving their utilization of various interventions.

CHAPTER IV

PATTERNS AND DETERMINANTS OF ADULTS UNDER-NUTRITION IN JHARKHAND

4.1 Introduction

Attainment of adequate amount of nutrition is essential for both men and women. The requirements of proper nutrients for women are of utmost importance because of its critical association with well-being (Jose and Navaneetham et al, 2008). Moreover, it becomes more challenging in the case of India, where women are often seen compromising their share either due to lack of availability or her status in the household.

As argued by Johnson et al (1996), the so called 'Asian Enigma' (differences in the nutritional rates between SSA[7] and SA[8] countries) exists not because of income inequality or inappropriate growth standards; instead it was due to the extremely low status of women relative to men. Women in the households are considered to be important in deciding good nutrition and household food security. Their decision is therefore the key determinant of child survival. However, this attitude of women is strongly influenced by her status in the household, which is governed by her ability to make decisions in the household and control over resources.

Moreover, most households depend on their male counterparts for providing necessary resources for the family. Under such circumstances, it is worth investigating whether the burden of under-nutrition and ill-health is borne equally or unequally among men and women. This has been investigated employing the unit-level data provided by the NFHS for the first time for men. Therefore the main focus of this chapter would be to see whether the nutritional pattern in Jharkhand followed any particular trend with regard to different background characteristics.

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[7] Sub-Saharan Africa

[8] South Asia

4.2 Assessing Adult under-nutrition using anthropometric measure

4.2.1 *Bivariate analysis*

Under-nutrition can be measured using the BMI. Height, an outcome of many factors such as childhood nutrition, household status etc. is another indicator to measure women's nutritional status. Short height would indicate risks during child birth as short stature often is related to small pelvic size (Rahman, 2009 and Das et al 2012). Also, short mothers have a risk of having a low birth weight baby (Rahman, 2009). In general the cut-off point for height i.e. the points below which a woman can be identified under-nutritional vary across populations, ranging from 140-150 centimetres. In this study, cut-off point of 145 cm is used for women. As already discussed in the previous chapters, the BMI is calculated using the weight and height measurements of adults. It is defined as weight in kilograms divided by height in metres squared (kg/m2). A BMI of 18.5 is used to indicate thinness or acute under-nutrition, while a cut-off point of 25 or above implies overweight or obese.

Anaemia is another indicator to measure under-nutrition. It is characterized by a low level of haemoglobin in the blood. The three levels of severity of anaemia are: mild anaemia (10.0-10.9 grams/decilitre for pregnant women, 10.0-11.9 g/dl for non-pregnant women, and 12.0-12.9 g/dl for men), moderate anaemia (7.0-9.9 g/dl for women and 9.0-11.9 g/dl for men), and severe anaemia (less than 7.0 g/dl for women and less than 9.0 g/dl for men) (NFHS 2005). In the subsequent sections we analyse the nutritional status of women and men separately.

i. Women

The table (Table 4.1) furnished below uses these three measures to evaluate the under-nutritional status in the state of Jharkhand for women using the NFHS-III unit level data. Results show that 43 per cent of women in Jharkhand are underweight i.e. having a BMI of less than 18.5 kg/m^2. The anaemia levels for women in Jharkhand are 70 per cent. Further only 41 per cent of women who were never married had a BMI

less than 18.5, while rest of the unmarried women had BMI more than 18.5. Similarly, of the total number of women married, only 42 per cent were underweight. It was also seen from the results (not shown) that only 18 per cent of women in the urban areas had BMI less than 18.5, while in the urban areas it was 81 per cent . As seen from the table below, within the urban areas 31 per cent women were underweight; while in the rural area of the total 47 per cent were underweight. When seen across religion almost 70 per cent of women having a low BMI were Hindus. However, it was higher among Muslims when seen within religion followed by others. Almost 50 per cent of the total women who had no education had a low BMI.

Social status has found to have some association with the BMI status of women. As can be seen (Table 4.1), women who belong to tribal community, almost 46 per cent of the total number were underweight. Whereas, almost 34 per cent of women belonged to no category were reported undernourished. Similar to what we saw for children, household status does impact the nutritional status of women. Women from the poorest household were more undernourished compared to richer or richest households.

Results showing women having low height or in other words women having risks during delivery are much higher among the women belonging to the backward categories, and those belonging to rural areas with no education. It was higher among women in the rural area with no education. Likewise, we see anaemia is particularly high for 73 per cent of women belonging to 'no education' group, 85 per cent among 'scheduled tribes' and also over 70 per cent for women belonging to 'two lowest wealth quintiles'. Thus from the above analysis we see that it is the women from the rural areas, who are not educated and belong to backward or tribal category and from the lowest wealth quintile who are more vulnerable. Therefore, as mothers, they contribute to the under-nutritional status of their children.

The Pearson chi-square test was used to analyse the association between different background characteristics and BMI, Height and Anaemia. The chi-square values were taken to be significant at p value less than 0.05 (5 per cent level of significance). Except for marital status and religion, all other characteristics showed significant association with BMI of women. Religion, age and marital status showed no

association with the height of women. For anaemia levels, only age showed no significant relation.

TABLE 4.1 PERCENTAGES OF WOMEN UNDERNOURISHED BY BACKGROUND CHARACTERISTICS

Background characteristics	Category	BMI (kg/m2)[9]	HEIGHT (cm)	Anaemia (g/dl)[10]
Demographic Characteristics				
AGE	15-19	46.6*	19.9	67.2
	20-29	42.5*	16.5	69.8
	30-39	42*	16.8	69.8
	40-59	37.3*	18.4	71.1
MARITAL STATUS	NEVER MARRIED	45.1	19.1	63.8*
	CURRENTLY MARRIED	41.7	17.2	70.0*
	WIDOWED/DIVORCED/	47.7	20.4	80.0*
	SEPERATED/DESERTED			
Socio-Economic Characteristics				
RESIDENCE	URBAN	30.5*	14.3	58.5*
	RURAL	46.7*	18.9	73.3*
RELIGION	HINDU	41.3	17.9	68.1*
	MUSLIM	47.4	14.8	61.7*
	CHRISTIAN	38.8	20.2	89.0*
	OTHERS	45.7	18.9	82.7*
CASTE	SC	38.1*	22*	72.5*
	ST	45.6*	20.4*	84.9*
	OBC	45.2*	17.6*	64.2*
	NONE OF THEM	33.8*	11.1*	57.4*
EDUCATION	NO EDUCATION	47.9*	21*	73.4*
	< 5	47*	11.5*	69.9*
	5 TO 9	36.6*	17*	65.0*
	10+	27.6*	8.1*	58.9*
WEALTH INDEX	LOWEST	51.1*	21.6*	76.2*
	SECOND	48.6*	19.8*	77.0*
	MIDDLE	468	19.5*	73.5*
	FOURTH	44.*	16.6*	63.4*
	HIGHEST	21.7*	10.7*	56.6*
Percentage		42.5	17.6	69.5

Source: NFHS unit level data

[9] Includes -2SD and -3SD

[10] Includes mild, moderate and severe anaemia

ii. Men

The NFHS round three for the first time provided data for men. The total sample for men collected in Jharkhand was 996. From the analysis below we see that, 38 per cent of the men in Jharkhand had low BMI status. Also when seen age wise, it was observed that between age group of 15-19 years almost 60 per cent were undernourished. It was also observed that of the total men samples only 29 per cent had low BMI in urban areas, while in the rural areas it was 40 per cent. Again it was found that education does play a significant role in deciding their nutritional status. Evident from Table 4.2, wherein the percentage of men undernourished reduces with increase in educational attainment, however exceptions are seen in the age group 0-9 years.

Men from the tribal group were no better with almost 43 per cent of the total population having low BMI. While those from the poorer household group have worse BMI level as compared to other groups.

When seen the anaemia levels, status of men is better than women. While almost 70 per cent of women in Jharkhand had any anaemia, it was only 37 per cent in case of men facing anaemia. High levels of anaemia were seen among the tribal group. While comparing across different characteristics, it was much lower among men when seen against women. The small sample in case of men could be the reason for such stark differences.

The association between different background characteristics and BMI and anaemia levels was seen for men. The significance level was decided at p value less than 0.05 (5 per cent level of significance). All demographic and socio-economic characteristics were associated to the BMI status of men. While for the anaemia levels, except for the demographic characteristics, all other characteristics have association with the anaemia levels.

Table 4.2 PERCENTAGES OF MEN UNDERNOURISHED BY BACKGROUND CHARACTERISTICS

Background characteristics	Category	BMI (Kg/m)	Any Anemia
Demographic Characteristics			
AGE	15-19	60.2*	41.3
	20-29	37.4*	30.4
	30-39	29.6*	35.3
	40-59	32.8*	42.1
MARITAL STATUS	NEVER MARRIED	50.2*	33.5
	CURRENTLY MARRIED	33.3*	38
	WIDOWED/DIVORCED/ SEPERATED/DESSERTED	42.9*	50
Socio-economic Characteristics			
RESIDENCE	URBAN	29.2*	23.3*
	RURAL	42.3*	42.8*
EDUCATION	NO EDUCATION	42.6*	47.4
	< 5	48.2*	41*
	5 TO 9	44.7*	39.1*
	10+	25*	24.1*
RELIGION	HINDU	35.9*	36*
	MUSLIM	42.7*	25.2*
	CHRISTIAN	38.5*	48*
	OTHERS	54.8*	54.2*
CASTE	SCHEDULED CASTE	40.8*	31.5*
	SCHEDULED TRIBE	42.6*	55.3*
	OTHER BACKWARD CLASS [OBC]	39.5*	0
	NONE OF THEM	25.7*	
WEALTH INDEX	LOWEST	47*	50.3*
	SECOND	46.7*	48.1*
	MIDDLE	40.4*	36.8*
	FOURTH	35.5*	29.9*
	HIGHEST	22.3*	19.4*
Percentage		38.2	36.8

Source: NFHS unit level data

4.2.2 *Multivariate analysis*

This section deals with the MVA similar to that discussed in the previous chapter, for adults- men and women separately. By means of Logistic Regression the unadjusted odds ratio and adjusted odds ratio is obtained. Here the dependent variable is taken

as BMI (0=Not underweight, 1= Underweight), along with a host of other independent variables. Whether these models estimated is a proper fit, is of importance. Hence the log likelihood ratio test (LLR) was used. The LLR test is used to test the significance of the difference between the likelihood ratios for the model fitted with predictors minus the likelihood ratio for model with the constant only. At 5 per cent level of significance we reject the hypothesis implying that, the model with the predicators is different from zero. In other words, the models estimated in the study are a perfect fit.

Unlike the previous chapter, which employs the UNICEF framework to understand the determinants of under-nutrition among children; this chapter does not follow any framework. However, based on literature available (as discussed in Chapter Two) on adult under-nutrition, important indicator has been selected in the regression model. From the literature we found the following indicators widely discussed as the determinants of nutritional status of adults, *viz. educational status, employment status, place of residence, marital status, anaemia level, social group, household status, religion and exposure by means of reading newspaper, watching TV* and *listening to radio.* For women, specifically, her *delivery age, antenatal care, breastfeed practices* were included.

i. Results of Logistic Regression for *Women*

From the table (Table 4.3) below it is observed that the unadjusted OR for age group of women is lower than the adjusted OR. This implies that despite controlling for other variables age group is a dominant indicator of women's nutritional status. Women who were of age group of 15-19 years were almost 5 times more likely to have low BMI when compared to women of age group of 40-59 years. Similarly in the case of rural or urban residence, the unadjusted OR was preceded by the adjusted OR, inferring that women who were from the urban area were almost 1.8 times more likely to have a low BMI compared to women from the rural area. In Jharkhand, the women started child bearing by 19 years which substantiate their under-nutritional condition. Often these young mothers would give birth to low weight children. Women from the poorest or poorer household contributed for high under-nutritional

rates. Height, which also indicates the risks mothers face during delivery, had a high adjusted odds ratio. Considering the unadjusted OR for anaemia level, caste and education levels were significant; however with the inclusion of other predictor variables, these variables lost significance. Awareness of women to information regarding AIDS, Family Planning or other health related discussion was often facilitated through television, or radio or newspaper. The information was gathered by the NFHS wherein women were asked question regarding their exposure towards different sources of media. The unadjusted OR for these three sources of media were significant, however, they showed no significance when other control variables were included; newspaper as a source of media being an exceptional case. Women, who did not read newspaper, were 4 times more likely to have a low BMI than women who read almost every day. While women who read once a week was 3.5 times more likely to be underweight compared to women who read every day.

So from the above analysis we can conclude that young women, from the rural areas and belonging to lower household groups are more vulnerable and easily influenced by a host of factors resulting into their poor nutritional status. From the analysis below, we see the unadjusted odds ratio for the following variables age, place of residence, educational status, household status, anaemia, delivery age, watching TV, reading newspaper, listening to radio significantly contributing to the low BMI of women. Likewise, in the case of adjusted odds ratio, most of the predictors were significant and had large ratios compared to unadjusted ratio.

Hence, it can be argued that the important factors which influenced the nutritional status of women were age, place of residence, wealth status, height and reading newspaper.

TABLE 4.3: RESULTS OF LOGISTIC REGRESSION FOR WOMEN

Background Characteristics		Unadjusted Odds Ratio	Adjusted Odds Ratio
AGE	40-59	1	1
	15-19	1.47* (1.14-1.89)	4.89* (1.89-12.61)
	20-29	1.24*** (0.98-1.58)	3.13* (1.31-7.47)
	30-39	1.22 (0.95-1.56)	2.69** (1.12-6.48)
MARITALSTATUS	WIDOWED/DIVORCED/	1	1
	NEVER MARRIED	0.89 (0.61-1.32)	3.66
	CURRENTLY MARRIED	0.78 (0.55-1.11)	1.24 (0.49-3.17)
PLACE OF RESIDENCE	RURAL	1	1
	URBAN	0.5* (0.42-0.6)	1.57* (0.98-2.51)
RELIGION	OTHERS	1	1
	HINDU	0.84 (0.65-1.07)	1.23 (0.75-2.01)
	MUSLIM	1.08 (0.8-1.46)	1.32 (0.72-2.41)
	CHRISTIAN	0.75 (0.48-1.19)	1.21 (0.54-2.68)
CASTE	NONE OF THEM	1	1
	SC	1.2 (0.9-1.61)	0.81 (0.46-1.41)
	ST	1.64* (1.29-2.09)	1.01 (0.59-1.73)
	OBC	1.61* (1.29-2.01)	1.14 (0.73-1.78)
EDUCATION	10+	1	1
	NO EDUCATION	2.41* (1.91-3.05)	1.54 (0.79-3.01)
	< 5	2.31* (1.60-3.35)	1.45 (0.66-3.19)
	5 TO 9	1.51* (1.16-2.00)	1.12 (0.61-2.06)
EMPLOYEMENT	EMPLOYED	1	1
	NOT EMPLOYED	0.91 (0.77-1.07)	0.86 (0.64-1.16)
WEALTH INDEX	HIGHEST	1	1
	LOWEST	3.75* (2.89-4.87)	3.37* (1.59-7.13)
	SECOND	3.40* (2.62-4.41)	3.78* (1.80-7.92)
	MIDDLE	3.07* (2.91-3.99)	2.71* (1.32-5.57)
	FOURTH	2.85* (2.19-3.71)	2.26* (1.22-4.21)
HEIGHT LESS THAN 145 CM	YES	1	1
	NO	0.99 (0.81-1.2)	1.34*** (0.96-1.86)
ANEMIA LEVEL	NOT ANAMEIC	1	1
	SEVERE	0.85 (0.43-1.7)	0.4 (0.13-1.22)
	MODERATE	1.24*** (0.99-1.55)	0.79 (0.55-1.15)
	MILD	1.23** (1.03-1.46)	1.11 (0.82-1.52)
INITIATION OF BREAST FEEDING	WITHIN ONE DAY	1	1
	IMMEDIATELY/WITHIN HALF AN HOUR	0.73 (0.49-1.09)	0.9 (0.58-1.40)
	WITHIN ONE HOUR	0.82 (0.64-1.07)	0.95 (0.72-1.26)
DELIVERY AGE	DELIVERY AGE (20-34)	1	1
	DELIVERY AGE (<20)	1.35* (1.08-1.68)	0.81 (0.57-1.17)
WATCHING TV	ALMOST EVERY DAY	1	1

Table 4.3 contd.

	NOT AT ALL	2.10* (1.74-2.54)	0.84 (0.49-1.42)
	LESS THAN ONCE A WEEK	1.84* (1.39-2.42)	1.03 (0.58-1.82)
	AT LEAST ONCE A WEEK	1.40** (0.99-1.96)	0.71 (0.37-1.37)
LISTENING TO RADIO	ALMOST EVERY DAY	1	1
	NOT AT ALL	1.38** (1-1.89)	0.97 (0.55-1.71)
	LESS THAN ONCE A WEEK	1.09 (0.74-1.59)	0.86 (0.44-1.70)
	AT LEAST ONCE A WEEK	1.74* (0.74-1.59)	1.38 (0.66-2.85)
READING NEWSPAPER	ALMOST EVERY DAY	1	1
	NOT AT ALL	2.91* (1.97-4.3)	3.94** (0.16-13.40)
	LESS THAN ONCE A WEEK	1.79* (1.15-2.8)	2.46 (0.71-8.59)
	AT LEAST ONCE A WEEK	1.35 (0.78-2.33)	3.48*** (0.92-3.13)

*p<0.01, **p<0.05 ad **p<0.10

Odd Ratio 1.00 denotes reference category

Figures in bracket indicates Confidence Interval

ii. Results of Logistic Regression for *Men*

Subsequent to the above analysis, the discussing moves further in examining the nutritional status of men. Making use of the logistic regression, the unadjusted and adjusted odds ratio has been reported in the table below (Table 4.4). The unadjusted odds ratio is significant for almost all indicators except for age and marital status of men. The education levels of men though does not have a direct influence on the nutritional status of child, however it directly affects their nutritional outcome which can obviously be seen from the high odds ratios reported. Also unadjusted odds ratio of men's employment was high, which implied that men who were not employed were 2.4 times more likely to be nutritionally poor than those who were employed. On including other variables, the effect of men's employment status has certainly reduced, but remains significant. Looking at the unadjusted odds against the household's status reveals that the probability for men from poorest or poorer households to remain undernourished is higher compared to those who belonged to better standards. Comparing the unadjusted with the adjusted odds ratio, we found some variables were no longer significant with inclusion of other variables, especially the variables such as reading newspaper and watching television.

On the other hand, for household status, education and employment both unadjusted and adjusted odds ratio was significant. Therefore, considering the adjusted odds, we find education levels and employment of men and their household status were the only variables which were significant. Hence, these can be concluded as the important determinants of their nutritional status of men in Jharkhand.

TABLE 4.4 RESULTS OF LOGISTIC REGRESSION FOR MEN

Background Characteristics		Unadjusted Odds Ratio	Adjusted Odds Ratio
AGE	40-59	1	1
	15-19	3.11* (2.03-.76)	2.02** (1.05-3.92)
	20-29	1.21 (0.82-1.8)	1.04 (0.66-1.66)
	30-39	0.86 (0.57-1.28)	0.83 (0.53-1.29)
MARITALSTATUS	WIDOWED/DIVORCED/	1	1
	NEVER MARRIED	1.47 (0.49-4.41)	0.94 (0.25-3.64)
	CURRENTLY MARRIED	0.73 (0.25-2.17)	0.75 (0.21-2.63)
PLACE OF RESIDENCE	RURAL	1	1
	URBAN	0.57* (0.42-.76)	1.29 (0.77-2.17)
RELIGION	OTHERS	1	1
	HINDU	0.47* (0.29-.76)	0.44* (0.24-0.81)
	MUSLIM	0.62 (0.34-1.13)	0.6 (0.28-1.32)
	CHRISTIAN	0.5 (0.2-1.26)	0.48 (0.17-1.3)
CASTE	NONE OF THEM	1	1
	SCHEDULED CASTE	2.02* (1.17-.51)	1.55 (0.8-2.99)
	SCHEDULED TRIBE	2.16* (1.37-.41)	1.46 (0.79-2.68)
	OTHER BACKWARD CLASS [OBC]	1.90* (1.25-2.9)	1.75** (1.06-2.89)
EDUCATION	10+	1	1
	NO EDUCATION	2.23* (1.55-3.21)	2.15** (1.1-4.22)
	< 5	2.74* (1.65-4.54	2.37** (1.14-4.9)
	5 TO 9	2.42* (1.7-3.44)	2.04* (1.28-3.26)
EMPLOYEMENT	EMPLOYED	1	1
	NOT EMPLOYED	2.38* (1.73-3.28)	1.98* (1.28-3.02)
WEALTH INDEX	HIGHEST	1	1
	LOWEST	3.10* (1.98-4.85)	3.41* (1.45-8.01)
	SECOND	3.03* (1.93-4.77)	3.19* (1.4-7.27)
	MIDDLE	2.37* (1.51-3.73)	1.90*** (0.89-4.05)
	FOURTH	1.94* (1.23-3.06)	1.79*** (0.97-3.29)
ANEMIA LEVEL	NOT ANAMEIC	1	1
	SEVERE	4.8 (0.31-74.13)	4.63 (0.26-82.54)
	MODERATE	1.39*** (0.97-1.98)	0.9 (0.59-1.36)

Table 4.4 contd.

	MILD	1.13 (0.79-1.61)	0.96 (0.64-1.43)
READING NEWSPAPER	ALMOST EVERY DAY	1	1
	NOT AT ALL	2.31* (1.58-3.37)	1.11 (0.57-2.16)
	LESS THAN ONCE A WEEK	1.83* (1.18-2.84)	1.39 (0.79-2.43)
	AT LEAST ONCE A WEEK	2.11* (1.3-3.43)	1.5 (0.85-2.67)
LISTENING TO RADIO	ALMOST EVERY DAY	1	1
	NOT AT ALL	0.64** (0.43-.97)	0.49* (0.3-0.81)
	LESS THAN ONCE A WEEK	0.57* (0.37-0.88)	0.43* (0.26-0.72)
	AT LEAST ONCE A WEEK	0.85 (0.5-1.43)	0.66 (0.36-1.21)
WATCHING TV	ALMOST EVERY DAY	1	1
	NOT AT ALL	1.72* (1.22-2.41)	0.72 (0.39-1.33)
	LESS THAN ONCE A WEEK	1.58** (1.07-.34)	0.76 (0.42-1.37)
	AT LEAST ONCE A WEEK	1.83** (1.12-.99)	1.03 (0.54-1.99)

*p<0.01, **p<0.05 ad **p<0.10

Odd Ratio 1.00 denotes reference category

Figures in bracket indicates Confidence Interval

4.3 Summary

The foregoing analysis on the nutritional status of women and men provides an understanding of the nutritional deprivation the state is under-going. As discussed in the section dealing with women's nutritional status, it was found that, there were many factors contributing to their status. Women form the centre of our discussion as they are the sole decision makers in regard of health and nutrition in the households. Conversely, plays an indirect role in making decisions regarding health in the households. From the above analysis we have also found that the nutritional outcomes differ across different characteristics. As we saw both in case of women and men, the caste, religion, wealth status differed and so did their outcomes.

Using the logistic regression estimates for both women and men, we tried to investigate, whether there exists any specific or unique reason which would answer our query regarding the prolonged under-nutrition problem in Jharkhand. For women, it is observed that her age and height strongly determines her nutritional status, as they are associated to high risks during pregnancy, often leading to high

maternal mortality. In this regard household status is found to be a common indicator determining the nutritional status of women and children. In the case if Jharkhand, it was found that women suffer poor nutritional status not only due to lack of affordability but also for the discrimination they witness within household or society, a phenomenon widely prevalent in India. The nutritional status of men too projects disturbing facts. For men, the educational status, employment status and household status were significantly contributing to the high under-nutrition rates in the state.

Comparing the results of both women and men, we find that both suffer from high under-nutritional rates, especially bearing severe effects for women. The high anaemia and BMI figures certify differences in under-nutrition rates between men and women. However, the high anaemia levels among women compared to men is a common attribute of Indian population (Jose, 2011). Women often have a compromised meal compared to women, owing to the traditional belief of 'women eating at the end'. Such difference also arises from the differential in the consumption of rich diet including fruits and vegetables, milk products, meat etc. The NFHS state report furnishes the details of consumption of such food, which was higher for men than women. Although, disheartening but such a practice starts from childhood, where the girl child is often seen sacrificing. Moreover, such inequality is common among women and girl child from lower household and poor social groups. Government has certainly realized this ambiguity and has introduced various programmes and policies focusing on women and girl child. Therefore, it has become necessary to focus on the two population groups separately. However, gender differential emerging in this study to some extent could be attributed to the small sample size for the state of Jharkhand.

CHAPTER FIVE

REVIEW OF POLICY INTERVENTIONS AND ITS IMPACT ON CHILD NUTRITION IN JHARKHAND

5.1 Introduction

Evidently, there exist numerous schemes for food, nutrition and social security. They can be sub-divided into four heads-schemes which guarantee employment and wage payment both in cash and kind; scheme which gives grains at concessional rate or free of cost like Targeted Public Distribution System (TPDS), Antodaya and Annapurna; schemes for social security like National Social Assistance Programme that includes National Old age Pension Scheme (NOAPS), National Maternity Benefit Scheme (NMBS), National Family Benefit Scheme (NFBS) and nutritional security schemes which includes Integrated Child Development Scheme (ICDS) and mid-day meal (MDM) programme. Since we are concerned about the nutritional pattern of the population of Jharkhand, the main focus of this chapter would be to explore the various schemes which are implemented by the government for nutritional benefit.

The two schemes implemented in Jharkhand to enhance nutritional status among the adults and children are- Integrated Child Development Scheme and Mid-day Meal Scheme. We shall discuss each program individually, focussing on the need, coverage and progress of the program. The National Family Health Survey unit level data provides information on Integrated Child Development Scheme. These program variables are used to study the impact of Integrated Child Development Scheme on the nutritional status of child and mothers in particular.

5.2 Mid-Day Meal Scheme

National Programme of Nutritional Support to Primary Education which is commonly known as Mid-Day Meal (MDM, hereafter) scheme was launched as a centrally sponsored scheme on 15 August 1995. It was initially institutionalised in 2408 blocks, which was later introduced in all the blocks nationwide by 1997-98.

Today it is the largest school nutritional programme in the world, covering nearly 100 million school children who benefit from hot cooked nutritious food distributed through 12 lakhs primary schools/Education Guarantee Scheme (EGS)/Alternative and Innovative Education (AIE) centres. Initially, central assistance under the scheme provided free supply of food grains of 100 grams per child per school day, and transportation subsidy of food grains up to a maximum of Rs 50 per quintal. But this did not result in increase in enrolment or attendance as the children or their parents would come once a month to collect the rations.

The scheme was revised on September 2004, under which hot cooked meal (CMDM) of a minimum 300 calories and 8-12 grams of protein was provided to every child studying in classes I-V in Government and aided schools and EGS/AIE centres. In October 2007, the scheme was expanded to cover children in upper primary (classes VI to VIII) initially in 3479 Educationally Backwards Blocks (EBBs). Around 1.7 crore upper primary children were included under this expansion scheme.

Further revision of rates was made in July 2006, under which assistance for cooking cost at the rate of (a) Rs 1.80 per child/school day for States in the Eastern Region, provided the NER States contribute Rs 0.20 per /school day, and (b) Rs 1.50 per child/ school day for other States and provided that these States and UTs contribute Rs 0.50 per child/school day. Following was the part of revision:

a) Free food grains of 100 grams (Rice/wheat) per child per school day

b) Cooking Assistance @ Re. 1/- per child, per school day

c) Reimbursement of transportation cost @ Rs. 100 per quintal for special case sates and Rs. 75 per quintal for other states,

d) Assistance for Management, Monitoring and Evaluation @ 2 per cent of (a), (b) and (c), and

e) Provision of mid-day meals during summer vacations in drought affected areas.

The Mid-day meal scheme was started in Jharkhand on November 2003, on a pilot basis covering 3140 Government Primary schools in 19 districts. Presently, all the Government schools, Gram Shiksha AbhiyanVidyalyas, Education Guarantee Scheme, Government Aided (including minority) schools, recognized Madrasas, recognized Sanskrit Vidyalaya and Alternative and Innovative Education Centres (AIE) are covered under this scheme.

In the subsequent section, we will analyse the performance of MDM in the state of Jharkhand for the recent years.

5.2.1 Coverage of Institutions

It implies the coverage of the number of institutions where the MDM scheme was adopted in the state. Although, 39 thousand primary level schools were approved by the Programme Approval Board (PAB), only 26 thousand of them served MDM. While at the upper primary school, PAB gave approval to 12 thousand schools, however 14 thousand served MDM. The reason for less coverage at Primary Stage and excess coverage at Upper Primary stage was due to the up gradation of Primary Schools to Upper Primary Schools and opening of new Government Aided schools at Upper Primary level.

5.2.2 Coverage of Children

For the year 2010-11 at the primary level schools, the total number of students enrolled was 4.3 million, out of which only 2.4 million students availed MDM, which is much less than the number of children (3.1 million) children approved by the PAB. Whereas, in the case of upper primary school level, around 1.3 million children were enrolled, for which the PAB approved 1 million. Out of which only around 0.8 million availed the MDM.

For 2010-11, there was low coverage under primary stage in the districts of Simdega (46 per cent), Khunti (42 per cent), Lohardaga (39 per cent), Ramgarh (36 per cent), Hazaribagh and Godda(33 per cent), Deogarh (28 per cent), Latehar (26 per cent), E. Singhbhum (25 per cent), Ranchi (24 per cent), Dumka (23 per cent),Palamau (21 per cent). While in the upper primary stage low coverage has been observed in Khunti (48 per cent), Simdega (45 per cent), Deogarh (42 per cent), Pakur (39 per cent), Ramgarh (36 per cent), Jamtara (34 per cent), Sahebganj (32 per cent), Hazaribagh (29 per cent), E. Singhbhum & Koderma (28 per cent), Godda & S. Kharswan (26 per cent), Ranchi & Latehar (20 per cent). The figures in bracket show the percentage of children who did not avail MDM.

The reason behind low coverage of children was asserted to the fact that some of the primary class children although are enrolled in Government aided and local schools actually study in private schools and do not avail mid-day meal.

The number of children availing mid-day meal was seen in excess of the PAB approval for the reason that, the scheme provides that every child attending the institution is eligible to be covered under the scheme and should be served mid-day meal irrespective of the approved numbers of students and working days.

5.2.3 Number of working Days

For the year 2010-11, there was 100 per cent coverage of MDM against the number of 173 working days. The PAB approved to implement the scheme in the drought areas of the state for 43 days for the year 2010-2011, for all the primary and upper primary children. However, the scheme was implemented only for 19 days in the drought prone areas of the state.

The state has adopted innovative measures to run the mid-day meal scheme. Under this, a training programme was conducted to implement Sarswati Vahini Sanchalan Samiti (SVSS), a group of parent mother who would look after the cooking and distribution of MDM. Also every school has a Bal Sansad elected among the students. The responsibility of the Bal Sansad is to ensure cleanliness and hygienic practice of every student, for instance check every student washes his/her hand before eating, washes the plates before eating etc.

Another measure adopted by the state was the School Chale Hum Abhiyan launched during 2005 to 2008 to check the attendance of students. The State has also developed a film on training module for cook-cum-helpers in order to bring awareness regarding the preparation of the meal.

5.2.4 Allocation of food grains

The allocation and utilization of food-grains for the primary and upper primary children in the state of Jharkhand for the year 2010-11 was 108100 Metric tonnes (MTs, hereafter) and 68001 MTs respectively. However, of the total allocated, only 71825 MTs was lifted while 78017 MTs was available. The amount lifted shows, the total amount of food-grains lifted from the Food Corporation of India (FCI, hereafter) godowns. The total availability of food-grains includes the unspent quantity and the amount lifted from the FCI for the current year. In the year 2008-09, the allocation of food-grain to the State was released in three phases, this caused delay hence it was requested to release the whole allocation of grain at a time in the first week of April.

It was observed that, in five districts *viz.* Sahebganj (43 per cent), W. Singhbhum (50 per cent), Khunti (52 per cent), Lohardaga (55 per cent) & Palamau (56 per cent) of the state less quantum of foodgrains was available; also the utilization in the following eight districts *viz.* Khunti (44 per cent), Deoghar & Koderma (51 per cent), S. Kharsawan & Simdega (52 per cent), Lohardaga (53 per cent), Ramgarh (54 per cent) & Jamtara (58 per cent) was less than 60 per cent. There was also mismatch between the utilization of food grains vis-a-vis availability. Mainly because in some districts (like, Chatra, Jamtara and Deogarh) of the state, the FCI does not have proper storing space or godown, therefore there is irregularity in the supply of food-grains in these areas along with other naxalite affected areas. Hence often, food-grains were procured from the neighbouring districts.

5.2.5 Utilization of cooking cost

The cooking cost utilised was low in the state due to the fact that the state has revised cooking norms with effect from 10 August, 2010. The districts having low utilization of cooking cost are Khunti (44 per cent), Koderma (48 per cent), Deoghar (50 per cent), S. Kharsawan, Ramgarh & Bokaro (50 per cent), Lohardaga (51 per cent), Hazaribag & Simdega (53 per cent), Jamtara (55 per cent). As a result of this, children from the disadvantaged groups were deprived of the scheme due to delay in the adoption of the revised rates.

As per the MHRD, (GoI) for the year 2010-11, the allocation towards cooking cost was Rs. 326 crore, while only Rs. 195 crore was utilized.

5.2.6 Central Assistance towards Transportation

The assistance provided towards transportation was Rs. 811 lakhs (including unspent balance) of which Rs. 300 lakhs was utilized. Since, the bills were not

submitted timely, there was low utilization of the transport assistance in the year 2010-11.

5.2.7 Number of meals served

The total amount of food grain approved for primary and upper primary schools for the period during 1 April, 2010 to 31 December, 2010 was Rs. 70.03 crore, of which Rs. 62.25 crore was served during this period. In the year 2008-09, except for very few districts such as Pakur, Sahebganj, Godda, Garhwa, and Dhanbad and Deoghar, MDM was served by and large regularly. This is because of the fact that, these regions suffered discontinuity or interruption mainly due to non-availability of food grains due to interrupted lifting of food-grains from FCI godowns.

5.2.8 Construction of Kitchen cum stores

For the year 2010-11 the central assistance provided Rs. 155.5 crore towards the construction of 22,401 kitchen-cum-stores in primary and upper primary schools. Of which Rs. 75.2 cores , i.e., around 49 per cent of the total fund has been utilized for the construction of 12,546 kitchens, which is around 56 per cent of the total kitchen-cum-stores required in the state for running the programme.

5.2.9 School Health Programme

In 2010-11, under the School Health Programme (SHP), only 15,362 schools out of the total of 41,391 primary and upper primary schools were covered. Only 27 per cent i.e., 1.1 million of children out of 4.1 million children were provided IFA, Vitamin-A and De-worming Tablets.

The Mid Day Meal initiative in Jharkhand was seen to function satisfactorily. However, there were few issues highlighted in the Annual Work Plan and Budget (AWP&B) meeting held on May 2011.

- Irregularities in cooking of mid-day meal at Middle School Salaiya were reported. Also in Kerkikhurd Primary School Mid-day meal is not provide since last one year.[11]
- In most of the schools, the students were asked to bring plates from their houses. But in the current year, the state government has decided to provide plates for every child.
- Due to unavailability of proper kitchen sheds, cooking activities were carried out in open fields which adversely affected the cooking & classroom processes besides resulting in unhygienic conditions.
- Due to the revision of cooking cost, which was effective from 10 August 2012, there was underutilization of cost allocated for the same.
- There had been no State Steering and Monitoring Committee Meeting in the state, since the meeting held on July 2009.
- Although under the MDM scheme, nutritious food was served, there exists very high level of anaemia & under-nutrition cases among children found in the state.
- There were poor management of the process by Management Monitoring and Evaluation (MME) Utilization.
- There was mis-match between food grain lifting and total availability, and also between cooking cost and food grain utilization in the districts.
- The school health programme had a very low coverage.
- No evaluation studies have been conducted even after so many years of the program implementation.
- The coverage of students against enrolment is poor.
- Another issue of concern was discrimination based on caste during serving of meals, where children are made to sit separately or served in different plates, smaller quantities and so on. Also there was discrimination made in the

[11]http://www.righttofoodindia.org/data/campaign/August_2011_public_hearing_meeting_district_officials_palamu_2_august_2011.pdf

appointment of cooks ruling out the order of the Supreme Court which said preference should be given to SC/ST cooks.

- Inappropriate use of funds shown by expenditure incurred in mid-day meals of those students who were not in the records of the schools in these districts (Indian Express, 2008).

Despite the above issues, it can still be argued that, the Mid Day Meal programme has to a certain extent increased enrolment and retention. It benefited the areas where the problems of food insecurity, hunger and endemic poverty was relatively higher. Along with this, the scheme has also brought more than partial success in fulfilling the universalization of elementary education.

5.3 Integrated Child Development Services

Today, the Integrated Child Development Services scheme, (ICDS, hereafter), is the World's largest programme focusing on the enhancement of health, nutrition and learning opportunities for infants, young children (0-6 years) and their mothers. This scheme provides an integrated approach for converging basic services through community based honorary workers viz. Anganwadi Workers and Helpers. The services are provided at a centre called the 'Anganwadi' which literally means a courtyard play centre[12]. ICDS is sanctioned and monitored by the Ministry of Women & Child Development (MoWCD), Government of India, uniformly throughout the country. In the State of Jharkhand, it is run by the Department of Social Welfare, Women and Child Development.

The ICDS comprises of six services:

(1) Supplementary Nutrition Programme

(2) ICDS Establishment

(3) Innovative Scheme

[12] A child care centre located within the village itself.

(4) Medicine Kits

(5) Pre-School Kits

(6) Publicity, Education & Communication

The progress of each component is discussed below in details.

5.3.1. Implementation agency

In Jharkhand, the ICDS scheme is run through a network of around 36 thousand Anganwadi Centres, each Centre being operated by a Sevika and a Sahayikas each. At the block and district levels the departmental functionaries in charge are Child Development Project Officers and District Programme Officers/District Social Welfare Officers respectively. At the state level, the scheme is supervised by the Directorate of Social Welfare functioning from the State capital, which in its turn is responsible to the Department of Social Welfare.

5.3.2. Source of fund

The Government of India provides 100 per cent funds for all the components, except for Supplementary Nutrition Programme (SNP, hereafter), which is partially supported by the state. The sharing pattern of supplementary nutrition in the North-Eastern States between Centre and States changed from fifty-fifty to ninety-ten ratio from year 2009-10. While for the other components, the ratio has been modified to ninety-ten against 100 per cent Central Assistance as earlier.

For the financial year 2009-10, the total funds released by the Government for the scheme accounted to Rs. 480.23 crore.

5.3.3. Supplementary Nutrition Programme

This programme focuses on providing timely supplementary nutrition to children of age group of 0-6 years, pregnant mothers and lactating mothers. Until 2005-06, SNP was the state's responsibility, but since many States were not providing adequately for supplementary nutrition due to resource constraints, Government of India began to support the States/UTs up to 50 per cent of the financial norms or to support 50 per cent of expenditure incurred by them on supplementary nutrition, whichever is less.

For the financial year 2009-10 the budget provided by the State for the Supplementary Nutrition Programme, was Rs. 200 crore for the year. Out of this, the sum sanctioned and allocated was Rs. 189 Crore. The number of pregnant and lactating mothers and children covered under the SNP of ICDS during this period was 0.8 million and 2.6 million respectively.

5.3.4 Establishment of Integrated Child Development Services

Under this component, allotment is provided for the maintenance of all the Anganwadi Centres (AWC). For the year 2009-10, budget provision for this component was Rs. 156.62 crores, of which Rs. 43.40 crores was sanctioned and allotted. The state made an expenditure of Rs. 29.31 crores, wherein 204 project and 10 District Program Office was established including around 32 thousand Anganwadi Centres (AWCs). At present, there are around 35 thousand AWC's running in 204 Projects in the State as well as for the 20 District Programme Offices at Ranchi, Lohardaga, Gumla, East Singhbhum, West Singhbhum, Palamu, Hazaribagh, Dhanbad, Dumka and Sahebgunj. Funds allocated also covers the honoraria payable to the Sevikas and Sahayikas which is Rs. 1,500 and Rs. 750 per month respectively[13].

[13]The budget provision, amount sanctioned and expenditure incurred for this period is unavailable.

5.3.5 Innovative Scheme

Under this component, there is space for the state to propose plans depending on the local requirement. The amount allocated for this purpose is Rs. 0.3 crore for the year 2008-09.

5.3.6 Medicine Kits

Medicine kits are provided to all AWC's for children, adolescent girls and women. For this, Rs. 1.94 crore has been provided in the budget of 2008-09.

5.3.7 Pre-school Kits

Under the ICDS Scheme, pre-school kits are provided to all the AWC's for children below six years. The amount allocated for this provision was Rs. 1.62 crore in the budget of 2008-09.

5.3.4 Publicity education and communication

Under this scheme, provision is given to generate awareness through electronic and print media on matters concerning the development of women and child. The amount released for this component was Rs. 12.50 lakhs for the year 2008-09.

5.3.5 Financial Progress

The utilization of fiancés of ICDS was not in a very good state. Up to November 2002, the CARE, an international NGO was providing free supplementary nutrition in

the form of corn soya-bean blend (CSB) and Refined Vegetable oil (RVO). However, after the withdrawal of CARE, the financial burden was on the state government.

The total budget provision for the year 2008-09 was Rs. 327 crore of which Rs. 301 crore was sanctioned and allotted, and the expenditure incurred by the state was Rs. 285 crore. For the year 2009-10, budget provision was Rs. 480 crore, of which only Rs. 150 crore was sanctioned and allotted. The expenditure figures were unavailable.

5.3.6 Coverage

Out of the 211 development blocks in Jharkhand, the ICDS projects have been sanctioned for 204 blocks. From the Table 5.1 we see, in Jharkhand 100 per cent of the sanctioned projects have been operationalized.

As was evident from the NFHS report (2005-06), among the 92 per cent of children under age six who are covered under the AWC, only 42 per cent receive services of some kind from the centre. Around 37 per cent of children below 6 years receive supplementary food, 27 per cent receive vaccinations and only 17 per cent receive early childhood care or pre-school.

TABLE 5.1: NO OF OPERATIONAL AND SANCTIONED ICDS PROJECTS AND AWCS AND NUMBER OF BENEFICIARIES OF SNP AND PRE-SCHOOL EDUCATION 2010-11

Components		Jharkhand	India
No. of ICDS Projects	Sanctioned	204	7015
	Operational	204	6719
No. of Anganwadi Centres	Sanctioned	38296	1366776
	Operational	38310	1241749
Beneficiaries for Supplementary Nutrition	Children 6 months-3 years	1337196	39615907
	Children 3 to 6 years	1271426	35487071
	Total Children 6 months to 6 years	2608622	75102978
	Pregnant and Lactating mothers	734553	16762402

Table 5.1 contd.

	Total Beneficiaries Children and P&LM	3343175	91865380
Beneficiaries for Pre-school Education	Boys 3 to 6 years	647801	18101413
	Girls 3 to 6 years	704730	17400724
	Total	1352531	35502137

Source: Annual Report 2010-11, Department of Women and Child Development, GoI

Out of the 204 projects which were sanctioned, the state has succeeded in operationalizing only 152 of them by 2003-04. However, in the period 2004-05, the remaining 52 projects were operationalized.

Though, the state of Jharkhand lags much behind in terms of the number of projects as compared to states like Uttar-Pradesh, West-Bengal, Bihar, Maharashtra and many others. It is still having better performance than the states like Jammu and Kashmir, Goa and the North-Eastern states.

Further, the Supreme Court ordered (dated October 7th, 2004) that all states with SC/ST habitations should have an anganwadi, and until there is full coverage of SC/ST population, all new anganwadis should be located in habitations with high SC/ST populations. However, like many other states, Jharkhand has made no progress in this regard.

5.3.7 Staff Appointments

In the table above (Table 5.1) we see, of 192 sanctioned posts, 41 posts lie vacant in case of CDPOs/ACDPOs. Similar is the case in staffing at other positions. One possible reason for the vacant position could be the salary issues. The entire staff of ICDS gets their salary only twice a year. This not only de-motivates new recruitment but also encourages corruption and lack of responsibility towards duties.

TABLE 5.2: NO OF POSTS OF CDPOS/ACDPOS, SUPERVISORS, ANGANWADI WORKERS (AWW's) AND HELPERS SANCTIONED AND IN-POSITION AS ON 31.12.2009

Workers		Jharkhand	All India
NO. OF CDPOs/ACDPOs	Sanctioned	192	9003
	In-position	151	5767
	Vacant	41	3236
ANGANWADI WORKERS	Sanctioned	1288	53529
	In-position	778	30256
	Vacant	510	23273
SUPERVISORS	Sanctioned	38186	1356027
	In-position	37615	1060587
	Vacant	571	295440
ANGANWADI HELPERS	Sanctioned	35635	1242096
	In-position	35389	1038947
	Vacant	246	203149

Source: Ministry of Women and Child Development, GoI

5.3.8 Problems faced by Integrated Child Development Services

- Expansion of ICDS without increasing the number of health workers to work the targeted populations.
- Undue attention by the ICDS to the older children rather than children below age three and pregnant mothers.
- The entire staffs of ICDS receive salaries only twice a year which de-motivates them to work sincerely giving way for corruption.
- Matters related to the coverage of the ICDS i.e. most of the ICDS were outside the village.
- Reporting issues as initially the number of AWCs operational was reported to be 16889 but later in the year it was reported to be 7429[14].
- The sanctioned AWCs were not working from May to December, 2003. As a result there were no supplies made to the children.

[14] Supreme Court Orders, 2009

- Absence of AW helpers.
- By norm, per person beneficiary was not followed in the state of Jharkhand. It was 0.42 paisa against Re. 1.
- The beneficiaries complained of inadequate provision of Take Home Ration (THR) in proper quantity. They received only 3 kg in place of 12 kg since last 6 months[15].
- In the district of Palamu, out of the 32 sanctioned posts only 18 supervisors were posted; simultaneously, out of 11 sanctioned post, only 3 CDPOs were working.
- This district also faced financial problems hence had to depend on debts to purchase rations materials in AWCs.
- There was complete exclusion of adolescent girls from ICDS in the state, as coverage was limited to children of 0-6 year's age group, pregnant women and nursing mothers.

As a result of the above shortcomings which the ICDS were facing, a new strategy was initiated in the states of Bihar and Jharkhand.

5.4 State Imitative-DULAR (love and care in Hindi) strategy

This program was a unique nutrition initiative undertaken by the UNICEF India in collaboration with two states initially- Bihar and Jharkhand. UNICEF along with Bihar Government launched the Dular scheme in 1999. It was launched in Jharkhand in 2001.

Under this scheme, which was built on the already existing ICDS infrastructure, training was given to local resource groups (LRGs), which was composed of local resource persons (LRPs), approximately one for every 10 to 15 households. They assisted the Anganwadi Workers (AWW's) to provide services to pregnant women and mothers of infants at their homes. This initiative adopts a life cycle approach to

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http://www.righttofoodindia.org/data/campaign/August_2011_public_hearing_meeting_district_officials_palamu_2_august_2011.pdf

the care of children below age three, improving access to adequate nutrition, health care, and information about child care to girls and women throughout their lives with special attention during pregnancy and lactation periods. The main aim of the Dular program was to improve health and well-being of children and women in the state, thereby strengthening the ICDS in remote areas.

5.4.1. Working of Dular

The program is initially introduced with the help of village contact drive (VCD) which involves two days of training and advocacy in which the volunteers discuss the strategies and gather information on the local beliefs and practices followed.

Using this information necessary interventions are taken. The LRPs who are selected through VCD form the local persons groups; meet weekly with the AWW's to review the progress.

In Jharkhand, it was implemented across four districts in Jharkhand *viz.* Jamshedpur, Ranchi, West Singhbhum & Saraikela Kharsawa. [16] On October 2005, the Dular project was extended to three more districts, now reaching 3 million children and women in the state.

5.5 Empirical evidence of the nutritional schemes in Jharkhand

In the above section we discussed the progress and the limitation of various schemes operating in the state. However, the above analysis would not suffice to point out the discrepancies of the schemes.

Using the programme variables from the NFHS unit level data, we tried to analyse the role of policy intervention in the state and investigate the extent to which it has impacted the nutritional status of the beneficiaries.

[16]http://nipccd.nic.in/mch/fr/cf/cf7.pdf

TABLE 5.3: COVERAGE OF ICDS BY BACKGROUND CHARACTERISTICS

Background Characteristics		Percentage of children age 0-59months in areas covered by an AWC
Age of child in months	< 6	91.1
	6-12	90.5
	12-23	92.8
	24-35	91.3
	36-47	92
	48-59	90.7
Sex of child	Male	91.9
	Female	91.7
Religion	Hindu	89.5*
	Muslim	96.4*
	Christian	100.0*
	Others	94.9*
Type of caste or tribe	SC	91.4*
	ST	95.1*
	OBC	90.9*
	None	87.8*
Mother's Education in Years	No Edu	93.1*
	< 5	96.2*
	5-9	92.1*
	10+	77.7*
Type of place of residence	Urban	74.8*
	Rural	95.6*
Wealth Status	Lowest	93.7*
	Second	92.3*
	Middle	93.1*
	Fourth	97.4*
	Highest	82.2*
Total		91.7

Source: Compiled from NFHS 3 unit data

* p value less than 0.05

The above table (Table 5.3) reveals the percentage of children under age six years of age who are in an area covered by an anganwadi centre by their background characteristics. Among the male children, 91 per cent children are covered by an ICDS/AWC. Among the Christian religion, all the children were covered under the

ICDS area; while only 90 per cent children covered were Hindu. 95 per cent of the tribal population were under the ICDS area. The proportion of children from the urban areas covered under the ICDS was less as compared to the rural areas. The total ICDS coverage in the state was 92 per cent.

However, coverage alone does not assure proper nutrition, which can be seen from the table below.

TABLE 5.4: NUTRITIONAL STATUS OF CHILDREN COVERED BY AN AWC

Indicators		Percentage of children age 0-59 months in areas covered by an AWC
Nutritional Status	Stunted	88.8*
	Under-weight	88.4*
	Wasted	91.6
Anaemia Level	Severe	100.0*
	Moderate	93.6*
	Mild	91.8*
	Not anaemic	87.0*

Source: Compiled from NFHS 3 unit data

Table 5.4, shows the differentials in child health indicators in areas coved by AWC. Children based on the three anthropometric measures are found to be more under-nourished in the areas coved by AWC. The percent of children severely anaemic was high in these areas. The Pearson Chi-square was used to see the difference between the nutritional status of children in the areas covered by an AWC. At 1 per cent degree of freedom, we reject the hypothesis. This implies that the nutritional status of children in areas covered by an AWC is different from those in areas not covered by an AWC. The high under-nutrition rates in the areas covered by an AWC itself justify the placement of the programme in these areas.

5.5.1 Determinants of Nutritional outcomes in areas covered and not covered by Anganwadi Centres (AWC)

Next we move to see the determinants of child health status in areas covered and not covered by AWC. In order to find out, whether an area covered under the AWC brought any improvements in the child health status, a logistic regression has been performed. Here the dependent variable of child health status is taken as: nutritional status (stunting, wasting and under-weight and anaemia levels). Four separate models used and each model has been adjusted for child's age, sex, caste, mother's education, place of residence and household economic status.

From the logistic regression results (Table 5.5), we see children covered under the AWC were 1.84 times more likely to be stunted than children who were not covered by AWC. Similarly when we see the impact of AWC on under-weight, we see that the Odds Ratio is 1.65, which implies that the AWC has not succeeded in improving the under-weight status of children in Jharkhand. The results obtained are unexpected as can be seen from such high odds ratio. The probable reason behind this could be extremely high coverage of areas under the ICDS as seen in the table above (Table 5.3) (92 per cent) implying only a small area (8 per cent) is not covered under the ICDS. The other reason could be that, the coverage is high as under-nutrition rates are high in those areas. However, it can be seen that in the case of wasted, AWC has made improvements as seen from the low odds ratio (OR=0.85, CI=0.53, 1.36) reported. The results are similar in case of anaemia levels (OR=1.77, CI=1.13-2.79) of children. The AWC was not able to make improvements in the anaemic status of the children.

TABLE 5.5: RESULT OF LOGISTIC REGRESSION

	STUNTED	UNDER-WEIGHT	WASTED	ANAEMIA
Not covered by AWC	1	1	1	1
Covered by AWC	1.84*(1.14-2.97)	1.65** (1.05-2.58)	0.85*** (0.53-1.36)	1.77* (1.13-2.79)

*p-value <0.01, **p-value<0.05 and ***p-value<0.10

adjusted for child's age, sex, caste, mother's education, place of residence and household economic status

5.5.2 Extent of the utilization of Integrated child Development Services

The impact of the ICDS services also depends on the extent to which the services are used. The services although available might not be used by many. Under such circumstances, it is essential to know the extent to which the services provided by the AWC are utilized by the population. From the NFHS unit level data we get the information on the number of children and mother availed any benefits from the AWC. To probe further, we can also check the kind of benefits received- such as supplementary food, growth monitoring, immunizations, health check-ups or education. This has been tabulated below.

TABLE 5.6: UTILIZATION OF ICDS SERVICES (in per cent)

Service utilized by children	No	Yes
In past 12 mths, any benefits/service[17] received	53.7	38.9
In the last 12 months, received food	4.5	34.3
Service utilized during pregnancy	No	Yes
During pregnancy any benefits received	64.7	34.7
During pregnancy received Supplementary food, Health check-ups, Health and nutrition education	0.8	33.8

Source: Compiled from NFHS 3 unit data

In table 5.6 we see that, about 40 per cent of the children receive any benefits from the AWC and about 35 per cent pregnant women receive any benefits from the AWC. Also only 34 per cent children and pregnant mothers received food[18] in the last twelve months. Obvious from the table above, despite being in an area covered by AWC, the utilization of service is just half among children, although much better among women.

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[17] AWC services for children include distribution of supplementary food, growth monitoring, immunizations, health check-ups, and preschool education.

[18] Supplementary food includes both foods cooked and served at the AWC on a daily basis or given in the form of take home rations.

We make use of the logistic regression for better understanding of who receive the service and who utilizes it. For this purpose the dependent variable taken is whether received any benefits from the AWC in last twelve months.

The results show that (Table 5.7) the odds of receiving services from AWC were higher among children belonging to ST category and from lower wealth status. Children from the lowest wealth group were almost 2 times more likely to receive services from AWC than from highest wealth group. While, tribal children were twice more likely to receive services than other category children. Also male children were found 0.7 times less likely to utilize the services compared against female. Urban children were less likely to utilize any service compared to rural children.

TABLE 5.7: RESULTS OF LOGISTIC REGRESSION

Characteristics	Odds Ratio
Sex (Female)	1
Sex (Male)	0.73* (0.59-0.91)
Religion (Others)	1
Religion (Hindu)	0.79 (0.53-1.18)
Religion (Muslim)	1.15 (0.70-1.86)
Religion(Christian)	0.95 (0.50-1.81)
Education (10+)	1
Education (No education)	0.79 (0.48-1.30)
Education (<5)	1.00 (0.54-1.87)
Education(5-9)	1.07 (0.65-1.76
Residence (Rural)	1
Residence(Urban)	0.42* (0.29-0.62)
WI (Highest)	1
WI (Lowest)	2.38* (1.51-3.78
WI (Second)	2.11* (1.35-3.30)
WI (Middle)	1.92* (1.25-2.97)
WI (Fourth)	1.76* (1.17-2.64)
Caste (None)	1
Caste (SC)	1.21 (0.77-1.91)
Caste (ST)	2.07*(1.36-3.16)
Caste (OBC)	0.84 (0.59-1.20)

*p<0.01

As seen from the above analysis, the impact of ICDS services varies within the AWC, we now move on to see to what extent the nutritional status of children have been affected by the utilization of the services available.

5.5.3 Utilization of ICDS services and its impact

Using the bivariate analysis, we see to what extent provision of food supplement has reduced under-nutrition both for children and mothers. However, before discussing it further, the table (Table 5.8) below is provided to show the utilization of supplementary food provided by ICDS/AWC by background characteristics for both children and mothers.

The table below (Table 5.8) reveals that mostly children receive supplementary nutrition once a month. And the children who belong to ST category avail more supplementary food at least once a month, while for the OBC category, food supplementation is less frequent.

TABLE 5.8: PERCENTAGE OF CHILDREN AVAILED SUPPLEMENTARY FOOD BY BACKGROUND CHARACTERISTICS

Background Characteristics	Not at all	Almost daily	At least once a week	At least once a month	Less frequently
< 6	11.8	3.9	0	74.5	9.8
6-12	9.7	2.2	3.2	73.1	11.8
12-23	14.4	4.8	2.4	68.3	10.2
24-35	7	10.9	6.2	63.6	12.4
36-47	10.5	20.3	4.5	51.9	12.8
48-59	16.2	31.3	3	38.4	11.1
Male	13.4	11.4	3	60.2	12
Female	10.3	13.5	3.7	61.3	11.1
Hindu	8.8	14.8	3.6	59	13.8
Muslim	31.9	7.1	4.4	47.8	8.8
Christian	5.4	13.5	0	75.7	5.4
Others	2.9	9.5	3.8	77.1	6.7

Table 5.8 contd.

SC	7.3	22	4.9	58.5	7.3
ST	6.6	10.8	1.7	71	9.8
OBC	17.9	10.4	5.8	51.2	14.6
Others	16.4	16.4	1.5	52.2	13.4
Urban	42.1	1.8	7	42.1	7
Rural	8.9	13.4	3.1	62.6	12
No Education	11.2	11.4	2.7	61.1	13.7
< 5	9.1	15.9	2.3	63.6	9.1
5-9	12.7	14.4	7.6	58.5	6.8
10+	17.9	17.9	0	61.5	2.6
Lowest	7.6	8.8	3.5	65.9	14.1
Second	14.4	9.8	1.3	59.5	15
Middle	9.2	15.7	0.7	65.4	9.2
Fourth	8.6	18.8	6.2	59.4	7
Highest	26.8	8.5	7	45.1	12.7

Source: Compiled from NFHS 3 unit data

Children of age group of 36-59 months mainly availed the supplementary nutrition. Evidently, this is around when the child shifts from mother's milk to other supplementation. There was a very slight gender differential in availing supplementary nutrition from AWs. However, there exists rural-urban differential.

Assuming better availability of food and health services in the urban areas, the high utilization of supplementary nutrition in the rural areas can be substantiated. It was seen that 18 per cent of children whose mothers were educated for more than 10 years received no supplementation as compared to mothers who were not educated. This explains their better living standard; hence they do not depend on services provided by ICDS/AWC. This holds true also for the children who belong to higher wealth status.

TABLE 5.9: PERCENTAGE OF WOMEN AVAILED SUPPLEMENTARY FOOD DURING PREGNANCY BY BACKGROUND CHARACTERISTICS

Background Characteristics	Did not receive any supplementary food during pregnancy	Did not receive any supplementary food during pregnancy
Hindu	72	28
Muslim	72.7	27.3
Christian	43.9	56.1
Others	34.9	65.1
SC	69.9	30.1
ST	45.8	54.2
OBC	75.9	24.1
Others	83.3	16.7
Urban	90.6	9.4
Rural	61.5	38.5
No Education	64.8	35.2
< 5	61.4	38.6
5-9	67.9	32.1
10+	84.6	15.4
Lowest	53.9	46.1
Second	66.4	33.6
Middle	59.1	40.9
Fourth	65.5	34.5
Highest	88.5	11.5

Source: Compiled from NFHS 3 unit data

Like the children, even pregnant and lactating mothers did not make efficient use of the supplementary food provided by the ICDS/AWC. However, among those who receive supplementary food, were higher from the Christian community and those from the ST category. It is quite obviously found higher among women in the rural areas and who were not educated or less than 5 years belonging to lower or lowest wealth status.

From the above analysis we have seen that the supplementary food service provided by AWC, although available is not fully utilized. Therefore, it becomes important to have a clear understanding of how far it has impacted the nutritional status of children and women.

To analyse this, the logistic regression is performed, wherein the nutritional status of the children and women have been taken as the dependent variable. While the existence of AWC and any services received from the AWC are taken as independent variables. The model has been adjusted for other background characteristics.

TABLE 5.10: RESULTS OF LOGISTIC REGRESSION

Background Characteristics	Stunting	Under-weight	Wasted
48- 59	1	1	1
< 6	0.05* (0.02-0.18)	0.31* (0.13-0.73)	1.47 (0.61-3.53)
6-12	0.36* (0.18-0.69)	0.86 (0.45-1.62)	1.74 (0.88-3.44)
12-23	1.34 (075-2.41)	1.5 (0.85-2.67)	2.61* (1.43-4.79)
24-35	0.86 (0.47-1.57)	1.19 (0.66-2.16)	1.28 (0.67-2.45)
36-47	0.89 (0.49-1.61)	1.11 (0.61-2.00)	0.87 (0.45-1.67)
Others	1	1	1
Hindu	0.66 (0.37-1.2)	1.16 (0.65-2.1)	1.98** (1.1-3.58)
Muslim	0.54 (0.24-1.2)	0.87 (0.4-1.9)	2.05*** (0.9-4.67)
Christian	0.95 (0.38-2.36)	1.22 (0.51-2.93)	2.54** (1.06-6.08)
10+	1	1	1
No Edu	4.46* (1.72-11.6)	2.47** (1.06-5.73)	2.53*** (0.9-7.1)
< 5	7.01* (2.2-22.38)	2.18 (0.77-6.19)	1.24 (0.35-4.44)
5-9	4.76* (1.82-12.46)	1.47 (0.63-3.45)	1.68 (0.59-4.75)
Highest	1	1	1
Lowest	1.21 (0.53-2.74)	1.11 (0.5-2.45)	1.44 (0.61-3.38)
Second	1.29 (0.57-2.9)	1.45 (0.66-3.2)	2 (0.86-4.63)
Middle	1.00 (0.45-2.22)	1.05 (0.49-2.26	1.2 (0.52-2.78)
Fourth	1.09 (0.52-2.29)	1.06 (0.52-2.16)	1.28 (0.58-2.82)
Availing ICDS service-supplementary food	1	1	1
Not Availing ICDS service-supplementary food	0.68 (0.37-1.24)	0.64 (0.35-1.14)	0.57*** (0.3-1.1)
Rural	1	1	1
Urban	1.38 (0.6-3.16)	1.5 (0.68-3.32)	1.32 (0.56-3.1)
Others	1	1	1
SC	2.56** (1.13-5.84)	1.36 (0.63-2.95)	0.89 (0.39-2.07)
ST	1.44 (0.71-2.92)	1.86*** (0.93-3.73)	1.64 (0.78-3.47)
OBC	1.22 (0.65-2.3)	1.28 (0.7-2.36)	0.99 (0.51-1.95)
Female	1	1	1
Male	1.44** (1.01-2.07)	1.27 (0.89-1.8)	1.18 (0.82-1.7)
Not Covered by AWC	1	1	1
Covered by AWC	0.7 (0.1-5.09)	0.34 (0.05-2.37)	0.53 (0.06-4.59)

*p<0.01, **p<0.05 and ****p<0.01

From the results above (Table 5.10), it is observed that, the presence of ICDS/AWC and services received in the form of supplementary food was insignificant in the case of stunting and under-weight. However, in the case of wasted the presence of ICDS was significant.

5.6 Summary

The above analysis substantiates the high rates of under-nutrition in Jharkhand despite the existence of program implementation. As recently published in the Hungama report that in the 100 focus districts[19], 42 per cent of children below five years of age are underweight, and 59 per cent are stunted. As we saw the coverage of ICDS was though impressive in terms of number of children, the number of children or adults who received any service were low, hence the poor nutritional outcomes were obtained. There was high under-nutritional status and anaemia level among children from the ICDS areas compared to its counterparts. This was also seen from the estimated logistic regression which showed high odds ratio for stunting, underweight and anaemia levels for children in the ICDS area.

Certainly, this corroborates the fact; mere presence of ICDS does not make a difference on the nutritional outcomes. It is essential to analyse the level of utilization of services provided in these ICDS covered areas, which of course is unsatisfactory. It was seen that the ICDS did not have any effect on two nutritional indicators. In other words, presence of ICDS did not make any improvement among children who were stunted or underweight.

To summarise the above analysis, it can be argued that the ICDS/AWC services have not been able to completely benefit the population of Jharkhand. The limitations ICDS faces in the state, demonstrates very poor outcomes. Therefore, it can be said that the problem of under-nutrition is persistent due to various factors. To point few of them, the lack of infrastructure and insufficient staffing and low budgetary

[19] The 100 focus districts come from six states: Bihar, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh.

allocation, improper management which in turn lead to inadequate coverage and the underutilization of services, poor quality of service and irregular delivery of services. The state and central government officials have to play a significant part by monitoring it at the state level or block level to ensure the efficient implementation and working of the program. Such an attempt would surely trigger down the high under-nutrition rates.

CHAPTER SIX

SUMMARY AND CONCLUSION

Under-nutrition among children and adults is a pervasive problem which all the countries are trying to tackle. It gathers significance not only for its detrimental effects on the children and adults leading to high mortality rates, but also for its transitory consequences in the long run, affecting the productivity and growth of the economy. Under-nutrition is often considered as an indicator of underdevelopment across the globe, and most of the countries which are facing the menace of it are trying to overcome it.

With amassing number of neonatal and maternal deaths, the problem of under-nutrition has managed to gather huge attention from researches, policy framers and organisations, who together are trying to unravel the puzzles of under-nutrition. There certainly exists an extensive array of studies on the nutritional status of children and adults around the world; as the problem of under-nutrition does not restrict itself only to poor and low income countries. This widespread phenomenon is not only detrimental for child's growth and development, but also obstructs the successful attainment of the Millennium development Goals. Additionally, for a country like India, where huge regional disparities exist, state specific studies have proved to be beneficial, not only in terms of policy framing but also as learning lessons. The review of the existing studies in the line of the issues relating to under-nutrition and the drawbacks which it creates for the society indicates that different demographic, social and economic factors have a significant influence on the nutritional status of children and adults. Also, studies concentrating in particular social groups or tribes of different states have found the depth and pattern of under-nutrition among regions. This has added much relevance to the issue of under-nutrition. However, studies conducted so far have failed to address the nutritional situation in the state of Jharkhand.

The present study titled '*Understanding Nutritional deprivation in the state of Jharkhand: Facts and Interpretations*' is an attempt to explore the pattern of under-nutritional status the state endures. Prevalence of high under-nutrition rates and dearth of literature has prompted the focus of the study to 'Jharkhand'.

The state has a total population of 32.96 million with 28 per cent of tribal dominance, 12 per cent of schedule caste and 60 per cent of the population belong to other category. The state ranks 19thout of 23 states (2007-08) in the Human Development Index[20], as can be seen from the states performance in indicators related to health.

In view to address this concern the main objectives formulated for the study was as follows:

- To explore whether under-nutrition among children and adults of different age, sex and social group is induced by lack of food or lack of health care.
- To discover the unique reasons (if any) responsible for sustained undernourishment remote from the usual factors.
- Analyse the reasons behind the slow progress in the bettering nutritional levels in Jharkhand despite various interventions undertaken by the state.

The study mainly focuses in the anthropometric measures of under-nutrition for both the population group-children and adults. Basic statistical tools such as measures of association and chi-square test have been used in the study. To explore if there exists specific reasons for the nutritional deprivation which the state in engulfed in, the Binary Logistic Regression has been estimated, which has been further interpreted by means of odds ratio.

[20]India Human Development Report 2011, IAMR and Planning Commission

6.1 Findings:

To study the nutritional status of child in Jharkhand, the three anthropometric measures of Stunting, Wasting and Underweight are used, which shows significant association with different background characteristics such as age, sex, religion, etc. Analysis show that, out of the total male children, 50 per cent were stunted, 57 percent were under weight and 35 percent were wasted.

It is also found that, across different background characteristics, the three measures varied significantly. The child's sex showed no association with any of the measures. Apart from this, mother's employment status was insignificant in case of stunting. In the case of underweight, child's birth interval was also not related. For wasting, other variables which were insignificant are- birth order, birth interval, mother's employment status, delivery age and religion.

Similar analysis is also done for men and women showing interesting facts. Women, take the centre stage of discussion for the role she plays in the household and society; in making decisions regarding food and nutritional security of her children, other family members and herself. It is observed that, women's nutritional status determines the health status of the child.

In Jharkhand, 43 per cent of women and 38 per cent of the men are underweight i.e. have a BMI of less than 18.5 kg/m^2. Anaemia which is a ubiquitous syndrome in the state is more common among women than men. Around 70 per cent of the total women population suffers from anaemia, whereas, only 37 per cent of the men suffers from it. Such stark gender differential can be attributed to data issues or small sample size of men. However, such facts cannot be disapproved that, there might be differences in the status of men and women, which is resulting such differences.

The high rates of under-nutrition among women foretell the nutritional status of children in the household. Children whose mothers had a BMI of less than 18.5 were seen to be more stunted, underweight or wasted compared to children whose mothers had BMI greater than 18.5. Nutritional status of women is one aspect which determines the child's health. Socio-economic factors which include mother's

education level are the other important characteristics. Likewise, is the household status, which largely influences mothers decisions making power in the household. Thus, observing such different background characteristics, it becomes intriguing and also interesting to explore further the determinants of the nutritional outcomes.

The multivariate analysis provides explanation of the determinants of the nutritional status among children and adults in Jharkhand. Three separate logistic regression models were obtained *viz.* stunting, underweight and wasting for children. While for adults separate single models for men and women using the BMI data are constructed.

Starting with stunting, we found the unadjusted odds ratio to be significant for age of child, mother's education, place of residence and wealth quintile groups. However, when the predictors were taking together to obtain the odds ratio, few variables such as place of residence showed no significance. The other variables which were significant were age of child, mother's education, delivery age, size at birth, sex of child, religion and wealth status. Nevertheless, only few variables exhibited exceptionally high odds ratio i.e. more than 1. Henceforth predictors having odds greater than one implies more likelihood to be stunted. Deducing from the analysis, age of child, mother's education status, age at delivery, sex of child, initiation of breastfeeding within one hour and the household wealth status are the predominant determinants of stunting among children.

Likewise for underweight, while calculating the un-adjusted odds ratios, the variables which become significant are age of child, place of residence, mother's educational status, mother's employment status, BMI of mother, delivery age, size at birth, diarrhoea, ARI symptoms (cough), religion, birth order, caste, fever and wealth group.

But, when these variables were included simultaneously in one logistic regression, they were no longer significant. As a result, the adjusted odds ratio of mother's education and BMI less than 18.5 had ratio greater than one verifying as the dominant factors of underweight. Finally for wasting, almost similar result was found, with most of the variable being significant when seen the unadjusted odds ratio.

Conversely, the adjusted odds ratio was significant only for few variables, such as, the age of child, mother's employment status, BMI less than 18.5 and schedule tribe. Therefore, these variables were major factors responsible for wasting among children among Jharkhand.

The nutritional status of adults was no better. Comparing the unadjusted odds ratio of women against the adjusted odds ratio, we found that most of the indicators lost significance. For variables such as, age, place of residence, caste, wealth status, education level, anaemia levels, delivery age, watching TV, reading newspaper and listening to ratio were significant in individual regression models, but when included simultaneously in one regression, only age, wealth status, place of residence, height less than 145 cm and reading newspaper were significant.

Conversely for men, the adjusted odds ratio was significant for age group of 15-19 years, place of residence, other backward class, educational level, employment level, listening to radio and wealth status.

Therefore, it can be asserted that amongst all significant indicators, age group of between 15-19 years, belonging to backward class, education levels, employment status and wealth status were major contributors of low BMI of men, which is evident from the high odds ratio. While for women, prime determinants are age, wealth status, place of residence, height and reading newspaper.

Certainly, the state has made progressive interventions to tackle this problem. But to our dismay, we found that not much has been achieved from the implementations of the various programs, which aimed towards attaining improvement over nutritional outcomes. The state has been successful to a large extent in implementing programs like ICDS and MDM, but, the achievements which should be seen in terms of reducing the nutritional outcomes of the state are still depressing.

The Mid Day Meal has certainly been successful in improving the retention and enrolment ratio partially fulfilling the universalization of elementary education. On the other hand through the flagship program, the ICDS has achieved more in terms of coverage of children where the government has attempted to focus in areas with high

under-nutrition rates. As a result high percentage of children and adults in those areas were covered by AWC. But, the sad part of this successful intervention is that only few have successfully availed the services. As a result the nutritional outcome of children in those areas was disquieting.

From the analysis, we found that the children who belonged to the areas covered by AWC, were more undernourished compared to children from the area not covered by the AWC. It was also found that, the services of the AWC/ICDS were mostly utilized by children and women from the backward or tribal groups and those who follow Christianity.

The interventions by the government have succeeded partially benefiting some sections or groups of people. There is a need to focus on those segments of people who are left unattended. Interventions should focus on pre-natal and post-natal care for mothers and children with special care to the vulnerable sections and communities such as the tribal and backward population of the state. There is a need to implement separate strategies focusing in rural and urban areas. But, all these attempts by the government will be futile in the absence of proper and stringent monitoring and reviewing committees. This can be made simpler and efficient through decentralizing the interventions at the district, sub-district and municipal or urban ward levels to enable policy framers to identify geographies for concentrated actions.

6.2 Conclusion

The objective of the study was to enquire whether under-nutrition in Jharkhand is food-led or health care led. For this purpose, the UNICEF Framework was employed. From the analysis undertaken it was observed that, unravelling under-nutrition as a result of either of the two is difficult. As both the immediate factors- food and health care have strong influence in the nutritional outcomes. Among adults, the poor nutritional outcome can be attributed to the cumulative effect of their caring and rearing practices during childhood. In the case of Jharkhand, it can be argued that low

nutritional outcomes are a result of both the immediate factors namely food intake and health status.

The second objective was to probe if any unique reasons of under-nutrition exist in the case of Jharkhand. Analyses revealed that, the main cause of under-nutrition were the reasons associated with the child's maternal characteristics and other economic factors. These reasons have widely been discussed in the literature. Hence, no specific reasons can be attributed for the high under-nutrition outcomes. However, in Jharkhand, the problem of under-nutrition is more pervasive as a huge chunk of population belongs to tribal population which is found to be more vulnerable compared to other social groups.

Finally, the third objective was to analyze the slow progress of the nutritional schemes launched in the state. The widely discussed programs for reducing under-nutritional status have been obstructed due to reasons such as poor infrastructure facilities, insufficient and irregular staffing operations, low budgetary allocation, poor coverage in terms of providing services, lack of quality services and delivery mechanisms. Apart from these generic issues, the programmes was criticized of making discrimination based on caste, poor management from the school authorities, pilferage of foodgrains and funds and other bottlenecks caused due to the instability of government and interference from disruptive groups inhabited in the state of Jharkhand.

6.3 Limitation

This study has been limited to deal with the nutritional outcomes only, as it would be difficult to deal with the input indicators in the same study simultaneously.

There is a strong linkage between infection and nutrition. And the understanding about the interactions of nutrition and infection has its origin from the clinical and biomedical literature. However, these studies do not take into consideration any socio-demographic or economic factors which may impact illness outcomes, instead

focuses on building physiological link between nutritional status and risk of morbidity or mortality.

The present study does not make a distinction between the nutritional status of tribal and non-tribal population. Studies focusing on different social groups across different states have found that these social groups are more vulnerable than the others. They believe the habitation and ecosystem in which they live has a major contribution to their poor nutritional status. Given this understanding, it would be worthwhile to explore the nutritional status of the non-tribal and tribal population of Jharkhand which has 28 per cent of tribal dominance.

6.4 Scope for Further Research

Understanding under-nutrition from the dimension of input indicators such as household food security; quality of care; resources for health, including access to health services; and a healthy environment would bring out interesting facts. Studies found that Jharkhand is one among the food insecure states. Therefore, exploring the linkages between food security, nutritional outcomes and poverty would provide a different dimension to the study.

As reviewed in the fifth chapter, the different policies announced by the government to eradicate under-nutritional status, it is essential to monitor the impact of these on the nutritional outcome. There have been studies which have tried to analyse the impact of the ICDS on different sections of people in different states by means of the Principal Score Matching method. This is one of the most widely used program evaluation technique which examines the outcomes and the program placements. Such a study done for the state of Jharkhand, where these programs are undergoing criticism, would enable policy framers to re-implement them, resulting in reduction of under-nutrition rates.

Aforesaid, the problem of under-nutrition is not a new phenomenon, as there are volumes of studies done to understand the dynamics behind this syndrome. Despite, this there are children and women still dying of under-nutrition. A much more

committed attempt has to be made at the grass-root level, with special focus to underprivileged groups, infants, uneducated and poor mother and other family members in order to free the state and the nation in whole, from the clutches of this syndrome.

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