

**ACCESSIBILITY, AVAILABILITY AND  
UTILIZATION OF INFANT HEALTH CARE  
SERVICES: A CASE STUDY OF MALDA  
DISTRICT, WEST BENGAL**

*Thesis submitted to Jawaharlal Nehru University  
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DECLARATION

I, Rituparna Sengupta, declare that the thesis entitled, "ACCESSIBILITY, AVAILABILITY AND UTILIZATION OF INFANT HEALTH CARE SERVICES: A CASE STUDY OF MALDA DISTRICT, WEST BENGAL", submitted to the Jawaharlal Nehru University for the award of the degree of DOCTOR OF PHILOSOPHY, is my bonafide work. The thesis has not been submitted for the award of any degree in this or any other university.

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*Dedicated  
To my  
“Lal Dadu”*

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## ABBREVIATIONS

ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
BPHC	Block Primary Health Centre
BPHN	Block Public Health Nurse
CHC	Community Health Centre
GNM	General Nurse Midwife
IMR	Infant Mortality Rate
MDG	Millennium Development Goal
NRHM	National Rural Health Mission
PHC	Primary Health Centre
PHN	Public Health Nurse
PNC	Postnatal Care
SC	Sub-Centre
SDG	Sustainable Development Goal
UPA	United Progressive Alliance
VHND	Village Health Nutrition Day
WHO	World Health Organization

## Chapter 1

### *Introduction*

The last few decades have witnessed international organizations and national governments collaborating in formulating and implementing policies, aimed at enhancing child health and thereby bringing down the mortality rates. Child mortality rates of a country often reflect its level of socio-economic development, as healthy children contribute to a quality future workforce. Therefore, endeavours have been intensified to enhance child survival worldwide, especially in sub-Saharan Africa and South Asian countries. With some notable successes, the infant and child mortality rates continue to be substantially high with young lives being lost to birth complications, inadequate neonatal care and preventable early childhood diseases.

The probability of death of a newborn baby before the age of one is termed as infant mortality rate ([http://www.searo.who.int/entity/health\\_situation\\_trends/data/mdg/IMR/en/](http://www.searo.who.int/entity/health_situation_trends/data/mdg/IMR/en/)). Expressed as per thousand live births, infant mortality rate is unanimously acknowledged as an indicator of the overall prevailing public health conditions as well as the level of socio-economic development of the country. A high infant mortality rate indicates the “*unmet health needs and unfavourable environmental factors*” (Parashar et al., 2017). Therefore, the decline in the infant mortality rate is not only expedient but also an indicator of the development of the overall living standards. Globally, 4.2 million children died in 2016 before reaching their first birthday, accounting for 75 percent of all under-five deaths (WHO, 2016). Majority of the infant deaths were concentrated in the developing countries of Africa, followed by South East Asia. Almost 83% of the infant deaths are caused by known and preventable diseases like infections, neonatal (pregnancy or delivery related causes) or nutritional conditions – prematurity being the largest single cause.

The infant mortality rate comprises of two classes; neo-natal mortality - deaths before the age of one month and post neonatal mortality - deaths between the age of 29 days to one year of birth (Chandrasekhar, 1954). From 129 infant deaths per 1000 live births in 1976 to 37 infant deaths in 2016, India registered an impressive decline of around 71 percent within a span of four decades (NIMS, ICMR and UNICEF, 2012; SRS, 2017). The substantial reduction in the infant mortality rate is attributed mostly

to the decline in the post neonatal mortality, while the neonatal deaths have remained the same or registered a slow pace of decline. However, when compared to the developed and many of the developing countries of the world, the infant mortality rate in India continues to be high. According to the World Health Organization's classification of its member states into 14 sub-regions, based on their under-five and adult male (15-59 years) mortality rate, India is categorized in the South East Asian Region – D (SEAR – D). The region comprising of India and its neighbouring countries like Nepal, Bangladesh, Bhutan and Myanmar and the other South Asian countries of Timor-Leste and Democratic People's Republic of Korea, with high child and adult mortality rate is characterized as “high mortality” developing region, (WHO, 2003).

India's incredible economic performance in the last few decades has earned her the title of an “emerging economy”, but the irony lies in the fact that it has recorded a worst performance in the domain of child health and nourishment (even worse than the underdeveloped countries of sub-Saharan Africa) during the same time span (Maitra and Ray, 2013). Further, it has also been perceived that despite the widespread expansion of the public health infrastructure, improving access to healthcare services, the country has failed to achieve the desired outcome (Fay et al., 2005). The preceding years have witnessed stagnation in the reduction of infant mortality rates in many of the states (Ghosh, 2012). In India, existence of inequalities in child health is evident across several dimensions. Vast differentials in terms of access and utilization of healthcare services, thereby affecting the health outcomes are observed across regions and socio-economic groups. Inequalities in health outcomes are not only the result of varied socio-economic development of the states, but also the differentials in access to and utilization of health services as well as uneven distribution of public health services in the country (NIPCCD, 2014). The public health infrastructure in the country underwent a major “architectural correction” under the National Rural Health Mission in 2005, aiming to remove the unequal access to healthcare facilities by providing them at the grass root level. Post NRHM, many of the states reported a high reduction in the infant mortality rate, with the annual reduction accelerating to 4 percent after 2005, compared to 2 percent during 2000 – 2005 (Singariya, 2013). However, dearth of trained medical personnel and quality

services have condensed many of these facilities obsolete as they remain unused or underutilized (Jana and Harata, 2016).

### **1.1 Infant Mortality: Evolution of Global Health Programmes**

The international conference on Primary Health Care in 1978, Alma Ata, is contemplated as the key milestone in the domain of public health during the twentieth century. Acknowledging the gross inequalities in health status among the people, especially in the developing and developed countries of the world and reaffirming health as a fundamental human right, the conference called for a fresh approach to the existing healthcare system. It deliberated the “*primary health care to be essential care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination*” (WHO, 1978). Laying the foundation of the primary health care system, the conference urged the international organizations and governments to formulate policies and programmes and make better use of resources to attain good health of the people by the year 2000.

The Alma Ata conference reiterated the goal of the 30<sup>th</sup> World Health Assembly, 1976, “Health for All by the Year 2000” and provided Primary Health Care as a strategy to achieve the objective. Attended by 134 countries and 67 non-governmental organizations, the conference stressed the role of the government and participation of the community in universalization of health care access and utilization (Maccioco and Stefanini, 2007; [https://www.unicef.org/malaysia/SOWC09\\_Alma\\_Atta\\_Primary\\_Health\\_Care.pdf](https://www.unicef.org/malaysia/SOWC09_Alma_Atta_Primary_Health_Care.pdf) ). The implementation of the primary health care system was however greeted with a host of financial, political and social barriers as it required countries to divert their policies, programmes and resources to serve the most deprived urban communities and the rural areas – which was opposed by the “social hierarchy and power base” in many countries (Missoni and Pacileo, 2009). Due to the complications in implementing the concept of primary health care, the succeeding decades witnessed a change in the approach with the emergence of Selective Primary Health Care (SPHC) which aimed at prevention, detection and management of



specific diseases which had the highest mortality and morbidity rate, and had effective medical expertise to deal it. These top-down approaches, backed by many international donor agencies and the World Bank, led the emphasis being drifted from health to specific diseases. With some notable successes in health outcomes, increased privatization of health services for enhancing efficacy and levying of user fees as suggested by the World Bank, have widened the gap between the poor and rich in terms of access and utilization of the health services (Maccioco and Stefanini, 2007; Missoni and Pacileo, 2009).

The International Conference on Population and Development, 1994 is considered as another milestone in the field of health which for the first time addressed the sexual and reproductive rights of women and girls and highlighted the crucial linkage of the former with almost every other attributes of population and development (<https://www.unfpa.org/icpd>). Among the myriad of issues addressed by the conference, reducing maternal and child mortality and thereby improving their health was one of the key aspect. The significant outcomes of the ICPD Programme of Action laid the

**Table 1.1 Child Health & Nutrition in the Millennium Development Goals**

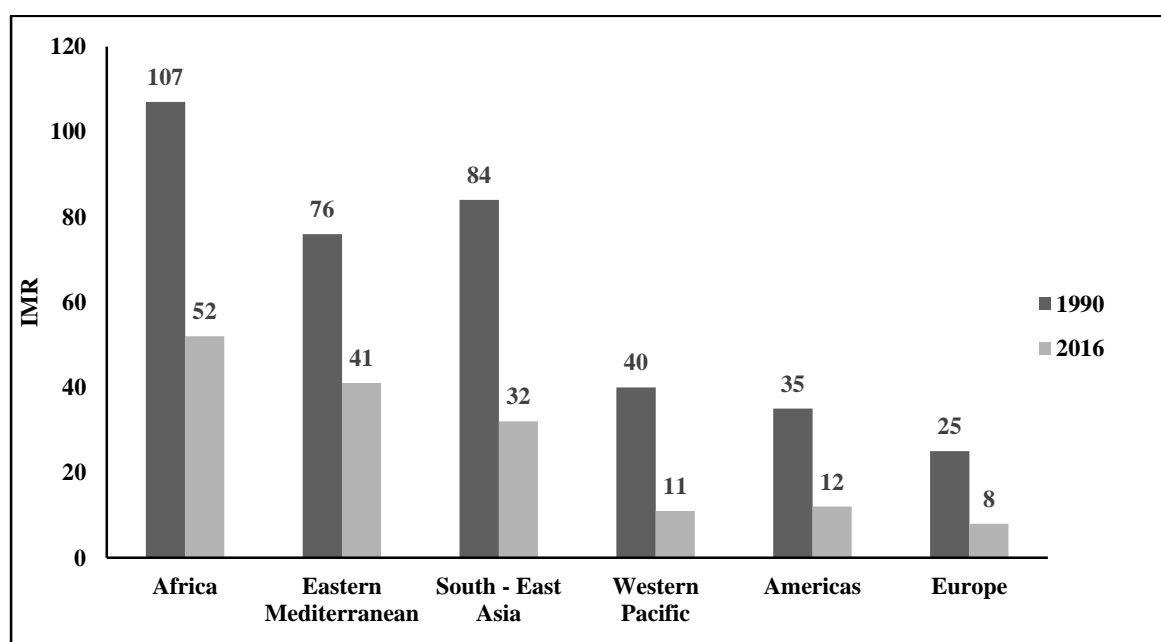
<b>Goal</b>	<b>Target</b>	<b>Indicators</b>
<b>Goal 1: Eradicate extreme poverty and hunger.</b>	<b>Target 2:</b> Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	<i>Prevalence of underweight in children( Under five years of age)</i>  Proportion of population below minimum level of dietary energy consumption.
<b>Goal 4: Reduce child mortality</b>	<b>Target 5:</b> Reduce by two-thirds, between 1990-2015, the under-five mortality rate	<i>Under-five mortality rate</i> <i>Infant mortality rate</i> <i>Proportion of one year children immunized against measles.</i>

*Source: The determinants of child health and nutrition: A Meta data analysis, WHO report*

foundation of the Millennium Development Goals, 2000 which presented “quantified targets” for the Governments to achieve. Universal access to quality sexual and reproductive health services was a pre-requisite to achieving the MDGs of reducing maternal and child mortality, improving nutritional health and protect from various preventive diseases (Bernstein and White, 2005).

In September 2000, 191 member states of the United Nations signed the Millennium Declaration, beginning a global partnership of international organizations and the countries, aimed to achieve eight development goals by the year 2015 (WHO, 2015). Goal 4 of the Millennium Development Goal aimed at reducing the under-five and infant mortality rate by two-thirds by the year 2015. The MDG 1 of “eradication of extreme poverty and hunger,” though not directly but aims to reduce child mortality by decrease in the percentage of malnourished and underweight children which is one of the key reasons for under-five mortality rates in the developing countries, especially in sub-Saharan Africa. Globally, remarkable progress has been made under the Millennium Development programme. At the end of 2015, regions like America, Europe and Western Pacific Region have met most of the targets of the MDGs, while the developing regions of South East Asia, Eastern Mediterranean and Africa have strived hard to meet the target, but have made it only half-way through (WHO, 2015).

*Figure 1.1 Infant Mortality Rates Estimate by WHO regions*



Source: UNICEF, 2017

The UNICEF report on child mortality, 2017 provides the estimates of infant mortality rates by the end of 2016 of the WHO Regions. As seen in figure 1.1, considerable progress has been made in reduction of infant mortality in all the regions, with the European region recording as low as 8 per thousand live births. All the regions have almost halved their IMR by 2016. However, when compared to the developed region, Africa, Eastern Mediterranean and South –East Asia still record a high infant mortality rate. The disparities in the reduction of the infant mortality rate is attributed to the inequalities in the economic development of the countries. Universal access to health services is still a far-fetched dream in many of the developing countries. Despite its success, the MDGs have been criticized as “one-size-fits-for-all” programme which provided targets irrespective of the level of development of individual countries, ignoring the intra as well as inter-country inequalities (WHO, 2015).

The MDGs were succeeded by the Sustainable Development Goals (SDGs), 2015 also known as Global Goals which aim for a sustainable future by 2030 integrating all three of its dimension – social, economic and environment. Built on the achievements of the MDGs, the SDGs are not individual goals but integrated as development and progress in one, leads to development in other. Along with preceding goals of MDGs, it also includes new areas like climate change, sustainable consumption and economic inequality among others (<http://www.undp.org/content/undp/en/home/sustainable-development-goals.html>). Among the 17 goals, Goal 3 of the Sustainable Development Goals – “*Ensure healthy lives and promote well-being for all at all ages*”, have been explicitly devoted to health, acknowledging the need of all country and all population. In terms of child health, Goal 3.2 aims to reduce neonatal mortality to 12 per thousand live births and under-five mortality to 25 per thousand live births by the year 2030. A distinctive feature of the SDGs is width of their embrace. Health is determined by various other factors like poverty, malnutrition, sanitation and hygiene, gender equality. Other than health goals, the non-health goals also attempt to improve child health through progress in environment, economic and social aspects (Table 1.2).

**Table 1.2 Child Health & Nutrition in the Sustainable Development Goals**

Goals	Target
<b>Goal 2:</b> Zero Hunger	<b>Target 2:</b> By 2030, <i>end all forms of malnutrition</i> , including achieving, by 2025, the internationally agreed targets on <i>stunting and wasting in children under five years of age</i> , and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.
<b>Goal 3:</b> Good Health and Well Being	<p><b>Target 2:</b> By 2030, <i>end preventable deaths of newborns and children under five years of age</i>, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.</p> <p><b>Target 3:</b> By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.</p> <p><b>Target 8:</b> Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.</p>
<b>Goal 6:</b> Clean water and Sanitation	<p><b>Target 1:</b> By 2030, achieve universal and equitable access to safe and affordable drinking water for all.</p> <p><b>Target 2:</b> By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations</p>

Source: <http://in.one.un.org/page/sustainable-development-goals/>

The global variation in infant mortality is not only the outcome of different levels of socio-economic development but also the differentials in the level of utilization of the various maternal and child healthcare services provided by the national Governments and international agencies. Utilization of healthcare services by the mother depends on a myriad of socio-economic factors and their level of interplay. The determinants of low utilization of healthcare services differ by region. While in the developed countries health insurance coverage, family structure and economic condition play an important role, in the developing countries, maternal education, age, parity and poverty emerge as important determinants (Güneş, 2013; Tswae et al., 2015; Heck and Parker, 2002; Le et al., 2010). Kalipeni et al. (2017), documenting the various studies carried out in sub-Saharan Africa to ascertain the major factors affecting

utilization in the region, states that despite considerable progress in reducing under-five mortality rate, the country continues to report the highest number of deaths in the world. High rate of adolescent pregnancy, low education, low contraceptive prevalence, poverty along low availability of healthcare services in the region emerges as the major predictors of low utilization and thereby high maternal and infant deaths. Among the various socio-economic and demographic factors, maternal education has been documented as the single most important variable determining utilization as well health status of the mother and the child (Caldwell, 1979; Santhya, 2011; Vora et al, 2009; Agnihotri, 2001; Klauww and Wang, 2011; Fang et al, 2015; Tiruneh et al., 2017). Recognizing the key issues affecting maternal and child health, the Sustainable Development Goals, therefore, aims to provide an all round sustainable growth of the people and reduce global inequalities thereby.

## **1.2 Infant Mortality: Indian Scenario**

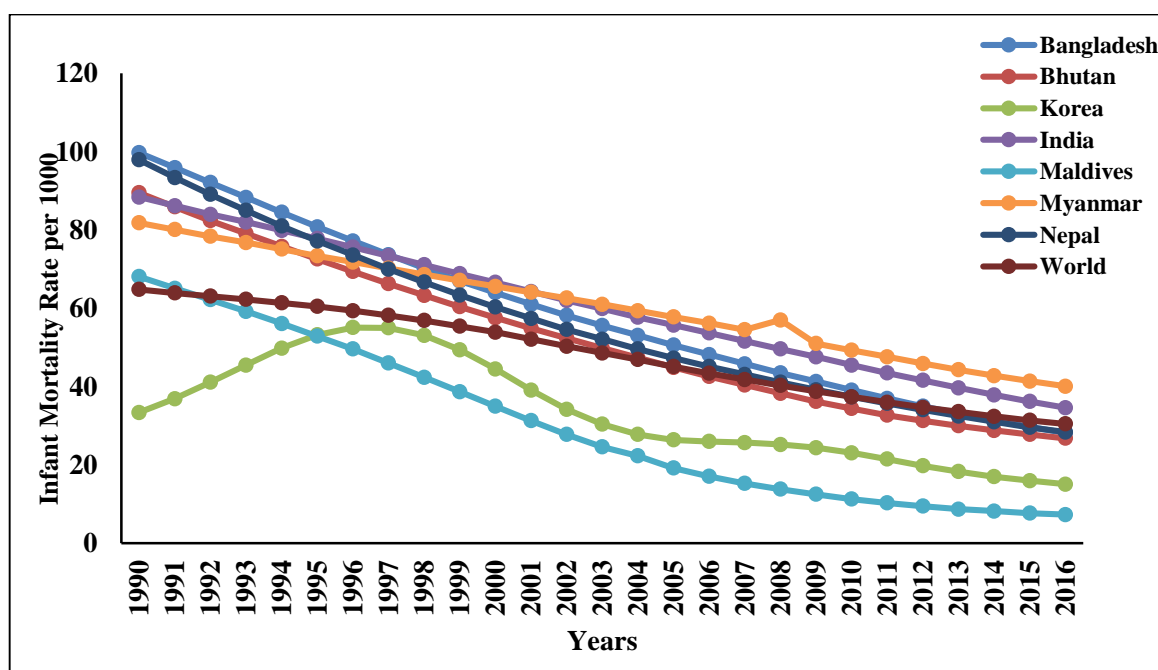
At the eve of Independence, the health system of the country was in a dilapidated state plagued by high fertility and child mortality rate. The major task for the forefathers of the country was to control the ever growing population to bring about the desired development. Thereafter, India became the first country of the world to launch a state-sponsored family planning programme in 1952. Initially, the family planning programme focused exclusively on reducing the fertility rates through various policies and programmes. Recognizing the importance of maternal and child health in bringing about the desired changes in fertility, the programme was renamed as Family Welfare Programme in 1977, with an inclusion of policies aimed at maternal and child health. The Alma Ata Declaration of 1978, was succeeded by considerable flow of resources into the realm of child health with the focus shifting from population stabilization to improvement in overall health, especially maternal and child health (NIMS, ICMR and UNICEF, 2012). Following the declaration, India envisaged a target to reduce the infant mortality rate to 60 by 2000, which however it failed to achieve with the infant mortality rate being 68 in 2000 (<http://planningcommission.nic.in/plans/mta/mta-9702/mta-ch17.pdf>).

The 1980-90s witnessed myriad maternal and child health programmes being launched like the Universal Immunization Programmes (1985), Oral Rehydration

Therapy (1985), Child Survival and Safe Motherhood (1990), Reproductive and Child Health Services (1997) – all of which resulted in a sharp decline in the infant mortality rate from 80 per thousand live births in 1990 to 37 in 2015 (MOSPI, 2015). Being a signatory to the Millennium Declaration, India aimed to reduce its infant mortality rate to 29 by 2015. To reduce the disparities in access to healthcare services - a key determinant of infant health, the National Rural Health Mission was launched in 2005. Despite its laudable success in increasing the rate of reduction in infant mortality rate post-2005, India missed the MDG target of 29 infant deaths per 1000 live births (Singariya, 2013).

The global distribution of under-five mortality reveals a wide disparity between the developed and developing countries, with sub-Saharan Africa and South Asia accounting for more than 80 percent of the deaths. Of the six countries (India, Democratic Republic of Congo, China, Pakistan, Nigeria and Ethiopia) accounting for more than half of the global under-five deaths, India and Nigeria alone account for more than a third (UNICEF, 2017). Registering an infant mortality rate higher than its neighboring countries, Nepal and Bangladesh, whose per capita GDP is much less than India, the country's economic performance remains questionable, as higher economic growth is often being linked with lower infant mortality rates (Preston, 2007; World Bank, 2016).

*Figure 1.2 Infant Mortality Rates, India & South –East Asia Region – D, 1990 - 2015*



Source: Global Health Observatory Data Repository, 2017

As stated earlier, WHO categorizes India into SEAR –D - a high mortality region which comprises of six other countries of South East Asia. Except the Democratic Republic of Korea and Maldives, all the other countries in the region have registered an IMR higher than the world average (Fig 1.2). When compared to other countries, India's performance in reducing infant mortality during the period of 1990-2015, has been abysmal. Bangladesh and Nepal, which had higher mortality rates during 1990 have shown a steep decline post-2000. Though the gap has been narrowing down, India recorded a long time high IMR than world average throughout the time period. This alarming situation calls for a look into the performance of the various policies and programmes of the Government in the domain of child health. However, the high mortality rate of the country could be attributed to the vast inequalities in mortality rate across states. India has a myriad of religion, culture, language and physical topography resulting in varied socio-cultural norms and economic growth. While the southern part of the country, with high economic and social development, have improved their child status markedly, poor child health status continues to be dominant in the northern states, thereby contributing to the high country average (Jain, 1985). Therefore, to achieve the sustainable development goal of ending all neonatal and under-five preventable deaths by 2030, formulation and implementation of the programmes and policies should take into account regional development and more emphasis should be laid on the high mortality states.

### **1.3 Health Care System in India**

A key aspect reiterated in all the global health programmes and international conferences was reducing the inequities in access to health care services which have resulted in unequal health outcomes. Accessibility to health institutions in terms of both physical as well as economic aspect is an important pre-requisite to better health status. The ever-widening gap between the rich and the poor in terms of health outcomes is a result of skewed access to healthcare services (Dalal and Dawad, 2009; Kumar and Mohanty, 2011). The inequalities are more stark when the rural-urban picture of healthcare utilization is taken into account. The rural areas, comprising more than 68 percent of the country's population, do not have access to good healthcare institutions which reduce their utilization of health services (Census of India, 2011; Dalal and Dawad, 2009).

The inevitability of a public health infrastructure at the grass-root level to provide access to basic health care services has been stressed since the Bhore Committee report, 1946 (National Health Portal, 2015). Post-independence, the public health infrastructure in the country has undergone through a lot of investments and changes to cater to the farthest of the rural population. The public health infrastructure in the country is far from satisfactory and the delivery of services is constrained by several factors like weak referral system, non-availability of workers, shortage of funds – all of which have led to the appallingly low utilisation of the healthcare services (Kumar and Prakash, 2011; Paria, 2013). The major restructuring of the rural health infrastructure of India was done with the launch of National Rural Health Mission in 2005. The programme was launched in the “high-focused” 18 states of the country with a view to improve the rural health infrastructure and provide quality services to the people (Singariya, 2013).

The significance of availability and accessibility to quality obstetric and child healthcare services in reducing infant mortality rates has been well documented in the literature (Fay et al., 2005; Dalal and Dawad, 2009; Bhattacharya and Haldar, 2014; Badari et al., 1991). The World Health Organization too, emphasises the role of quality health workers in reducing maternal, infant and child mortality rates (WHO, 2006). The healthcare system in India is included both in the State as well as the Concurrent list. Healthcare services include not only mere physical infrastructure but also the trained health personnel who are required to deliver these services. Keeping in view the varied physiography and socio-economic structure of the country, the rural health infrastructure in India is a three-tier structure, based on specific population norms (Table 1.3).

**Table 1.3 Rural Healthcare Infrastructure by population norms**

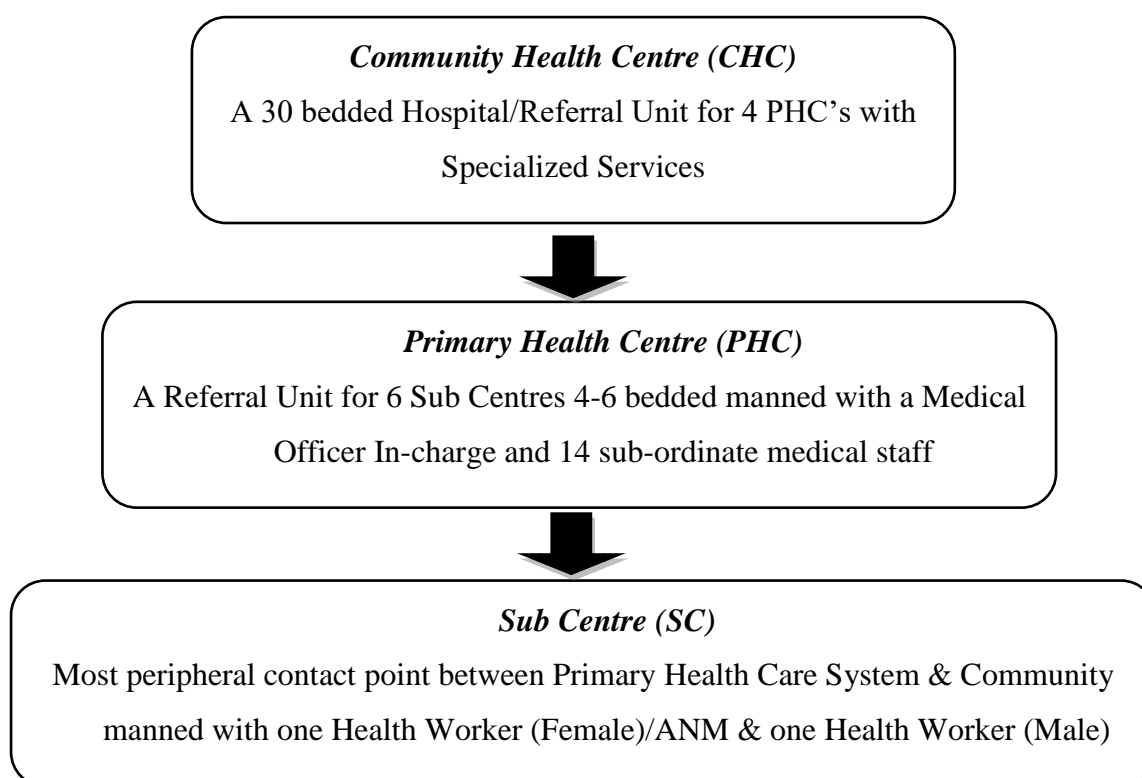
Health Infrastructure	Population Norms	
	Plain Area	Hilly/ Tribal/ Difficult Area
<i>Sub Centre</i>	5000	3,000
<i>Primary Health Centre</i>	30,000	20,000
<i>Community Health Centre</i>	1,20,000	80,000

Source: Rural Health Statistics, 2014-15



At the lowest of the three-tier system is the Sub-centre which forms the “*most peripheral and first point of contact*” between the rural areas and the primary health infrastructure (MoHFW, 2015). Consisting of an Auxillary Nurse Mid-wife (ANMs) and ASHAs, they cater to a population of 5000 in the plain areas and 3000 in the tribal or hilly areas, providing basic maternal and child healthcare services, advice on nutrition and family planning as well as control and prevention of communicable diseases. The second in the tier is the Primary Health Centre, which “*first point of contact between the village and the medical officer.*” Catering to a larger population of 30,000 in the plain areas and 20,000 in the tribal or hilly areas, the PHCs provide preventive, curative and promotive healthcare services”. The PHCs are staffed with doctors, laboratory technicians and assistants and also provide inpatient services on a small scale. The last in the tier is the Community Health Centre which is the largest in the rural health infrastructure, catering to a population of 1,20,000 in the plain areas and 80,000 in the tribal or hilly areas. Comprising a higher number of beds, the CHCs provide a higher in-patient services and also provide emergency obstetric services to pregnant women. It is staffed with medical specialists along with paramedical and other staffs (MoHFW, 2015).

**Figure 1.3 Structure of Rural Healthcare System in India**



Source: Rural Health Statistics, 2014 - 15

The secondary healthcare system consisting of sub-divisional hospitals forms the primary tier for the urban population. Medical colleges and district hospitals form the tertiary sector of the public healthcare system in India. Both the secondary and tertiary public health infrastructures are situated in the urban areas, which are also found to be adequately endowed with private healthcare facilities (Chokshi et al., 2016).

The private health sector has witnessed a spurt in growth in the last few years. Due to inefficient and low quality of services provided by the Government health institutions, people are found to rely more on the private health sector, resulting in a high out of pocket expenditure. The private health infrastructure in India can be divided into two broad categories – institutional and non-institutional. The former consists of the private clinics, multispecialty hospitals, hospitals run by trusts, nursing homes, etc. The non-institutional sector consists of private registered practitioners, government doctors with private practice, local unregistered doctors known as quacks, chemists and traditional healers (Majumder, 2006). Private practitioners of traditional medicine system of India, Ayurveda, Unani, Siddha, and Homeopathy are also included in the private health sector, though some of the Government hospitals have also started provision of these traditional medicines recently (<http://ayush.gov.in/>).

#### **1.4 Maternal and Child Health Care Programmes in India**

Enhancement of health status of its general population has been the key impetus of all the social development programmes in India. Since Independence, the Government has initiated various health measures to improve access to health care, especially to the underprivileged section of the society, by developing an extensive health infrastructure. The health infrastructure delivers health services under the various government programmes to address the major health issues of the population, monitor and control communicable diseases and also advice on the family welfare programmes.

Maternal health holds immense significance in reducing infant deaths, as poor health of the mother results in increased miscarriages as well as perinatal, neonatal and infant mortality. Often, obstetric complications, if not monitored and treated, ensues higher incidence of both maternal and child mortality. Therefore, as survival of both mother and child depends upon the health status of the mother, maternal and child

health (MCH) services in India includes antenatal, natal, and postnatal care for mothers and health and nutritional services for infants and children less than five years of age.

Maternal and child health services have always been an integral part of the government's policies since independence. However, though the initial focus was on controlling the population growth, maternal and child health soon gained spotlight. The Minimum Needs Programme, 1974, launched during the fifth five-year plan, integrated the maternal and child health and nutrition services with the family planning programme (<http://planningcommission.nic.in/plans/planrel/fiveyr/7th/vol2/7v2ch19.html>). The year 1978, witnessed the introduction of Extensive Immunization Programme in all the states, as a key intervention to reduce the number of infant and child deaths by preventable causes. The programme was expanded to all the districts as Universal Immunization Programme in 1985 (<https://mohfw.gov.in/sites/default/files/41016395871489662752.pdf>). The UIP provides vaccination to children against six preventable diseases, diphtheria, pertussis, childhood tuberculosis, measles, neonatal tetanus and poliomyelitis. Two major preventable causes of infant death are diarrhoea and pneumonia which account for more than half of the deaths (WHO, 2016). The diarrhoea control programmes was also started in 1978, which aimed to prevent infant and child mortality by dehydration, which is caused by diarrhoea among children. The Acute Respiratory Control Programme was launched in India in 1990, which later merged with the child survival and safe motherhood programme in 1992. A major breakthrough in the maternal and child health programmes took place after the National Health Policy, 1983 which envisaged to reduce maternal, infant and child mortality significantly and therefore all the child health programmes was focused on achieving the targets. The Child Survival and Safe Motherhood Programme, 1992-93, brought together all the major child survival programmes, safe motherhood and family planning activities under one roof. The major objective of the programmes was to improve health status of mother and child and reduce infant, child and maternal mortality all throughout the country (<https://mohfw.gov.in/sites/default/files/2156472494RTI%20Act%2C%202005%20for%20Child%20health%20division.pdf>).

The Reproductive and Child Health (RCH) programme was introduced in 1997, which integrated the child survival and safe motherhood programmes into its realm.

Along with bringing down the birth rate, infant and maternal mortality rate, the RCH also aimed at increased institutional delivery, antenatal care and immunization rate (<https://gmch.gov.in/e-study/e%20lectures/Community%20Medicine/Reproductive%20&%20Child%20Health.pdf>). To fulfill the targets of MDGs and the National Health Policy, 2000, the National Rural Health Mission was launched in 2005 which not only brought about a widespread development and renovation of the existing healthcare infrastructure but also introduced a multitude of maternal and child health services. Some of the important interventions introduced are the Accredited Social Health Activist (ASHA), who works at the village level and is the first point of contact between the ANM and the community and Janani Suraksha Yojana – a safe motherhood intervention aimed at increasing institutional delivery among poor women by cash assistance, and thereby, reducing maternal and neonatal mortality (IIPS and Macro International, 2007). Other child and maternal health-related programmes include Janani Shishu Suraksha Karyakram, 2011, providing women cashless delivery in Government health institutions, free referral service, free treatment of sick new-borns within the 30 days (<http://nhm.gov.in/janani-Shishu-suraksha-karyakram.html>).

Initially launched in 18 high focus states, the NRHM was extended to all the states in 2012. New programmes and policies, along with extension of the older ones were carried out to provide services even to the remotest village to improve the vital health outcomes. The Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH +A), launched in 2013, under RCH, phase – II, included an important section of the population which has long been neglected – the adolescents. Adolescents, especially adolescent girls, need specialized care during the transition period from child to women for proper physical as well as mental development. In the traditional society of India, many girls are married off and give birth at adolescence, which is harmful for both the mother and the child. Therefore, along with reduction of maternal and child mortality and fertility rate, the programmes also aim at better health status of the adolescents (NHP, 2015). Other important child health-related programmes include the Mission Indradhanush launched in 2014, which strengthens the Universal Immunization Programme and aim at full vaccination coverage of children up to 24 months and pregnant women (<http://www.missionindradhanush.in>).

### 1.5 Statement of Problem

Since independence, along with economic development, improvement in the quality of life of the general population has also been a principal objective of the Government. The World Health Organization defines health as “a *state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*” (WHO, 1946). Therefore, along with increased socio-economic development, provision of better healthcare services is also a requisite for enhanced quality of life. However, notwithstanding the rapid economic growth in the last two decades, India’s performance in the field of child health and nutrition has been disappointing. India still lags in health outcomes like malnourishment and nutrition not only in South Asia but also in comparison to some of the African countries (Maitra and Ray, 2013). While the crude death rate of the country has declined appreciably, infant and child mortality rates continue to be high, implying that the various preventive and curative health interventions, as well as improved food security, have not yielded positive results for children (Jain, 1985).

Despite rapid urbanization, 69 percent of the population still resides in rural areas, many of which is deprived of basic health and sanitation facilities. The Census 2011 records 45 percent of the rural households being not electrified, 69 percent do not have latrine facility and around 18 percent of the rural households fetching drinking water from sources located more than 500m away (Census, 2011). The rural health infrastructure of the country too, presents a dismal picture, with low accessibility and utilization of public health services. With the government spending a meagre percentage of its GDP on health, the public health infrastructure in India is ailing. The rural areas accounting for around 70 percent of the population, have only 20 percent of the hospital beds (Bhandari and Dutta, 2007). Recognizing this fact, an attempt was made to revamp the healthcare infrastructure and improve the quality of healthcare services provided under the National Rural Health Mission.

Despite rapid expanse of the health care system brought about by the NRHM, several problems have plagued the proper use and delivery of services. The most important problem is the paucity of trained medical personnel as rural areas have a hard time in alluring and retaining them due to the underdevelopment of the region (Bhandari and Dutta, 2007). The third round of District Level Household Survey, 2007-08 reported 46 percent of the villages have access to government hospital and only 16 percent of

the villages have doctors residing in the village. Further, the average population served by the sub-centres, primary health centres and community health centres was found to be 8,372, 49,193, and 1,28,186 respectively, much above the prescribed norm (Table 1.3) (IIPS, 2010). Along with acute shortfall in medical personnel and health infrastructure, the system is hounded by absenteeism, low skill and poor service delivery of the people employed, which results in low utilization (Dalal and Dawad, 2009). Accessibility to health institutions also appears to be a key determinant of healthcare utilization. Given the varied topography of the country, physical accessibility to health institutions in remote areas often poses difficulty, as they are built based on population norms. Absence or poor referral services often compels people to access private health services (Jana and Harata, 2016). In a study by Datar et al., 2007, it was found that the likelihood of immunization coverage increased with existence of a health system within the village.

The private healthcare services have experienced a parallel growth with the public health services. However, most of them are found to be situated in the urban areas. The rural areas have witnessed a spurt in the non-institutional private health care providers, who, unregulated by the Government, charge arbitrary fees for medical services resulting in high out of pocket expenditure (Bhattacharya, 2013; Soman, 2002). With 22 percent of the population living below the poverty line, development of public health infrastructure is, therefore, necessary to achieve the Alma – Ata goal of “Health for All” (World Bank, 2016).

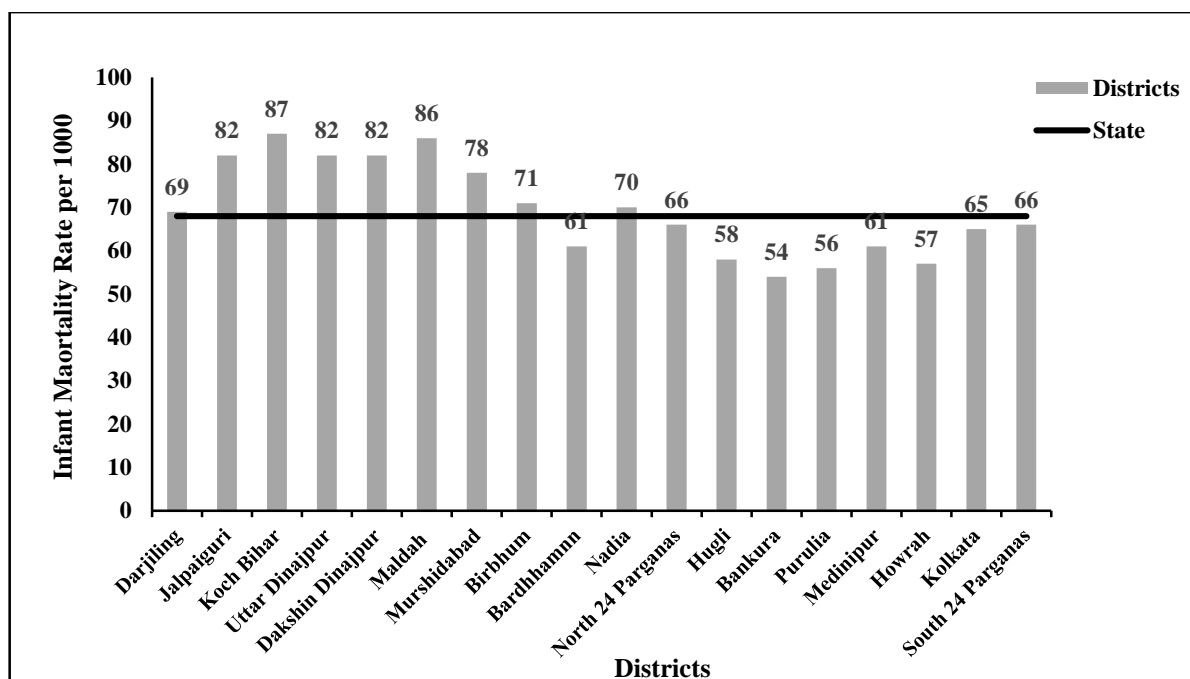
The general consensus among people and even health planners is that the existing health infrastructure is insufficient for the ever-growing population. But the key question is whether the existing services provided by the Government health institutions are being optimally utilized? Regardless of the massive expansion of the public health care infrastructure, the government health care services remain underutilized. Reflecting low faith in the existing services, people often resort to home remedies or visit the private practitioners, many of whom are inadequately trained in medical practice. The percentage of women availing antenatal services from government institutions was found to be less than 50 percent in many of the states in India like Bihar, Chhattisgarh, Andhra Pradesh, Haryana, and Gujarat in the third round of District Level Household Survey. The survey also reported more than 60 percent of children had been taken to private health facilities when they suffered from

diarrhoea or acute respiratory infection (IIPS, 2010). Therefore, it is essential to identify the underlying reasons behind the low utilization of public health care services in the rural areas, so that attempts to remove the obstacles and improve utilization of health services can be made.

True to its varied physiography and socio-economic conditions, the utilization of health services also differs across the country. The present study aims to investigate the access to and utilization of infant health care services in the district of Malda, West Bengal. Lying in the floodplains of the mighty Ganges, several blocks of the district have villages situated on the low lying areas of the floodplains which shift annually with the flood waters. Provision and accessibility of healthcare services in these regions is, therefore, challenging. Hence, the focus of the study is to comprehend the significance of physical distance and socio-economic conditions of the household in determining access to health care and also to investigate the factors facilitating and constraining health care utilization by the households.

### **1.6 Rationale behind Choice of Study Area**

West Bengal has persistently recorded a lower IMR than the national average in the last few decades. From 95 infant deaths per 1000 live births in 1981, the state average reduced to an impressive 32 in 2013 (Census, 1980; SRS, 2014). The rapid decline of IMR in the state can be attributed to the reduction in post-neonatal deaths by preventable causes like obstetric complications, low birth weight, delivery by unskilled medical personnel and poor utilization of antenatal and post natal health care services ([http://atiwb.gov.in/index\\_htm\\_files/Public%20Health%20in%20West%20Bengal.pdf](http://atiwb.gov.in/index_htm_files/Public%20Health%20in%20West%20Bengal.pdf)). A study by Bhattacharya and Haldar (2014) reported that though the state recorded a low IMR, total fertility rate, higher percentage of women receiving antenatal care and higher institutional deliveries than the national average, the disparity in access to and utilization of maternal and child health services in the state is glaring. The northern districts of Malda and North Dinajpur continued to be the most deprived districts in terms of utilization of maternal and child health care services across the three district-level household surveys (Bhattacharya and Haldar, 2014).

**Figure 1.4 Indirect Estimates of Infant Mortality Rate, West Bengal, 2001**

Source: Ministry of Home Affairs, 2009

The variation in the levels of infant mortality rate among the districts in West Bengal is conspicuous from figure 1.4. A prominent north-south divide is noticed in the state, with all the northern districts recording an IMR higher than the state average of 68. In the south, only Birbhum and Nadia records a higher IMR than the state average. This portrays the existence of regional imbalance in the state. The highest IMR is recorded by Koch Bihar (69), followed by the district of Malda (68).

West Bengal is one of the few states in India, whose total fertility rate (TFR) has declined below the replacement level fertility rate of 2.1 in the recent years. The state registers a crude birth rate (CBR) of 17.3 in 2011 and a decrease in the TFR from 2.6 in 2001 to 2.0 in 2011 (Table 1.4). The same phenomenon is observed in all the districts. The highest CBR and TFR is recorded in the district of Uttar Dinajpur (24.6 and 3.2), followed by Malda (23.0 and 2.9). The district of Malda, with the second highest concentration of Muslim population in the state after Murshidabad, registers a high TFR of 5.1 among the Muslims and 3.5 among the Hindus simultaneously in 2001, which explains the high CBR in the district (Rajan, 2005).



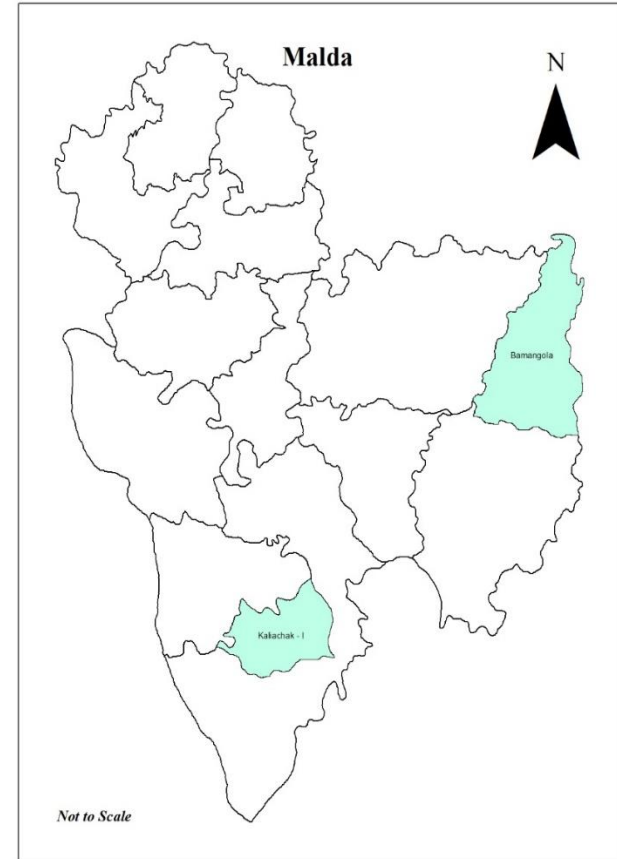
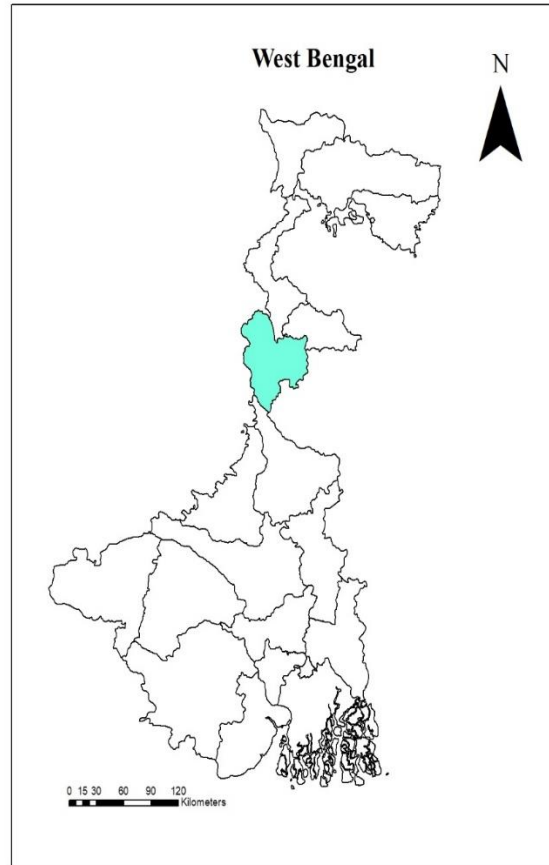
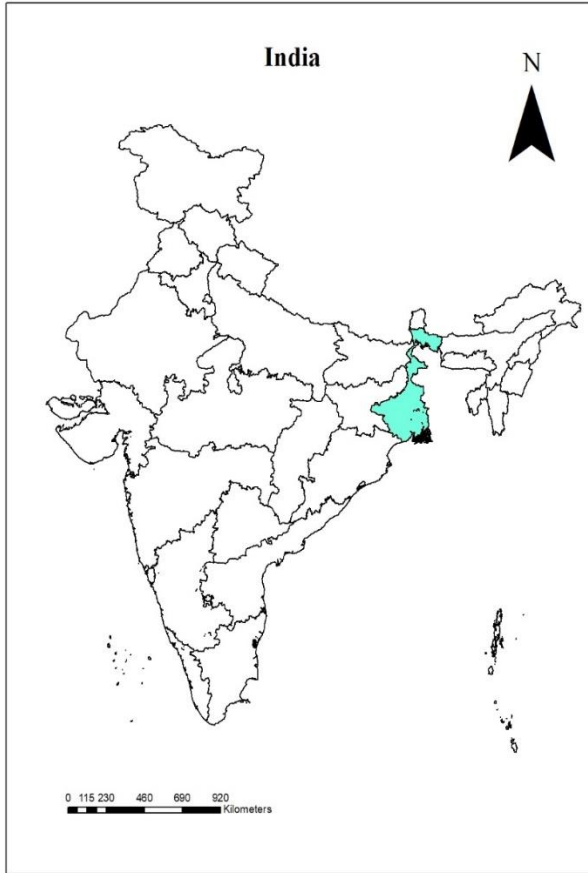
**Table 1.4 Crude Birth Rate and Total Fertility Rate, West Bengal**

<b>Districts/State</b>	<b>CBR (2011)</b>	<b>TFR (2011)</b>	<b>TFR (2001)</b>
<b>West Bengal</b>	<b>17.3</b>	<b>2</b>	<b>2.6</b>
Darjeeling	15.2	1.6	2.1
Jalpaiguri	18.1	2.1	2.8
Koch Bihar	18.6	2.3	3
Uttar Dinajpur	24.6	3.2	4.3
Dakshin Dinajpur	17.2	2.1	3.3
Malda	23	2.9	4
Murshidabad	22.2	2.7	3.5
Birbhum	19.8	2.3	3
Bardhaman	16	1.8	2.3
Nadia	15.2	1.7	2.4
North Twenty Four Parganas	13.9	1.6	2.1
Hugli	14	1.6	2
Bankura	17.4	2.1	2.6
Purulia	21	2.7	3.1
Haora	15.8	1.8	2.1
Kolkata	9.9	1.2	1.4
South Twenty Four Parganas	19	2.2	3
Paschim Medinipur	17.4	2	2.6
Purba Medinipur	17.3	2	2.6

Source: Guilmoto and Rajan, 2013

Further, a peek into the socio-economic and demographic characteristics of women in West Bengal reveals that quite a high percentage of girls in Malda (67.4) are married before the legal age of 18, thereby resulting in a simultaneous high percentage of adolescent pregnancy (67.8) (Table 1.5). Adolescent pregnancy is harmful for both the mother and the child due to low physical development of the women often resulting in poor health or mortality of the child (Singh et al, 2012). Scholars have long established the importance of female literacy in reducing infant mortality in a multifaceted way (Gokhale et al., 2002; Shetty and Shetty, 2014; Miah, 1993; Fuchs et al, 2010). Higher literacy leads to higher age at marriage thereby higher age at birth. Utilization of maternal and child health services are also found to be higher among educated mothers. Less than 50 percent of the women were found to be literate in Malda, with the district accounting for 48 percent of female literacy against the state average of 62. The female work participation rate and child sex ratio is also found to be low. All these maternal characteristics, effective in reducing infant mortality and improving their

Map 1.1 Study Area



health are found to be in an alarming state in the district and therefore can be cited as the some of the main reasons for high IMR in the region.

**Table 1.5 Socio-economic & Demographic characteristics of women in West Bengal**

Districts	Child Sex Ratio (0-6)	Female Literacy	Female Workforce participation	Women married before the legal age of 18 (%)	Women having first birth before the age of 19 (%)
Darjeeling	953	65.7	20.0	38.7	46.8
Jalpaiguri	955	58.3	15.3	48.3	55.8
Koch Bihar	948	60.1	12.1	64.6	67.8
Uttar Dinajpur	953	43.7	12.6	62.3	68.0
Dakshin Dinajpur	957	59.5	14.1	65.0	65.8
Malda	950	48.2	12.9	67.4	67.8
Murshidabad	968	54.0	13.9	74.2	76.0
Birbhum	959	55.9	9.6	69.8	71.8
Bardhaman	951	62.1	11.3	62.0	65.3
Nadia	960	63.7	10.4	62.4	64.0
North 24 Parganas	956	72.7	11.9	54.3	59.1
Hugli	952	69.0	11.7	50.8	55.2
Bankura	949	53.1	10.5	60.3	62.9
Purulia	953	43.5	9.6	68.7	69.4
Haora	962	70.8	10.5	45.7	52.8
Kolkata	933	77.6	15.7	35.9	43.9
South 24 Parganas	963	62.4	8.6	58.5	64.4
Paschim Medinipur	963	62.4	10.3	64.4	67.5
Purba Medinipur	946	71.9	6.7	56.6	63.6

*Source: Census of India, 2011 & DLHS –III, 2007-08*

Utilization of health services is also determined by the availability and accessibility of healthcare institutions. A composite score has been constructed to assess the availability and accessibility of health infrastructure in the districts of West Bengal. This includes the health personnel available in the health centre, transport connectivity, whether the health centre is open for 24 hours and availability of road network. The data has been used from third round of the District Level Household

Survey 2007- 08. Thereafter the districts are ranked according to their resultant composite scores (Table 1.6). Ironically, the northern district of Jalpaiguri, which records a high IMR ranks first in terms of public health infrastructure. Other than Jalpaiguri, all the northern districts rank lower in the state portraying the poor condition of the public health infrastructure in the northern districts of West Bengal. Malda portrays a poor health infrastructure facility, with a score of -0.488, ranking as low as 15 among the 19 districts.

**Table 1.6 Ranking of districts according to Health Infrastructure Condition**

<b>Districts</b>	<b>Composite Index Score</b>	<b>Rank</b>
<b>Jalpaiguri</b>	0.569	1
<b>Purulia</b>	0.532	2
<b>Hugli</b>	0.497	3
<b>Nadia</b>	0.474	4
<b>Birbhum</b>	0.374	5
<b>Bardhaman</b>	0.325	6
<b>Paschim Medinipur</b>	0.272	7
<b>Bankura</b>	0.226	8
<b>Purab Medinipur</b>	0.200	9
<b>North 24 Parganas</b>	0.065	10
<b>Koch Bihar</b>	0.043	11
<b>Darjeeling</b>	-0.061	12
<b>Uttar Dinajpur</b>	-0.114	13
<b>South 24 Parganas</b>	-0.224	14
<b>Malda</b>	-0.488	15
<b>Haora</b>	-0.738	16
<b>Murshidabad</b>	-0.971	17
<b>Dakshin Dinajpur</b>	-0.982	18

*Source: Computed from DLHS – III, 2007-08*

As stated before, utilization of maternal and child health care services is a key determinant of infant mortality rate. Therefore, to measure the level of utilization of infant health care services in the districts of West Bengal a composite index (based on utilization of antenatal care, safe delivery and postnatal care) has been computed. The composite index computed by the PCA method comprises of the following indicators:

1. Percentage of mothers who had three or more ANC visits
2. Percentage of mothers who received two or more TT injections during the pregnancy
3. Percentage of mothers who took IFA for at least 90 days

4. Percentage of births delivered in a health facility
5. Percentage of deliveries assisted by health personnel
6. Percentage of deliveries with a postnatal check-up within two days of birth
7. Percentage of children having check-up within 24 hours
8. Percentage of children having check-up in a health facility
9. Percentage of children receiving full immunization.

As anticipated, the utilization of infant health care services was found to be higher in the urbanized southern districts of Hugli followed by Kolkata, North 24 Parganas and Haora. Malda ranks the second lowest followed in Uttar Dinajpur in terms of utilization (Table 1.7).

*Table 1.7 Ranking of Districts according to Infant Health Care Utilization*

Districts	Composite Index Score	Rank
<b>Hugli</b>	1.209	1
<b>Kolkata</b>	1.127	2
<b>North 24 Parganas</b>	0.787	3
<b>Haora</b>	0.47	4
<b>Purab Medinipur</b>	0.201	5
<b>Jalpaiguri</b>	0.191	6
<b>Darjeeling</b>	0.088	7
<b>Dakshin Dinajpur</b>	0.033	8
<b>Birbhum</b>	0.007	9
<b>Purulia</b>	-0.1	10
<b>Nadia</b>	-0.168	11
<b>Koch Bihar</b>	-0.199	12
<b>Murshidabad</b>	-0.23	13
<b>South 24 Parganas</b>	-0.26	14
<b>Bankura</b>	-0.47	15
<b>Paschim Medinipur</b>	-0.484	16
<b>Bardhaman</b>	-0.52	17
<b>Malda</b>	-0.807	18
<b>Uttar Dinajpur</b>	-0.876	19

*Source: Computed from DLHS – III, 2007-08*

There exists a stark north-south division in the level of socio-economic development as well as demographic factors among the districts in West Bengal, with the southern revealing a higher level of development. Except Darjeeling, all the other northern districts reports a very low human development index, with Malda performing the worst (Government of West Bengal, 2004). Along with high IMR, Malda also records

low female literacy, poor demographic indicators, infrastructural facilities as well as low utilization of infant health care services. Therefore, the district has been selected for the present study to investigate the underlying causes of low utilization and infant health in the region.

### 1.7 Background of the Study Area

Dating back to the medieval period, wherein it was a part of an ancient city, the district of Malda was separately constituted in the year 1813 through an incorporation act, which merged “*two of the southern thanas of erstwhile Dinajpur district, three from the western Rajshahi district and four from eastern Purnea district*” (Government of West Bengal, 2007). In the 18<sup>th</sup> century, the British commercial town of *Engrej Bajar* or English Bazar was established in between the *char* lands of Mahananda and Ganga rivers and urbanization followed in the region. This town metamorphosed into the present day town of Malda. Originally constituted with nine thanas, the present day district comprises of fifteen development blocks.

With an area of 3733 sq.km, accounting for 4.2 percent of the total area of the state, the district is home to 39.48 lakh population in 2011. Malda lies between 24°40’20”N to 25°32’8”N latitude, and 87°45’50”E to 88°28’10”E longitude. Bounded by Uttar Dinajpur in the north, Dakshin Dinajpur in the north-east and Murshidabad in the south, the district shares an interstate boundary with the states of Bihar and Jharkhand in the west and south-west, and international border with Bangladesh in the west.

Physiographically, the district consists mostly of low-lying alluvial plains, sloping towards the south. On the basis of soil and topography, it is divided into three distinct regions of Tal, Barind, and Diara, each having its distinct characteristics (Table 1.8). The north-eastern part contains a few elevated tracts made up of ancient alluvium deposits of the floodplains, which intersected by deep water channels have the impression of small hills. This area of old alluvium is known as Barind. The southern region is relatively well-drained plains formed by the fluvial deposition of the newer alluvium and is very fertile, known as the Diara. The remaining northwestern part of the district is known as Tal, composed of swamp lands formed in many marshy pockets in places of inland drainage. It gradually slopes down towards the south-west and merges with the Diara region. The district is drained by several south-flowing

rivers of the Himalayan and Sub-Himalayan origin like Ganga, Fulahar, Tangon, Punarbhaba, Mahananda, Bhagirathi, Kalidri. These rivers overflow during the monsoon and cause devastating flood almost every year, especially in the western part of the district, resulting in loss of property and human lives (Office of the Register General, 2011).

The ecological divisions are important in the district as they are also distinct in terms of demography, economic and social composition. The Barind area is sparsely populated while the Diara region witnesses dense population. Between 2001 and 2011, the district recorded an annual growth rate of 2.2 percent (Table 1.9). The high rate of population growth in the district is attributed not only to natural increase but also high influx of immigrants resulting in substantial changes in the ethnocultural

**Table 1. 8 Ecological Divisions of Malda**

<b>Regions</b>	<b>Barind</b>	<b>Diara</b>	<b>Tal</b>
<b>Blocks</b>	Old Malda	Manikchak	Harishchandrapur-I
	Habibpur	English Bazar	Harishchandrapur-Ii
	Bamangola	Kaliachak - I	Chanchal - I
	Gazole	Kaliachak - II	Chanchal - II
		Kaliachak - III	Ratua - I
			Ratua - II

*Source: Government of West Bengal, 2007*

complex of the North Bengal. Because of the high fertility of the region resulting in intensive agriculture which can support high population density and shared interstate and international borders, the districts receive high volumes of immigration since the 20<sup>th</sup> century (HDR, 2007). Though the district has a high concentration of scheduled population in the Barind blocks, in other areas, it is found to be low or absent. Further, both male and female literacy are found to be low, with the latter having even lower percentages. A large percentage of Muslim population is also found in the region (Census, 2001). In fact, the district is the home to the second largest Muslim population in the state after Murshidabad.

**Table 1.9 Background Characteristics of Malda District, 2011**

<b>Name of Blocks/District</b>	<b>Total Population</b>	<b>Decadal Growth</b>	<b>Sex Ratio</b>	<b>% of SC/ST population</b>	<b>Male Literacy</b>	<b>Female Literacy</b>
Harischandrapur - I	199493	22.84	933	26.67	48.65	39.87
Harischandrapur - II	251345	26.92	928	15.73	47.35	42.13
Chanchal - I	204740	17.53	950	13.79	59.70	53.20
Chanchal - II	205333	24.30	949	15.05	50.47	45.96
Ratua - I	275388	26.70	937	19.61	53.65	46.44
Ratua - II	202080	25.59	963	7.34	49.28	45.58
Gazole	343830	16.67	970	57.30	60.86	48.91
Bamangola	143906	13.09	943	69.61	67.02	53.34
Habibpur	210699	12.28	974	79.13	58.11	44.35
Malda (old)	156365	19.13	952	47.21	56.52	46.34
English Bazaar	274627	21.39	949	19.20	57.37	50.27
Manikchak	269813	26.01	933	42.60	53.97	42.65
Kaliachak - I	392517	26.24	958	4.22	56.66	51.79
Kaliachak - II	210105	-0.62	954	17.85	58.30	50.05
Kaliachak - III	359071	26.27	949	36.49	49.30	39.40
Malda	3988845	21.22	944	28.82	56.15	48.23

*Source: Primary Census Abstract, 2011*

Once a rich trading port, the district of Malda has lost its ancient glory over the period. With the fall of the independent sultanates, along with the shift in the river bed, thereby transforming the region into marshy land and shifting of the capital to Murshidabad and later to Kolkata with the advent of the British, the importance of the region declined irreversibly. Subjected to the political and geographical fluctuations, the present day district is the most backward in West Bengal. Plagued by various social evils, like early marriage, high fertility, and high illiteracy especially among women, the district registers a very high population growth which puts pressure on the health infrastructure of the district and is also detrimental for the health for child and infants. Hence, a close study of the health situation in Malda is needed to understand and thereby attempt to overcome the socio-economic barriers as well as infrastructural constraints.



## 1.7 Scheme of Chapterisation

- a. **Chapter 1: Introduction:** This chapter provides brief introduction of infant mortality and its global and regional distribution in India. A large number of interventions and policies made by international organizations as well as the national governments has also been discussed. The chapter also debates the need for the study in Malda, West Bengal, where the infant mortality rate has been consistently high over the years. The detailed description of the methodologies used, data sources and sample selection process has also been provided.
- b. **Chapter 2: Literature Review:** The phenomenon of infant mortality is of grave concern worldwide. It is an important indicator of socio-economic development of any country. Innumerable studies have been carried out to find out the underlying causes, pattern, and effects of infant mortality. Infant mortality differs across region; varied landscape, level of development, demographic stage affects the rate. Not to forget the immense role that the health infrastructure plays in reducing the IMR, especially in the developing countries, where the general population predominantly depends on the public health infrastructure and policies. This chapter discusses the all these studies and the various results that have emerged over the years.
- c. **Chapter 3: Spatial and Temporal Variation of Infant Mortality Rate in West Bengal:** True to its regional diversity, the infant mortality rate in India varies across states. This chapter provide a glimpse of the district wise variation of infant mortality rate in India and also attempts an explanation of how various determinants affect the mortality variation spatially. West Bengal emerges as a state with low mortality and falling TFR in the recent years. The TFR of the state has gone down much below the replacement level fertility and the achievement of the state in reducing its infant mortality rate is applaudable. However, the decrease in the IMR is not equal in all the districts, there has been regional variation. This chapter discusses the pattern and trend of IMR in West Bengal since 1981. It also tries to ascertain the underlying causes for the same.

**d. Chapter 4: Availability and accessibility of healthcare institutions in Malda:**

The role of infrastructure in affecting the health status of a population cannot be denied. The health infrastructure in the country has undergone massive changes since Independence. There has been a rapid increase in infrastructure. However, inequalities between public and private healthcare have increased. Inefficiency and management problem have plagued the public healthcare system. The medical system and rural health infrastructure in India have been discussed in this chapter. It also provides a look into the acute shortfall of infrastructure across states despite the expansion under the National Rural Health Mission. With reference to the availability and shortfall of health infrastructure in West Bengal, the chapter also discusses the availability, efficiency and functionality of the government health infrastructure in Malda.

**e. Chapter 5: Availability, accessibility and utilization of Maternal health care:**

Infant health is affected by the care and health services that the mother receives during her pregnancy. A majority of the infant deaths occur in the first month of birth and there are several factors affecting it, one of the major being mother's health care utilization during her pregnancy. This chapter deals with the various components of maternal health care utilized by the mother in the study area. It also discusses the availability of health facilities, mode of transportation, distance to the health facilities and various services received by the mother throughout her pregnancy.

**f. Chapter 6: Infant Health Status in Malda: Utilization of Healthcare Services and Determinants:**

Infant health depends on the utilization of various services provided to them just after birth. Also, congenital factors like low birth weight and gestation period are important in determining the health of the child. All these factors which affect infant health and thereby mortality are discussed in this chapter. Infant health in the region is assessed by the preventive and curative care availed by the infants when suffering from ailments like diarrhea, pneumonia, fever, and infection. The chapter sheds light on the utilization pattern of infant health services in the region. Finally, the effect of various socio-economic, demographic and healthcare services on the child health is assessed through the multinomial logistic regression.

- g. Chapter 7: Conclusion and Recommendation:** This chapter concludes with the summary and major findings of the study. It also gives recommendations related to infant health care and various ways in which the infant health in the region can be improved by increasing the utilization of public healthcare services in the district.

## Chapter 2

### Review of Literature

The World Health Organization defines health as “*A state of complete physical, mental and social well-being and not merely absence of disease or infirmity*” (WHO, 1948). Health is often contemplated not only as an indicator of social well-being, but also economic development of a country. Comprehending the importance of health in fostering economic growth as well as reduce poverty, it has also been included as one of the indicators of the United Nations Human Development Index. Development of a country is grossly measured by the economic indicator of Gross Domestic Product, but what is often ignored is the role of health in promoting economic growth. The quality of labour force in the form of human capital plays a crucial role in the economic development and therefore health of the population is a significant element with regard to development (Bloom et al., 2001). Health and development go hand in hand as improvement in one leads to improvement in the other. Higher levels of income enhance health through better nutrition, improved sanitation and general living conditions and efficient health care which in turn results in proficient human capital imperative for economic growth (Bloom and Canning, 2008).

Measuring health status of a population by WHO’s definition of health is challenging given the limitations of reliable data especially in the developing countries. Therefore, various conventional measures of life expectancy, mortality and morbidity are used to assess the health status of a population. Some of the widely accepted key health indicators are the infant and child mortality rate, which measures the probability of death among children aged one and below five years of age. Though recently, IMR has been criticized as a measure of health as it can result in skewed resource allocation, it is still widely used because of easy availability of data (Reidpath and Allotey, 2003). Widely acknowledged as the indicator of a country’s socio-economic development, infant and child mortality rates also reflect the unmet need and unfavorable health conditions prevailing in a country. The global health picture replicates the inequalities in the level of development among countries of the world. More than 80 percent of the child deaths are concentrated in the countries of Sub-Saharan Africa and South Asia. Recognizing the

gross inequalities in infant and child health, several international organizations and national governments have collaborated to design and implement programmes and interventions aimed at reducing infant mortality and thereby improve child health. Following the Alma Ata Declaration of 1978, affordable primary health care for all, based on “practical and socially acceptable methods” became the major goal of the countries (Hill, 2003). The 1980s witnessed a huge flow of resources into the realm of healthcare and several researches on child survival was carried out to ascertain the key factors affecting infant health. New technologies and cost-effective interventions brought down the level of infant mortality across the globe. However, the decline was not uniform across countries and the variance in the level of economic growth was cited as the major factor.

While economic growth was termed as the key determinant of child health, researches revealed several social and cultural factors also plying alongside, which explained the low infant mortality rate achieved by many low-income countries (Caldwell, 1986). In 1984, Mosley and Chen blamed the failure of the programmes to achieve desired results on the absence of conceptual models for the study of child health and proposed a model of child survival (Hill, 2003). Integrating both the biological and social factors, they designed an analytical framework which demonstrates how the background variables (social and biological factors) operate through a series of proximate determinates thereby affecting child health. The proximate determinants range from biological factors to social determinants and are categorized into five classes of “*maternal factors, environmental factors, nutrient deficiency, injury and personal illness control*” (Mosley and Chen, 1984). With the global progress in improving child health, several new researches have come up which provide insight into the different regional factors playing an important role in reducing infant mortality, but the widely accepted framework by Mosley and Chen had stood the test of time and has been the basis for many studies on child survival.

The first few years after birth are crucial for the child as most of the physical and cognitive development takes place during this time. Further, due to the insufficient development of the immune system, children are more prone to ailments like diarrhea, pneumonia and infections, which in the absence of timely medical intervention can prove

to be fatal. Adequate diet, nutrition and preventive medical care is a pre-requisite for the healthy development of the child. Recognizing this fact, Governments all over the world have designed and implemented various programmes aimed at the improved health status of the child. Other than the socio-economic development of a region, literature have documented several other factors like demographic characteristics and health-seeking behavior as some of the key determinants of infant and child health. Further, in the developing countries, due to poverty and high cost of private healthcare, the poor relies predominantly on the public health system which is often plagued by lack of efficient health infrastructure as well as quality health personnel thereby resulting in low utilization of services (Berman et al., 2011; Epstein and Bing, 2011). Therefore, the health status of the infants are not only the result of socio-economic and demographic factors but also health care utilization which is further constrained by inaccessibility, poor quality and lack of qualified health personnel. This chapter discusses the various issues related to infant health care utilization which in turn affects the infant health status.

## **2.1 Determinants of infant health care utilization**

As stated before, several socio-economic, demographic and medical factors affect utilization of infant health care services. All the factors are categorized and discussed below.

### ***2.1.1 Maternal Factors***

Infant health is intrinsically related to maternal characteristics. A foetus develops inside the mother's womb and receives nourishment exclusively from the mother. Therefore, maternal characteristics and care meted out to the mother is a decisive factor of the health of the newborn. An important maternal determinant is age at marriage. Due to its inherited link with fertility, age at marriage has always been a matter of concern for the demographers and policymakers. Identified long back by Malthus, the ill effects of early age at marriage compelled governments to formulate legislation and acts to raise the age at marriage. Despite the efforts, age at marriage continues to be low in many parts of the

globe, especially in Sub-Saharan Africa and South Asia, which account for more than 60 percent of the child marriages globally. However, a marked reduction of 25 percent in the child marriages has been noticed in the last decade, most of which is attributed to the progress made by India (UNICEF, 2018).

The period of 10 – 19 years is recognized as adolescence by the World Health Organization, during which physical, as well as psychological changes, occur in children (WHO, 1998). This transition phase is a crucial period in the life of an individual, especially girls as they attain menarche and are more vulnerable to reproductive health hazards. Marriage before the age of 18 are therefore termed as child or adolescent marriages. Other than its association with high fertility, the adverse effects of early age at marriage are well documented. In most of the societies, where the prevalence of child marriage is high, women are expected to give birth to an offspring soon after marriage. In a comparative study of Maharashtra, Rajasthan and Bangladesh, it was noted that early marriage being a widespread practice in these areas, often adolescent pregnancy was an immediate consequence (Sethuraman, 2007). However, though menstruating, the adolescent may not be fully developed physically to bear a child and often physical immaturity results in high obstetric complications as well as neonatal deaths (Sharma et al, 2003; Bhatia and Chandra, 1993, Santhya, 2011). Studies have reported children born to adolescent mothers have a higher risk of neonatal death due to preterm birth, low birth-weight and nutritional deficiencies (Reynolds et al., 2006; Banerjee et al, 2009). In India, widespread regional variations are found in age at marriage with the northern states, especially Rajasthan, Bihar and Jharkhand accounting for a higher percentage of women married before the legal age of 18, compared to the southern states (Moore et al., 2009). Persistence of early marriage in the traditional society of India often results in high rate of adolescent pregnancy due to increased pressure of childbearing which further amplifies the situation of poor maternal and child health in the country (CEDPA, 2001; Santhya, 2011).

Age at marriage has a high association with age at birth, especially in societies where prevalence of early marriages is widespread like South Asia and Sub-Saharan Africa, as childbirth mostly happens within marriage. Both low and higher age at birth have adverse consequences for both the mother and the child. While lower age at birth or adolescent

pregnancy results in higher risk of maternal and neonatal death, preterm birth, low birth weight; higher age at birth, i.e. more than 35 years is associated with perinatal mortality, growth restriction and genetic abnormalities (Lisonkova et al, 2011; Powers, 2013). A study in the United States reported that compared to infants born to mothers in the age group of 25 – 29 years, infants born to mothers in the age group of 35 – 39 and 40 – 49 have 18 percent and 69 percent higher risk of mortality (Friede et al, 1988). Further, though low age at birth is often associated with low education and poor knowledge of the mother and thereby low utilization of maternal and child health care services (Srivastava et al, 2014; Singh et al, 2014) , there is an increasing body of research which has revealed that with higher age at birth along with higher birth parity, women are less likely to use maternal and child health services thereby resulting in poor child health (Mekonnen and Mekonnen, 2003; Emelumadu et al. 2014; Srivastava et al, 2014).

In traditional societies like South Asia, marriage is a universal phenomenon and prevalence of early marriage is widespread. Therefore, higher age at birth is often inherently related to higher parity. A study by Pandey et al, 1998 on infant and child mortality in India, revealed an U- shaped relationship between parity and infant mortality, with the first born and higher order births above three being at higher risk of mortality. Utilization of maternal and child health care services are also found to be low among higher birth order mothers. Due to their cumulative experience of previous child birth and care, higher parity mothers are found to be less likely to use these essential services (Srivastava et al, 2014; Mishra et al, 2017). Ogunlesi and Olanrewaju (2010), in their study noted that first parity child and children no sibling are more likely to receive treatment compared to children with siblings, which could be attributed to the cultural and emotional value associated “first born” or “only child”. Further, higher birth order infants are more likely to have low birth weight – a key reason for low health and heightened morbidity among children, a possible reason for which is the physical changes and pregnancy complications associated with high birth order and high maternal age (Joseph et al, 2005; Ghaemmagami, 2013).

The reversal in mortality differentials from neonatal period to under –five child is often attributed to gender discrimination faced by the female child post neonatal period. While the high male mortality in the neonatal period is the result of biological factors, the



excessive female child mortality post neonatal period is the ascribed to the differential treatment meted out to them. Son preference is age old phenomenon widely prevalent in many parts of the world, especially in South Asia, Middle East, some countries of Africa, China and southeastern Europe (<https://www.npr.org/sections/goatsandsoda/2015/08/26/434616512/selecting-boys-over-girls-is-a-trend-in-more-and-more-countries>). Biasness towards male child in terms of care, feeding practices as well as health care utilization is evident from literatures (Pande, 2003; Boorah, 2004; Dasgupta, 1987, Berhman, 1988). Chen et al, 1987, in their study in Bangladesh noted that the dietary intake was high for males across age-groups. Further, even though the incidence of diarrhea among children was almost equal for both males and females, the treatment rate for male children was 135.6 per 1000, while it was only 81.9 among female children (Chen et al, 1987). Due to the laws of inheritance and ancestral rites performed by the male child, son-preference is a constant feature in India. Chanwani and Pandor (2015), in their study of the tribal community in Gujarat witnessed that out of the total sample of girl children, 42 percent did not receive any treatment when they were ill. While no discrimination was found in case of access to preventive health care, stark difference was noticed in case of curative health care with male child being favoured.

Across age – group, females are found to be neglected in terms of health care utilization. The India Human Development Survey data reveals that irrespective of short or long morbidity, the health care expenditure of females continues to be quite low compared to males in India (Saikia et. Al, 2016). Using data from the Demographic Health Surveys, Hill and Upchurch, 1995, reported that the global female disadvantage at mortality post neonatal period is the outcome of low immunization rates and utilization of healthcare services when suffering from diarrhea and acute respiratory diseases. A similar situation was observed in India with the first three rounds of the National Family Health Survey revealing higher percentage of male child being immunized, breastfed for a longer time and taken to health care facilities when suffering from diarrhea and acute respiratory diseases compared to females, reinforcing the existence of widespread gender-discrimination in the country thereby leading to excess female child mortality and morbidity (Mishra et al, 2004; Kundu, 2010).

The effect of education of women is multidimensional. Education of the mother has always been hailed as the key determinant of maternal and child health as well as utilization of healthcare services. Education not only increases the age at marriage but also enhances the quality of life enjoyed by the women by generating employment opportunities, better health awareness and lower maternal and child mortality ([https://www.unicef.org/education/bege\\_61718.html](https://www.unicef.org/education/bege_61718.html)). Literatures have documented existence of a positive association between maternal education and utilization of health care services, thereby reduction in the infant and child mortality (Vora et al, 2009; Shetty and Shetty, 2014 ; Agnihotri, 2001; Gokhale et al, 2002; Klauww and Wang, 2011; Govindswamy and Ramesh, 1997; Fang et al, 2015; Singh et al, 2014). In a comparative study of West Bengal and Kerala, both having a long history of communist regime, high level of female literacy along with increased awareness and autonomy was stated as the major reason for higher utilization of maternal and child health services in Kerala compared to West Bengal (Nag, 1983). Gokahle et al, 2002, reported female literacy as the key predictor of usage of maternal and child health services in India, with infant mortality rate being higher in the “worst” states having low literacy like Rajasthan Uttar Pradesh, Madhya Pradesh, Bihar and Odisha. The *“regression coefficients for female illiteracy suggested that a 10 percent decrease in the female illiteracy would result in the reduction of infant mortality by 12.5 per thousand”* (Gokhale et al, 2002). Shetty and Shetty, 2014, further stated that the highest reduction in infant mortality is not achieved with highest increase in female literacy. Rather, there exists two thresholds of 50 – 55 percent and 65 – 70 percent wherein the highest decline in IMR has been noticed in the states of India. Studies have also reported that mere female literacy does not ensure higher utilization of healthcare of services. The increase in utilization of healthcare services increases with the increase in the level of education of the mother (Ghosh et al, 2015; Bhattacharya and Haldar, 2014). Güneş, 2013, reported that mothers with more than 8 years of schooling showed higher utilization of prenatal care services compared to mothers who have less than 5 years of primary schooling in Turkey. The influence of education in enhancing the autonomy of the women is also noteworthy. Educated mothers were found to enjoy greater autonomy, thereby influencing healthcare decisions and intra-household distribution of resources

(Caldwell et al, 1983; Tiruneh et al, 2017). In a study by Caldwell, 1983, in rural areas of South India, doctors reported higher educated mothers were more likely to accept modern medicinal practices and bring their children to the healthcare facilities for treatment rather than resorting to traditional healers. The cascading effect of education is also noteworthy. In communities with higher percentage of educated women, the knowledge about healthcare services are often disseminated to the illiterate or low educated women through informal social network (Tiruneh et al, 2017).

Increased urbanization and industrialization in the last decades have witnessed higher percentage of women entering the workforce. While women's employment have often been linked with her elevated status in the society, concerns have been expressed over the possible negative effect it can have on the infant's health (Huston and Aronson, 2005). In the first few years of life, children are highly dependent on the mother and employment may result in decrease in the care and attention provided to them. The time constraint of the mother may lead to irregular feeding practices with decreased exclusive breastfeeding and lack of timely care. Kim and Wickrama, 2014, however pointed out that working mothers tend to suffer less from depression and have high self-esteem which is beneficial in terms of the care meted out to the children. Also, working mothers tend to have an increased social support which helps them in taking care of their child. Khojasteh et al, 2016, in their study in Zahedan, Iran, reported a significant association between working mothers and preterm deliveries, the possible reason for which they cited to be longer working hours. It is to be noted that in the developing and poorer countries, mother's employment may not be due to choice, but rather because of compulsion. A similar situation was noticed in a district of Rajasthan, wherein young mothers were engaged as labourers in the Mahatma Gandhi National Rural Employment Guarantee Act either due to low economic condition of the household or coercion from the in-laws. The study also revealed that longer working hours often compromised the infant feeding and care and mothers were also skeptical about the care provided by the care-givers in the family (Nair et al, 2014). Further, infant health is also influenced by the type of employment the mother is engaged in. In a study by Tor. jarern et al, 2014, on effect of pregnant working mother on infant deaths, it was noticed that women engaged in lower levels of occupations like agriculture and fishing had higher infant deaths compared to women

engaged in higher level jobs, which she attributed to higher education and economic status associated with the latter. This finding was reiterated in a study in Nigeria, wherein a positive association between maternal occupation and feeding practices was noticed. Mothers working in offices were found to introduce complementary feeding later than the mothers working in home or shops. Higher educational level and increased awareness about childcare through peer-group was cited as the possible reason (Ogunba, 2015).

Mass media is an important instrument of the government to reach out to people, especially women in the rural and remotest part of the country. The various family planning measures, government health programs like free immunization of the child, obstetric care for the mother are aired through television, radio and newspaper. Mass media acts as a mediator to increased knowledge and awareness which in turn affects the health seeking behavior of the women. The positive association between mass media and utilization of maternal and child health care services has been documented well in literatures (Tsawe et al, 2015; Habtom, 2017; Singh et al, 2014; Singh et al, 2012; Tiruneh, 2017). A study in Uganda noted that the frequency of exposure also matters and women who are frequently exposed to mass media are more likely to avail the healthcare services (Asp et al, 2013). In developing countries, where female literacy is quite low, the Government relies heavily on electronic media like television and radio to reach out to the mothers. Ghosh, 2006, reported that compared to women not exposed to electronic media, women who are regularly exposed are 15 percent, 75 percent, 59 percent and 111 percent more likely to use complete prenatal care services in Himachal Pradesh, Uttar Pradesh, Andhra Pradesh and Karnataka, even after controlling all the other socio-economic and demographic factors. The same result was also revealed in Navaneetham and Dharmalingam's study of the utilization of health care services by women in the southern states in India (Navaneetham & Dharmalingam, 2000). Archarya et al, 2015, in their study on rural community in Nepal, reported women who have exposed to mass media to possess a higher likelihood for utilization of antenatal care services.

### **2.1.2 Socio-economic Factors**

The intrinsic relationship between socio-cultural factors and economic growth in reducing infant mortality was well established by Caldwell in 1986. While maternal characteristics play a key role in influencing child health, socio-economic development of a region also emerges as important predictor. The traditional and cultural practices related to pregnancy, child birth and infant care vary across religions over the world. The observed global differences in health care utilization are largely a result of the religious and cultural beliefs and marked differences among religions in terms of utilization of health care services has been noted (Khanal et al, 2014; Srivastava et al, 2014; Singh et al, 2014; Singh et al, 2012). . Within religion too, regional variance in religious beliefs and practices are noticed. A study of the Apostolic community in Zimbabwe reveals that there exists different sects within the community based on multiple interpretation of the Apostles. While the Ultra-Conservative Apostolic groups believe in natural healing by the Holy Spirit and forbids use of modern medicinal practice, the Semi-Conservative are more liberal and allows selective use of modern medical practice. However, usage of maternal and child health services in both the groups are limited within ‘health services’ of the Apostolic church (Maguranyanga, 2011). The study by Gyimeh et al, 2006, revealed a similar finding. Compared to the Catholic mothers, traditionalist mothers were found to be less likely to use prenatal and post natal care services in Ghana. Solanke et al, 2015, noted religious affiliation play a dominant role in utilization of maternal health care services in Ghana. Muslim women were 0.3 times less likely to access 4 or more antenatal care services and 1.8 times more likely to not have any ANC compared to the Christian women in the country. The same situation was noticed in Ghana too wherein Muslim women was least likely to receive any maternal healthcare services. Higher education, low fertility and better socio-economic status of the Christian women are stated as the probable reasons for the differences noted in Africa (Gyemeh et al, 2006). However, it is to be noted that the influence of religion on utilization of health care services and health status is often affected by other socio-economic factors working in the region. In the study by Mujtaba et al, 2016, in North-Central Nigeria, no significant difference in health care utilization was observed among the Muslim and Christian

women and rather distance to health facilities and female dependency was stated as the major reason.

In India, the influence of the two dominant religions, Hinduism and Islam, on the utilization of health care services and infant health are confounding. Given the minority status and the low socio-economic conditions of the Muslims in the country, advantage of Muslim child survival during the first year over Hindus is astounding. Better physical features, less undernourishment during childbirth and non-vegetarian diet of the Muslim mothers have been cited as some of the major reasons for the better child health. Further, it has been noted that while feeding of colostrum- the first yellowish thick breast milk of the mother, takes place almost immediately among Muslim mothers, in Hindus, the ritual of offering the colostrum to mother earth often results in delayed initiation (Bhalotra et al, 2010). Son – preference among Hindus too play an important role and if the child is a male, the likelihood of better health outcome increases. The reversal in child survival has however been noticed post infant period. Low education, high fertility and high parity among Muslim women has been cited as some of the major reasons due to which the effect of the biological superiority of the child decreases over time (Brainerd and Menon, 2015). However, the harmful practice of pre-lacteal feeding, i.e. feeding the child before initiation of breast milk, is found to be widespread in both the religion. Among Muslims, a softened date chewed by a respectable member of the family is rubbed on the infant's tongue with the belief that all the good attributes of the member will be transferred to the infant. On the other hand, the feeding of ghee, honey or sugar juice to the infants along with recitation of “mantras” is more common among Hindus (Asim et al, 2015; Haq, 2008, Rumun, 2014). When compared to other religions, Hindus and Muslims in India are found to be less likely to utilize healthcare services. Salam and Siddique, 2006, noted that Sikh and Christian women in the country showed higher likelihood for utilization of maternal health care services and births assisted by medical personnel compared to Hindus and Muslims. The same was noticed by Singh et al, 2012, in their study of married adolescent's usage of health care services. The utilization of antenatal care, safe delivery and post natal care was found to be higher among the women belonging to other religious groups, followed by Hindu and Muslim women.

The pervasive and dominant effect of caste on maternal and child health care utilization is well documented. While religion appears to be a global predictor of healthcare utilization, caste is a regional factor in India. The caste system has been long ingrained in the Indian society and though predominantly followed by Hindus, existence of caste is also noted in Christianity and Islam (Hassan and Kumar, 2014). Existence of the caste system has led to social stratification of the society and exclusion and exploitation of the lower caste people from centuries in India. The Indian Constitution, having recognized the evils of the caste system, had introduced many policies and measures towards the amelioration and upliftment of the lower caste. However, marginalization of the people still continues with the 4th round of the National Family Health Survey reporting higher percentage of the mother belonging to the lower castes not utilizing the maternal and child health care services and thereby leading to a high percentage of neonatal, infant and child mortality, compared to the higher caste people (IIPS and ICF, 2017). Kumar and Gupta, 2015, reported the existence of both inter as well as intra caste differences of healthcare utilization among mothers in India. While quite a low percentage of scheduled caste (SC) and Scheduled Tribe (ST) women are found to utilize maternal health services, compared to the other caste, the inequality in utilization was found to be low among them, which implies that even mothers in the richest quintile in the lower caste has low utilization compared to the others (Kumar and Gupta, 2015). A high inequality in utilization of maternal healthcare services is noticed between the scheduled groups and others. Economic status of the household, followed by educational level of the mother has been stated as the major determinants for these disparity (Kumar and Singh, 2016; Rai, 2016). Further, lack of awareness among the scheduled population as well as discrimination by the health providers have also emerged as some important predictor of low utilization ([http://www.chsj.org/uploads/1/0/2/1/10215849/charm\\_09-11-12\\_royal\\_blue.pdf](http://www.chsj.org/uploads/1/0/2/1/10215849/charm_09-11-12_royal_blue.pdf)). The gross inequalities and exclusion of the scheduled groups in India despite are well reflected in these studies and need to addressed for optimizing the utilization.

In the recent era of globalization and urbanization, family structure has emerged as an important determinant of infant health status as well as healthcare utilization. With higher number of children born out of wedlock in the developed countries, the negative association between single parents and infant health is noticed. Married women are found

to be more likely to utilize prenatal services and prohibit from smoking and drinking during pregnancy, compared to single mother or cohabiting couples (Freeman, 2013). Albretch et al, 1994, in their study of black, white and Hispanic women in the United States found no significant relationship between infant mortality and family structure. However, utilization of prenatal care services revealed a significant association with family structure, and women who resides with their parents were found to be more likely to receive prenatal services. Heck and Parker, 2002, noted that while unmet need for healthcare was higher for single mothers, education played an important role too. Children to mothers having higher education were found to have similar access to healthcare services as children with two parents. In the traditional societies of South Asia, wherein most of children are born within marriage, family structure affects maternal and infant health care utilization in a different way. With increased urbanization, the traditional joint family system in India is breaking down and families are increasingly becoming nuclear (parents with their unmarried child or living alone). Singh et al, 2012, reported lesser percentage of women living in nuclear families to avail maternal healthcare services, compared to women living in joint family. However, the study by Srivastava et al, 2014, revealed a contrasting finding with women living in nuclear families reporting a higher utilization of health care services and better infant health. Not much research has been done on the effect of family structure on healthcare utilization in India and this predictor variable needs to be investigated in more detail.

The inequalities in health care utilization across the world is predominantly a result of the differential levels of economic development. Countries with high level of economic development and thereby high per capita income are found to have better health outcomes compared to countries with low per capita income. Household wealth is intrinsically related with the health care utilization as higher income provides more choices of healthcare facilities to the population. Since poverty estimates of a country are difficult to obtain, often a dummy variable, standard of living index, comprising “*household structure, resources available in the household, ownership of consumer goods and agricultural land*” is taking into account to measure the effect of wealth on health care utilization (Kauser et al., 1999). A study urban poor in Maharashtra reported that along with education and place of residence, standard of living of the households has



a strong positive association with maternal health care utilization. Mothers with high standard of living depicted a higher likelihood of registering ANC and having more than 4 ANC visits compared to mothers in the low standard of living (Kauser et al, 1999). In a similar study by Singh et al (2012), only half of the poor-migrant women were found to utilize safe delivery care. The study while discussing the healthcare utilization in urban areas, categorized women into poor-migrant, non poor-migrant, poor non-migrant and non poor-non migrant and found that among all the categories, poor-migrant women had the least probability of utilizing safe delivery services.

Lower age, illiteracy, higher parity coupled with low economic status of the household often results in low utilization of maternal and child healthcare services (Datta and Manna, 2012; Okigbo et al., 2017; Titaley et al, 2009, Khanal et al, 2014). In a comparative study of utilization of maternal healthcare services in Nigeria and Malawi, Kuuire et al, (2017) found that there exists a significant positive association between wealth and timing of ANC visit in Nigeria. While in Nigeria, women in the poor category showed lesser likelihood to access ANC in the first trimester, no significant association was found in Nigeria. However, poorer women in both the countries showed lesser likelihood to utilize the recommended four ANC visits. Titaley et al. (2009), also found a progressive decrease in utilization of post natal care services in Indonesia, with decrease in the household wealth in Indonesia. In developed countries of the world, health insurance coverage is provided to all citizens and a positive association between health insurance and utilization has been noticed. Households having health insurance were found to be more likely to utilize maternal and infant health care services. Paqueo and Gonzalez (2003) found that households having insurance coverage reported 12 times more likelihood to utilize preventive child health services among the indigenous population of Mexico. Wolfe (2009), noted that in United States, children with insurance coverage were found to better health status and if health insurance is also provided to the uninsured, the likelihood of utilization of health services increases.

### ***2.1.3 Accessibility to Health Services***

The differentials in health care utilization across regions is also an outcome of accessibility. The distribution of the healthcare facilities is often dependent on the population of a region and therefore rural areas with lesser population are found to have a lower number of healthcare facilities. Geographical accessibility poses a constraint to utilization of health services in remote areas, wherein people have to travel long distances to avail the facilities. The skewed distribution of health infrastructure is evident in the study by Kyei et al. (2012), who reported that while all mothers in the urban areas had access to antenatal care facilities within 15 km and 57 percent had access to better provisions within the same distance, only 88 percent and 9 percent of the mothers had access to antenatal care services and better provisions within 15 km. This reveals the long distances women in the rural areas have to travel to access health services. A study by Feikin et al (2008) found that the median distance to the nearest health facility was 2.01km in rural Kenya and around 95 percent of the under-five children had to travel less than 5 km to visit a health facility. Further, the rate of health facility visits decreased with increase in the distance at the rate of 0.5 km until 4 km. This refers that even when sick, children were less likely to be taken to the health facility due to the distance. Hanson et al. (2017), noted that in Tanzania, while distance does not reveal any significant relation with availing ANC, the likelihood of deliveries at home or in the nearest facility increased with increasing distance to the hospital. Long distances to the health facilities increase the risk of mortality in children as the often the crucial time for intervention are lost in the way. In a similar study in Tanzania, Kadobera et al. (2012) noted that children living within 5km distance to the health facility has a lower mortality rate of 72.4 per 1000 person years, compared to 82.3 per 1000 person years for children living more than 5 km away from the health facility. In a study of 21 low and middle income countries, it was noted that the likelihood of neonatal deaths increased by 7.7 percent among households situated at a distance of 2 km, 5 km and 10 km away from the health facility compared to households within 1 km. Utilization of antenatal services was also found to be 38.3 percent lower among women living more than 10 km away from the health Centre compared to women living within 1 km (Karra et al., 2017).

Accessibility in terms of time taken to reach the health facilities is also important in determining utilization. Time taken to reach health facilities depend not only on the distance, but also on the mode of transport and condition of the road. Therefore, even though the distance between the household and health facility may be less, time taken can be high if the women had to walk to the facility, or the road is a rugged terrain. Schoeps et al (2011), in their study in Burkina Faso, reported significant increase in child survival with decrease in the travel time. While the estimated child survival was 87.7 percent for children who had to travel 30 minutes to the hospital, it reduced to 82 percent for children who had to travel for more than 120 minutes. Also, the risk was higher for infants than children above the age of 1. Similar finding was noticed in the multi-country analysis by Karra et al. (2017), wherein it was noticed that children living within 60 minutes travel time to the hospital had 25.6 percent higher odds of neonatal mortality compared to children living within 10 minutes away from the facility. A study by Awoyemi et al. (2011) stated that distance and travel time also affects use of modern health care. Due to long distance, more travel time and high cost of transportation often people in rural Nigeria resort to self – medication and traditional care available within short distance.

Availability of transport is another predictor of utilization of healthcare services. At times of emergency, if vehicle is not available the risk of mortality increases. Women in southern Odisha, India, reported that due to unavailability of public vehicle to the hospital, 60 percent of the households had hard time arranging for vehicles during pregnancy. Though, the Janani Surakhsha Scheme launched by Government of India, provide for free transportation for the pregnant mother, unavailability and poor condition of the vehicles result in low utilization of the scheme (Mahapatro, 2013). A similar situation was noticed in Northern Ethiopia, where lack of transportation posed a challenge to utilization of health services. Women who were provided free transport to the hospital were found to have higher percentage of skilled delivery, compared to women who had to arrange transport on their own, thereby reducing maternal mortality (Fisseha, 2017). Jana and Harata (2016) reported that availability of transport facilities not only increase utilization but also affected satisfaction of the people.

### **2.1.4 Availability of Health Care Services**

When the Alma Ata conference on primary health care, 1978, gave a call for “*Health for All*”, it rendered to a lot of developmental works that was to be undertaken, especially in the developing countries. To ensure equitable access to healthcare, expansion and renovation of the health infrastructure in the countries was inevitable. The world has witnessed a substantial progress in providing healthcare for all, thereby improving their health status. Availability of physical infrastructure is therefore one of the key predictors of utilization of health care services. Fay et al. (2005), in their paper stated that infrastructure is a significant determinant of child mortality and increase in infrastructure from 1<sup>st</sup> quintile to 5<sup>th</sup> quintile would result in 5 percent decline in child mortality. The delivery of various health services provided by the Government takes place through the health facilities and therefore, utilization of the health services often depend on the availability of physical health infrastructure. Presence of health facility in the villages are found to significantly increase the utilization of maternal and child healthcare services. A study by Datar et al. (2007), reported 4.8 times more likelihood for no immunization coverage among children who did not have any health facility within 2 km of their villages, compared to children who had a health facility. The National Rural Health Mission in India was launched with the goal of removing the bottlenecks in access to healthcare services, through expansion and renovation of the existing health infrastructure in the country. Post NRHM, the country witnessed a rapid increase in the utilization of healthcare services and progressive reduction in IMR, especially in the high focused states (Singariya, 2013).

Accessibility to healthcare is not only measured by the quantity of health infrastructure but also the quality of the service provided and the availability of health personnel. A study by Essendi et al. (2015), in rural Kenya stated lack of qualified health personnel, poor service delivery, lack of better roads and transportation facilities and absence of improved sanitation and electricity in the hospitals as the key reasons for low utilization of health services and high maternal and neonatal mortality in the region. Sankar and Kathuria (2004), in their paper stated that the difference in health outcomes are the result of efficiency differentials among the health facilities and efficiency should be improved through construction of more health infrastructures as well as appointing qualified

doctors. Saksena et al (2010), in their study of utilization of health services in 39 low and middle income countries, concluded that utilization of public health care services is significantly influenced by the quality of care, geographical accessibility as well transport costs. The Indian healthcare system is plagued by various problems like dearth of staffs, rude behavior, proper health infrastructure, absenteeism of those who are employed, all of which have led to low utilization of the health care system. A study of the women in the tea gardens of Darjeeling, West Bengal, stated long distance to health care facilities, rude behavior of health staff, long waiting hours has resulted in low utilization of antenatal care services in the region (Bhattacharjee et al., 2013).

### ***2.1.5 Health Seeking Behaviour of the Mothers***

In a study by Jana and Harata (2016), in West Bengal, while child mortality and infrastructural facilities revealed a significant association, no such relationship was observed in case of infant mortality. The reason attributed was while child health predominantly depends on the health services accessed, infant health depends to a great extent on the health services utilized by the mothers during their pregnancy and child birth. Therefore, utilization of maternal health services like ANC, delivery care and PNC has an important influence on the infant health as well as utilization. Antenatal care refers to the various preventive care and nutritional recommendations provided to the mother during her pregnancy for better infant and maternal health outcomes. The World Health Organization recommends at least 4 ANC visits, two tetanus toxoid injection and 100 days of iron folic acid during pregnancy. The visits comprises overall screening, recognizing danger signs, nutritional advice as well as advice of infant care (WHO, 2016). Recognizing the danger signs during pregnancy and availing treatment is essential to reduce morbidity and enhance maternal and neonatal health. Jain et al. (2017), in their study found almost 53 percent of the mothers in India receives treatment for natal complications, especially excessive bleeding, from untrained / trained Dias rather than visiting health facilities. This is alarming taking into account the increased morbidity risk it poses for both mother and child if not treated properly. A study by Arunda et al. (2017), stated the importance of various components of ANC in reducing neonatal mortality in

Kenya. The neonatal mortality rate was found to be 4 times higher among neonates whose mothers who did not receive any ANC, 3.5 times higher among those who did not receive ANC from any skilled health personnel and 2.5 times higher whose mothers did not went for any check-up for pregnancy complication. A similar situation was noticed by Singh et al (2014), in India, wherein children whose mothers who received ANC are less likely to during the neonatal period, compared to mothers who did not receive any ANC. Tetanus toxoid injection emerged as one the key interventions to child survival and the study stated that 6 percent of the neonatal deaths in India could be averted by administering the mother two TT injections during pregnancy. Kunht and Vollmer (2017), established the intrinsic, positive association between ANC and infant health in their study of 69 middle and low income countries in the world. The probability of neonatal and infant deaths decreased by 0.56 and 0.42 percent respectively for women receiving at least four ANC visits from a skilled provider. Further, it also showed a reduction of 2.83 percent, 1.41 percent and 1.91 percent in probability of having low birth weight, stunting and underweight among children whose mothers received at least one ANC visit from the skilled providers.

As stated, globally a high percentage of neonatal deaths occur due to asphyxia, preterm births and birth complications. Majority of these deaths can be averted by timely care and interventions. Therefore, safe delivery and post natal care is a pre-requisite to identify risks and provide timely interventions, thereby reducing both maternal and neonatal deaths. However, despite the importance of post natal care in preventing maternal and child deaths, it has not received attention as much as the antenatal care. A study by Haider et al (2017) found the utilization of PNC services to be much low than the ANC services among women in Bangladesh. Further, utilization of PNC services depend on the utilization of ANC and institutional delivery. During the ANC visits, advice regarding delivery, danger signs and post-partum care is also provided and therefore, women who access ANC are more likely to utilize PNC services. Bayuo and Gacho (2013), stated utilization of safe delivery practices were higher among women who had more than one ANC visit. During each visit of the ANC, women are provided advices related to child care and preventive health care. Women in the study region who had only one ANC visit was found to be less likely to have instutional delivery as they were uninformed. Abebo

and Tesfaye (2018), found that in Southern Ethiopia, women who had institutional delivery were more likely to utilize PNC services and immunization services for the child. Low utilization of PNC services continue to be one of the leading causes of maternal and neonatal mortality. Limenih et al (2016), in their study noted that PNC utilization was very low among women in Ethiopia, with 9 out of 10 women not receiving any PNC. Place of delivery and delivery complications showed significant relationship with utilization of PNC. Mothers who had institutional deliveries and complications 1.6 and 2.5 times more likely to utilize PNC services. The major reason for low utilization of PNC was no information about post natal services being provided to the women by the health personnel. This exhibits the lack of awareness on the part of the women and indifference of health workers towards PNC services. Health seeking behavior of the mother has a significant relationship with the utilization of infant health care services. High utilization of ANC and PNC increases the likelihood of infant health care utilization due to increased awareness and knowledge.

#### ***2.1.6 Infant Health Status and Utilization of Services***

Globally, pneumonia and diarrhea continues to be largest cause of under-five mortality. Accounting for 16 percent and 8 percent of under-five deaths in 2016, pneumonia and diarrhea, often termed as diseases of the poor are highly prevalent in sub-Saharan Africa and South Asia. These preventable diseases have a detrimental effect on the health and constrains the physical and cognitive development of the child. Around 72 percent of the deaths due to diarrhea occur in the first two years of life with most of the deaths being concentrated in South Asia and sub-Saharan Africa with India, Afghanistan, Nigeria, Pakistan and Ethiopia alone accounting for more than half the child deaths (UNICEF, 2018; Walker et al., 2013). Acute diarrhea is caused by rotavirus, which accounts for more than 40 percent of hospitalization. Being an infectious disease, diarrhea mostly spread from the excreta of one infected person to other through contaminated water, food or objects (CDC, 2015). Lakshminarayan and Jayalakshmi (2015), stated the disease as the third largest cause of child deaths in India.

While diarrhea can affect the nutritional development of the child, acute pneumonia results in death. An air borne infection, it is the largest killer of children under the age of five, accounting for more than 90 percent of the infant deaths in low and middle income countries (UNICEF, 2016). Other than diarrhea and pneumonia, fever and infections among children are also major reasons for child deaths. Malarial fever forms one of the largest cause of child deaths in the tropical countries of sub-Saharan Africa and India. In 2012, 33 percent of the under-five deaths in India was due to pneumonia, diarrhea and malaria (Chandwani and Pandor, 2015). Also, children are found to be most vulnerable to infections during the neonatal period and utmost care is taken therefore for early assessment and management.

Immunization is a preventive measure which protects the children against preventable diseases. It is considered as one of the cost-effective treatment, as not only it increases life expectancy but also enables proper growth of the child. Globally, vaccines are targeted to pregnant women, infants and children as they are most vulnerable and at high risk for vaccine-preventable diseases. Though the number of vaccines in the immunization program varies from country to country depending on the burden of disease and disease profile, some of the vaccines against tetanus, diphtheria, polio, measles, pertussis and Hepatitis B are part of the immunization program of the most countries of the world (Lahariya, 2014).

### ***2.1.7 Summary***

The Mosley and Chen's framework for child survival holds true till date and explains much of the variation in child survival across regions. Infant health is an outcome of various socio-economic and demographic factors which works simultaneously and health status often depends on the utilisation of preventive and curative healthcare services. Maternal factors like education, age at birth, parity are found to be key predictors of healthcare utilization. Mothers with high level of education, higher age at marriage and lower parity are more likely to utilise health care services optimally. Further, utilisation also depends on the availability and accessibility to the health institutions. Adequate health infrastructure and quality of health resources lead to better health care utilisation and achieve the goal of healthcare for all.



## **2.2 Objectives of the Study**

The broad objective of the study is to analyse access to health care services in terms of physical, social and economic accessibility to health care services, and to examine the impact of availability and accessibility on utilization of Infant health care services in the district of Malda, West Bengal. More specifically, the key objectives of the study are as follows:

1. To examine the spatial and temporal pattern of infant mortality in India and West Bengal.
2. To study the spatial distribution, availability and quality of health infrastructure and health personnel in Malda, West Bengal
3. To study the differentials in maternal health care utilization by their background characteristics in the study area
4. To assess the infant health status and to study the differentials in infant health care utilization in Malda
5. To assess the effect of availability, accessibility and utilization of health care services on infant health status

## **2.3 Research Questions**

1. What are the major factors affecting infant health in the region?
2. What is the health care seeking behaviour regarding infants and how it varies by socio-economic and demographic variables?
3. How does the location of health infrastructure affect the infant health care utilization?
4. Is there any relationship between the quality of health care services and better utilization of services?

## 2.4 Conceptual Framework

A conceptual framework is a model wherein a set of concepts are linked with each other to set up a function and a relation. It explains either graphically or in a narrative form, the key factors or concepts to be studied and the possible relationship between them. A conceptual framework is one of the necessities of a study to understand the internal link between the independent and dependent variables. Fig 2.1 shows the causal model for this analysis. The proximate determinants have been further categorized into maternal, socioeconomic, geographic accessibility and availability of health care services. All these variables together or individually affect the utilization of infant health care services. The infant health care includes preventive and causative care which in turn influences the infant health status in the region.

## 2.5 Data Sources

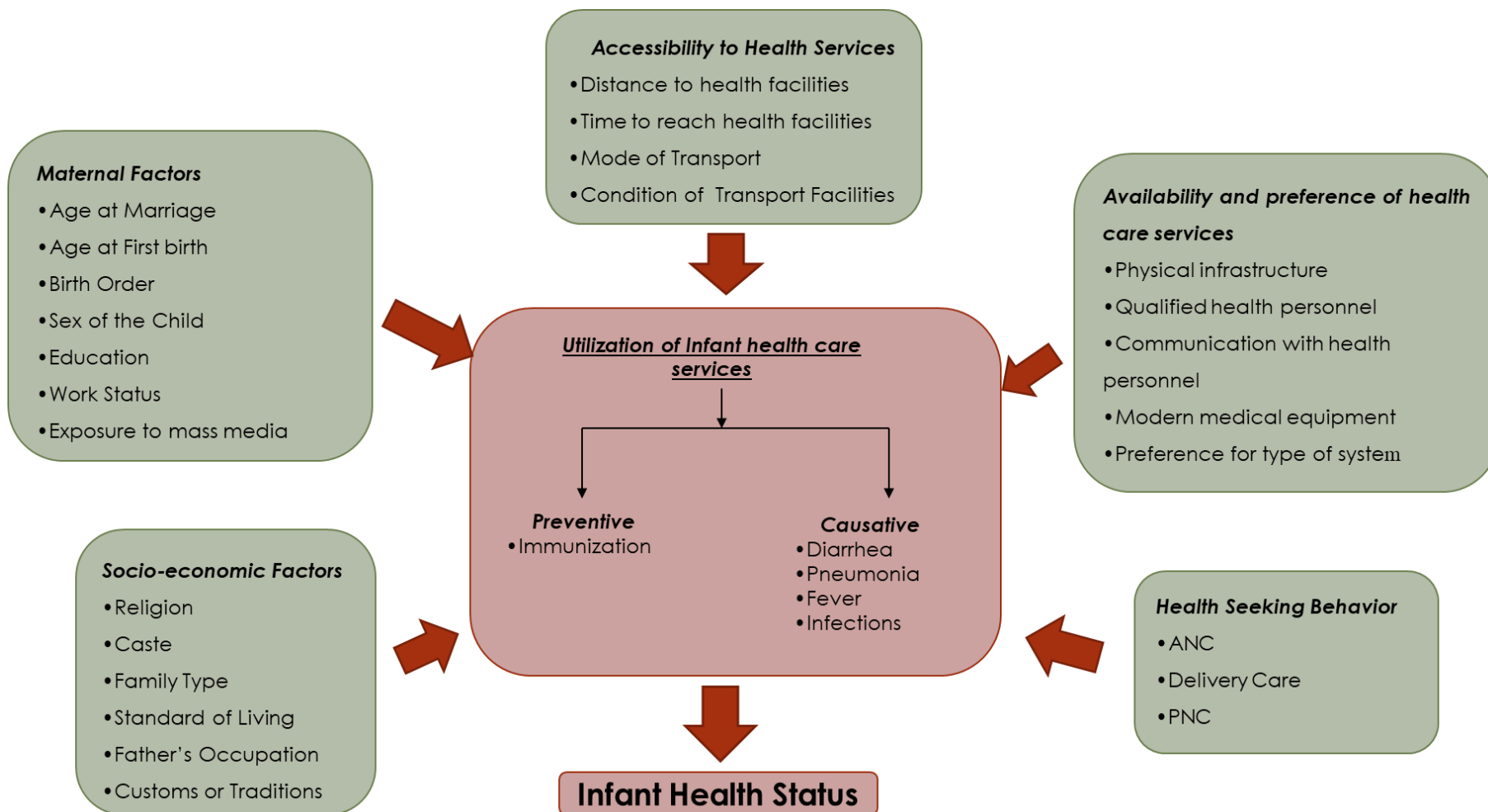
The present study uses primary as well as secondary data. Primary data is collected through interview of eligible respondents in the study area. Secondary data is taken from the various documents of the Government of India:

### 2.5.1 Secondary Data

#### *A. District Level Household and Facility Survey, Round III, 2007-08:*

The District Level Household and Facility Survey (DLHS-3) is third in the series preceded by DLHS-1 in 1998-99 and DLHS-2 in 2002-04. It provides data on maternal and child health, family planning and other reproductive health services. Also, it provides information related to the programmes of National Rural Health Mission (NRHM). Unlike the other two rounds in which only currently married women age 15-44 years were interviewed, DLHS-3 also interviewed ever-married women (age 15-49), in which never-married women (age 15-24) were also included.

**Figure 2.1 Conceptual Framework of the Study**



While information on women's characteristics, maternal care, contraception and fertility preferences, immunization and childcare, reproductive health was collected for the ever-married women's questionnaire, the unmarried women's questionnaire collected information on women's characteristics, awareness about reproductive health and contraception, family life education, and HIV/AIDS, etc. An important inclusion for the first time in DLHS-3 was data regarding health care facility, which contained information on human resources, infrastructure and services. At the district level, all Community Health Centres and District Hospital all Sub-Centres and Primary Health Centres which were anticipated to serve the population of the selected Primary Sampling Units (PSUs) were covered. The sample size for ever – married women is 6,43,944, ever married women is 5,48,780 and for never married women is 1,66,260. The present study used data from the mother's file to calculate the utilization of maternal healthcare services and facility data to assess the condition of public health infrastructure in the districts of West Bengal.

***B. National Family Health Survey, Round IV, 2015 -16***

The 4th round of the National Family Health Survey was conducted under the leadership of Ministry of Health and Family Welfare by the International Institute of Population Studies, Mumbai. The survey provides detailed information about population, health and nutrition for all the states and union territories of India. Unlike the earlier three rounds, the 4th round of NFHS for the first time provides district level estimates of some of the important indicators. Other than information on fertility, mortality, family planning, HIV-related knowledge, and important aspects of nutrition, maternal and child health care, NFHS – 4 also provides information on malaria prevention, migration in the context of HIV, abortion, violence during pregnancy etc. In NFHS – 4, 601,509 households, 699,686 women in the age group of 15 – 49 and 112,122 men in the age group of 15 – 54 were interviewed. The present study uses data from the child file regarding the maternal characteristics as well as ailments of the child.

***C. Census of India, 2001 & 2011:***

The history of census in India dates back to 1872, when the British made an effort to enumerate the population of India across the country. However, the first synchronous census was conducted in 1881 and thereafter the census has been conducted every 10 years in India. With a 100 percent coverage, the Census provides authentic information on various socio-cultural, economic and demographic aspects of the population like literacy status, work status, age group wise population distribution, religion, caste, work status etc.

The Census 2011 was conducted in two phases – April to September, 2010, during which house listing was done and Feb 9 to Feb 28, 2011, when the population enumeration took place. At the time of enumeration, India's population stood at 1.21 billion. The Census 2011 included some new categories for a comprehensive data which includes creation of new category of "other" in gender, separate codes for divorced and separated in the marital status, increase in number of categories in disability etc. In the study, data has been used from the Primary Census Abstract to gather demographic information about the population in the districts of West Bengal. Further, fertility tables from F –Series was also used to calculate the district-wise infant mortality rate.

***D. Rural Health Statistics in India, 2010, 2015, 2016:***

The rural health care system forms the basis for primary health care in India. To provide accessible healthcare to the rural areas, where more than 68 percent of the country's population reside, efficient management is required. Therefore, compiling data as provided by the States and Union Territories, the Ministry of Health and Family Welfare, publishes the bulletin on Rural Health Statistics. It provides data on various aspects of the rural healthcare system in India, including human resources, rural health infrastructure, and training provided, condition of the buildings, facilities provided etc. This study uses data for availability of rural health infrastructure, shortage of manpower and vacant seats.

***E. Statistical Handbook of West Bengal, 2011:***

The various socio-economic data pertaining to West Bengal, is published by the Government of West Bengal in the statistical handbook. District wise estimates of most

of the data are provided by the handbook. This survey uses the number of healthcare facilities available in the districts from the data source.

***F. District Human Development Report, Malda, 2004:***

The State Government of West Bengal in collaboration with the United Nations Development Programme and Planning Commission of India, published the West Bengal Human Development Report in 2004 which won the UN award for the quality of the analysis and indepth content of the report. The success of the state report encouraged the Government to publish data at the district level too. The report provides insight into the quality of life and level of satisfaction enjoyed by the people in Malda. The present study uses data for human development index from the source.

**B) Primary Data**

Primary data is collected through interview of mothers having child aged 6 months to 18 months during the survey of the study area. For the primary survey two blocks have been selected namely Bamangola and Kaliachak –I from the district of Malda, West Bengal.

**2.6 Sample Design & Sample Selection**

In order to bring out the differences in availability, accessibility and utilization of infant health care services in Malda, two blocks, namely Kaliachak- I and Bamangola have been selected, each from the contrasting physiographic region of Diara and Barind. While the former lies in the well-drained newer alluvium zone, thereby supporting greater population, the latter lies in the almost impermeable, old alluvium zone which is sparsely populated. Table 1.9 shows the block-wise background characteristics of the district of Malda.

It can be seen that while Bamangola has the lowest population, Kaliachak – I record the highest population in the district. Also, the latter experienced almost double the annual growth of the former. Fertile lands of the Diara region may be contributed to the high population growth in Kaliachak-I. Further, the ethnic composition of the region is also varied. While Bamangola records the second highest concentration of scheduled population, Kaliachak –I has a high concentration of Muslim population (Census 2001).

In terms of birth rates, both the block falls in two distinct clusters – Kaliachak- I has more than 10,000 births annually while Bamangola has less than 4,000 births. However, a reason for the high birth in the former could be attributed to the high density of population in the region. Institutional deliveries are also found to be higher in the low cluster birth areas. A study of the available health infrastructure of the region shows that there is high variability both in number of health care institutions and spatial pattern. For instance, Kaliachak – I, the most densely populated block, offers patients with only 29 beds while, Bamangola with less than half of its population offers as many as 39 beds (Government of West Bengal, 2007). Further, in the Barind region, i.e. Kaliachak-I, inaccessibility and long distances to health care infrastructure also plays a key role in accessing the available services.

The sample size consists of 423 households, from 27 villages of both the blocks. While 20 villages from Bamangola were surveyed, 7 villages were surveyed from Kaliachak – I. Two sub-centres from Bamangola, Doulatpur and Madnabati and one sub-centre from Kaliachak-I, Silampur was selected and all the villages cater by these sub-centres were surveyed. As questions regarding infant health status were related to their health status in the past six months, households having children within the age group of 6 to 18 months were surveyed.

## 2.7 Methodology

1. **Descriptive Statistics:** It is the simplest form of statistical analysis, used primarily for descriptive purposes. The analysis is carried out with the description of a single variable and its attributes of the applicable unit of analysis. Crosstabs and frequency run has been carried out for various variables. Multiple response analysis has been used to know the multiple sources of knowledge, practice of women for utilising maternal and infant health care services.
2. **Composite Indices:** Composite indices have been carried out to find out the utilization of healthcare services, infrastructural facilities and calculating wealth index. Wealth index according to Demographic Health Survey, is calculated using data from the primary survey.

3. **Indirect Estimation of Infant Mortality:** The estimation of infant mortality rate was carried out using data from the F – Series of Census 2011 and MORTPAK. Children ever born (F-1), children ever survived (F-5) and total women was used to calculate the average children ever born and average children surviving. Thereafter using the FERTCB option in MORTPAK, mean age at childbearing of the women was calculated. Lastly, the QFIVE option was used to estimate infant mortality using the UN South Asian life table.
4. **Geographically Weighted Regression:** To understand the spatial variation in factors determining infant mortality, geographically weighted regression has been carried out. Unlike the global regression model, the coefficients of in the GWR are functions of the spatial variation. The basic equation as given by Fotheringham et al. (2002) is :

$$y_i = \beta_{i0} + \sum_{k=1}^m \beta_{ik} X_{ik} + \varepsilon_i$$

where  $y_i$  = dependent variable at location  $i$  ,

$x_i$  =  $k^{\text{th}}$  independent variable at location  $i$ ,

$m$  = number of independent variable,

$\beta_{i0}$  = intercept parameter at location  $i$ ,

$\beta_{ik}$  = local regression co-efficient for  $k^{\text{th}}$  independent variable at location  $i$

$\varepsilon_i$  = random error location  $i$  (Lu et al., 2014)

The co-efficients in GWR vary continuously across regions and can be estimated at any place, which allows to create a map demonstrating the spatial heterogeneity of the predictors. This equation is standardized using bi-square kernel function. The Akaike Information criterion is also used to compare the fit of the GWR model compared to global regression. The study used GWR 4.0 for carrying out the regression model.

5. **Multinomial Logistic Regression:** In order to find the effect of healthcare services on the infant health in the blocks of Malda, multinomial regression has been carried out.



## Chapter 3

### *Spatial and Temporal Variation of Infant Mortality Rate in West Bengal*

#### **3.1 Introduction**

The past decades have witnessed extensive efforts worldwide to improve the health of the children. Though substantial progress has been made, the achievements remain unsatisfactory in the low income and developing countries of the world. Child mortality rates – often considered as a key indicator of health status and well-being of the children continues to be high in many parts of the world. It is not only an indicator of health and medical condition of the country but also the level of socio-economic development of the country. Globally, 5.6 million children under the age of five died in 2016, which translates to nearly 15,000 deaths per day. Out of this, 4.2 million (around 75% of the under-five deaths) occur in the first year of life and the highest number of deaths occurred in WHO African region followed by the South East Asian Region (WHO, 2017). The likelihood of child deaths was found to be almost six times greater in African region compared to Europe. Most of these deaths are by preventable causes like pneumonia, diarrhea and malaria with malnutrition as the underlying factor (UNICEF, WHO and UN, 2017).

Good child health is imperative for the development of the country as they form the future workforce and contribute to the intellectual, political, social and economic development of the country. Therefore reduction in infant and child mortality was one of the important objective of the Millennium Development Goals (MDG) and now also of the Sustainable Development Goals (SDG) which aims to end all preventable under five and neonatal deaths by 2030 (WHO, 2015). During 1990 – 2016, while the decline in child mortality was fast, the reduction in newborn deaths made slower progress. In 2016, the largest number of under-five deaths occurred in Southern Asia, followed by Sub-Saharan Africa, both of them accounting for around 80 percent of the deaths. About half of the deaths occurred in only six countries – India, Pakistan, China, Nigeria, the Democratic Republic of Congo and Ethiopia with India and Nigeria alone accounting for around one – third of the deaths (UNICEF, WHO and UN, 2017).

India achieved a notable decline in infant mortality since the 1970s. The mortality rate declined from above 100 deaths per 1,000 live births to 34 deaths per 1,000 live births in 2016 (Kapoor, 2010; SRS, 2017). The infant mortality rates registered a rapid decline prior to 1990s. The various programmes and policies aimed at improving the child health reduced the mortality rate drastically. However, in recent years the rate of decline has slowed down and reached a plateau. The MDG 4 was reduction of infant and child mortality by two-thirds from 1990 to 2015. This translates to an infant mortality rate of 29 per 1000 live births for India (PIB, 2015). Nonetheless, India missed the target with the infant mortality rate standing at 34 per 1000 live births in 2016. Keeping in mind the grim situation of child health status in the country, the Government integrated universal access to free, comprehensive primary health care services for maternal, child and adolescent health as one of the key objectives in the National Population Policy 2015 (NPP, 2015) and to achieve the target of National Population Policy 2000 of reducing infant mortality rate to at least 30.

Despite registering a significant decline in the infant mortality rate in the past four decades, India's performance in comparison to its neighbouring countries in South – East Asia is not noteworthy. Least developed countries like Bangladesh (28), Nepal (28) and Maldives (7) have registered a much lower infant mortality rate than India (34) in 2016 (Hug et al., 2017). The WHO classification of 14 sub-regions by mortality stratum, categorizes India in the South East Asian Region – D (SEAR-D), which is characterized as a “high mortality” region (NIMS, ICMR, and UNICEF, 2012). India's economic performance since the 1990s has earned her the title of “emerging economy.” However, the irony lies in the fact that despite the high growth rates, it has accomplished very poorly in the field of child health and nourishment. The country's health statistics are found to be worse not only than the neighbouring countries in South Asia but also of sub-Saharan countries (Maitra and Ray, 2013). Further, despite the widespread development and expansion in universal coverage of healthcare and nutrition, a stagnation in the decline of mortality rates was perceived in some of the states in the last decades (Ghosh, 2012). The infant mortality rates vary by several factors like regional, social, economic, gender etc and identification of these factors which contribute to the high mortality in the regions is necessary to enable the government to formulate necessary policies accordingly for bringing down the rates (Agnihotri, 2001).

In 1978, International Conference on Primary Health Care was held at Alma Ata, which for the first time suggested development of the primary health care systems in countries as an indispensable measure to reduce child mortality (NIMS, ICMR and UNICEF, 2012). The declaration, known as Alma Ata declaration, 1978 recognized the development of the primary health care system as a key to reduce health inequities and make the goal of universal coverage of healthcare system possible (UNICEF, 2008). Several efforts have been made by the United Nations since then to help nations identify new ways to reduce child mortality and support for the same. Following the declaration, India also envisioned of attaining an infant mortality rate of 60 by the year 2000, which it failed to achieve by registering a noteworthy decline of 68 per 1000 live births in 2000. The succeeding years after the declaration witnessed a considerable flow of resources into the realm of child health. The Family Planning Programmes whose major aim was to reduce the birth rates evolved into Family Welfare programmes. The focus shifted to the overall development of health, especially maternal and child health rather than population stabilization. The integration of the maternal and child health programmes was based on the hypothesis that better maternal and child survival rates will lead to a subsequent reduction in birth rates (<http://planningcommission.nic.in/plans/mta/mta-9702/mta-ch17.pdf>).

India has a long history of population policies which aimed at reduction of maternal and child deaths. Maternal and child health care has always been an integral part of these policies and programmes. Recognizing the factors responsible for infant deaths several programs have been launched in various plans like the Universal Immunization Program (1985), Oral Rehydration Therapy (1985), Child Survival and Safe Motherhood (1990), etc. Over time, these programs have been integrated and strengthened and in 1997 the Reproductive and Child health programme was launched which included more services like the essential newborn care and interventions to reduce the incidence of Diarrhea and acute respiratory diseases, universal immunization coverage etc. After the completion of RCH –I in 2004-05, the second phase was launched in 2005 (NIMS, ICMR and UNICEF, 2012).

Keeping in mind the regional disparities in the level of development, the National Rural Health Mission was launched in 2005 which aimed at providing accessible and affordable primary health care services to even the poorest household and reducing morbidity and mortality rates thereby improving the overall health status of the

population (NRHM Annual Report 2012-13). In spite of ushering of several programs in the 1990s, the health service saw stagnation in the number of rural health care institutions, increase in non-accessibility of health services due to financial constraints and rise in untreated ailments among the poor (Dasgupta and Qadeer, 2005). Thereby, the program suggested a complete renovation of the rural healthcare system and decentralization of the healthcare services.

The National Rural Health Mission integrated several national programs within its ambit. The programme was launched in 18 states, mostly the Empowered Action Group states with a poor health infrastructure for restructuring the health system. The basic objectives of the NRHM were to reduce maternal and child mortality, ensure population stabilization, provide universal access to primary health care services, to prevent and control of non-communicable and communicable diseases and to rejuvenate the traditional medicinal systems. The NRHM was extended to other states and a new programme – National Health Mission was launched in 2013 with National Rural Health Mission and National Urban Health Mission as its submissions. Both the programs include strengthening of the health systems in both rural and urban areas, the reproductive, maternal, newborn, child and adolescent health (RMNCH-A) and the control of communicable and non-communicable diseases ( NRHM annual report, 2013-14). While the success of the programme has received appraisal due to a significant decrease in the mortality rates in the country, the decline has not been up to the mark, and in some areas, it continues to be high.

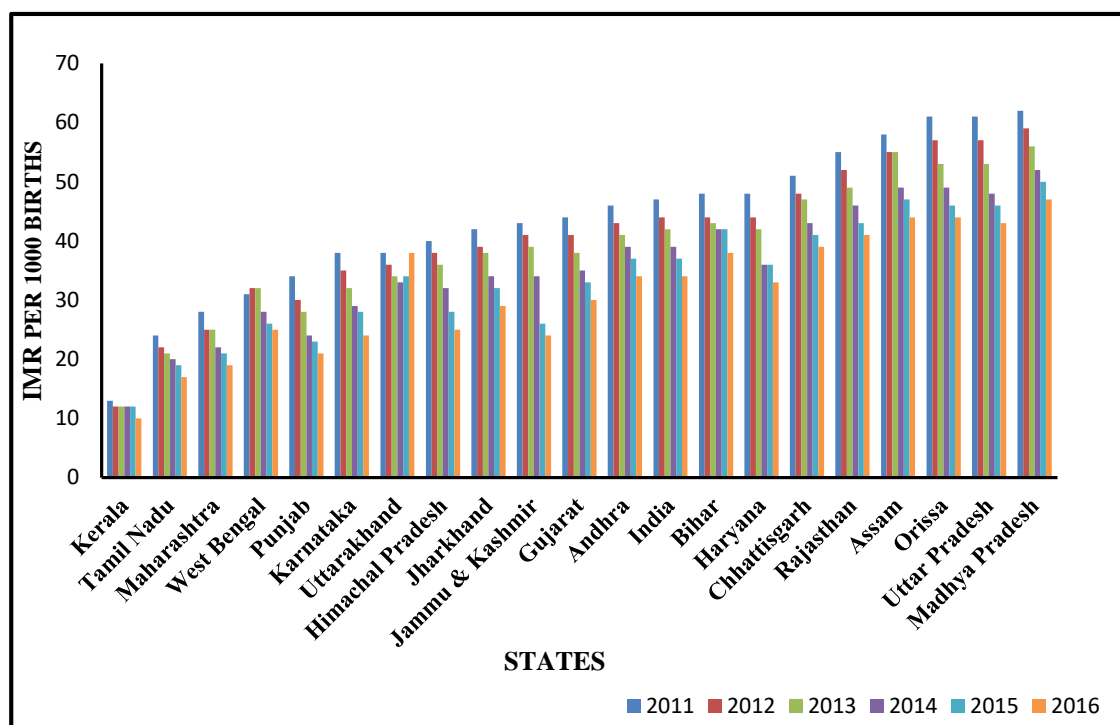
### **3.2 Temporal Variation in Infant Mortality Rate in India**

India had made substantial progress in reducing its mortality rate since independence. However, while the crude death rate fell dramatically from about 15 during the 1970s to around 6 in 2017, the infant and child mortality did not register the same pace of decline. This implies that unlike the adults, children did not profit from the innovations and implementation of several nutrition programmes and preventive and curative healthcare (Jain, 1985). The regional, physical, socio-cultural and economic miscellany of the country has always been reflected in its general as well child mortality rates with rural areas accounting for a larger percentage of the deaths compared to their urban counterparts. Reduction in the infant mortality rates therefore

requires identification of pockets of high mortality and formation and implementation of policies and programmes accordingly.

It is often argued that economic growth measured in terms of growth of per capita gross domestic product has a positive association with infant mortality. High level of economic growth leads to decline in the infant mortality rate as is portrayed by the global scenario (Demetriou and Tzitziris, 2017). Developed regions of the world have very low level of infant mortality rate compared to the developing and least developed countries. Figure 3.1 reflects the same. States with high level of economic development are found to have lower mortality rates than the financially constrained states.

**Figure 3.1 Temporal Variation of IMR in Major States, India, 2011-2015**



Source: SRS Bulletins, Office of the Registrar General of India, 2011 – 2016

Throughout the temporal scale, the empowered action group (EAG) states and Assam registered a high infant mortality rate, more than the national average. In spite of a steady decline since 2011, the states of Madhya Pradesh (47), Assam (44), Odisha (44), Uttar Pradesh (43) and Rajasthan (41) documents some of the highest IMR in the country in 2016. Being perennially plagued by poor socio-economic development, cultural constraints and taboos, high birth rates ensuing to higher levels of morbidity and mortality, these states have always been in the limelight. Various medical and non – medical care like place of delivery, birth assistance, care received

during pregnancy, practices followed during birth and for newborn care are some of the pivotal elements affecting infant mortality (Claeson et al., 2000). Globally 2.6 million deaths occur within the first 28 days of birth in 2016 (WHO, 2017). Most of these deaths can be prevented by ensuring proper medical care during and after childbirth. A study by Visaria, (1985) found states like Rajasthan, Madhya Pradesh, Odisha, Jammu and Kashmir, and Uttar Pradesh having low rates of institutional births and following unhygienic traditional customs for newborn care thereby resulting in high infant mortality rates.

Studies have agreed unanimously that mother's education is a key determinant of child health. Education empowers women in a multifarious way. Women having higher years of schooling are found to have better child health status which could be attributed to increased age at marriage and childbirth, gainful knowledge, higher autonomy in decision-making process and taking better healthcare decisions (Shetty et al., 2014). Higher educated women are found to avail maternal and child health care services, which are crucial for better health status of both mother and child, more regularly than women with little or no education. All the EAG states recorded a female literacy lower than the Indian average of 65.46 percentage in 2011. The lowest female literacy was registered by Rajasthan (52.6%), followed by Bihar (53.3%), Jharkhand (56.2%) and Uttar Pradesh (59.2%) (ORGI, 2011). These "worst literacy group" states were also found to have low usage of maternal child healthcare services resulting in a high IMR. The influence of female illiteracy was found to be adverse in case of maternal health-seeking behaviour as well preventive child health care services like vaccination and health check-ups (Gokhale et al., 2002) in all these states, which explains the prevalence of high infant mortality.

However, among the EAG states, Jharkhand records an infant mortality rate of 29 in 2016, impressively lower than the national average. The state has seen a substantial decline in the IMR in the last few years and is the only EAG state achieve such progress. Higher rates of institutional delivery, breastfeeding in the first hour after birth have been cited as some of the crucial interventions that have helped the state in achieving the success (TOI, 2014). In spite of low economic development and female literacy rate, the achievement of the state is laudable, and it infers the proper functioning of the healthcare system and programs and policies of the state at work.

The economically developed states performed well in keeping their IMR lower than the national average as well as showing a steady decline. Tamil Nadu (17), Maharashtra (19), Punjab (21), Karnataka (24), Jammu and Kashmir (24), and West Bengal (25), all registered an IMR less than 30 in 2016. Conversely, Uttarakhand surfaces as the only EAG state where, after registering a continuous fall, the IMR has risen in the last two years. The state recorded five-point increase in the IMR from 33 in 2014 to 38 in 2016. Of the infant deaths, 63 percent occurred in the first 28 days of birth due to asphyxia, while the majority of the infant deaths were due to pneumonia, fever and diarrhoea. The state health officials quoted that 37 percent of the births were by home delivery during that period of time. High influx of migrants from the surrounding states in search of work, who end up living in slums which have improper living conditions, was attributed as major contributing factor to the increase in IMR. Pregnant women living in these areas often do not have proper access to healthcare services, are malnourished and anaemic which result in rise in infant and neonatal deaths. The constraint of access to and absence of proper roads to healthcare institutions in hilly areas was also cited as another reason (TOI, 2016).

The state of Kerala is a demographic outlier constantly recording the lowest infant mortality rate in the country throughout the period. From 2012 to 2015, it reached a plateau of an IMR of 12 per 1,000 live births which further declined to 10 in 2016. The state has always been a frontrunner in social and economic development. A long communist regime in the state has ensured a stable situation thereby leading to proper implementation of the programmes and policies. The state has a history of high socio-economic development since the arrival of the British in the country. The rulers of Kerala took a keen interest in promoting public health and sanitation infrastructure and being a matriarchal society, women's education has always been given a priority. Women also enjoy higher autonomy and decision-making ability compared to the rest of the country (Dyson and Moore, 1983). The ratio of primary health centre and population as well as usage of government healthcare services is also high in the state (Nag, 1983). Further, it was also noticed that the people of Kerala are more politically active and aware of their rights which lead them to demand and access better and proper medical services from the Government (Nag, 1985). All this have lead the state being the most demographically advanced state in the country.

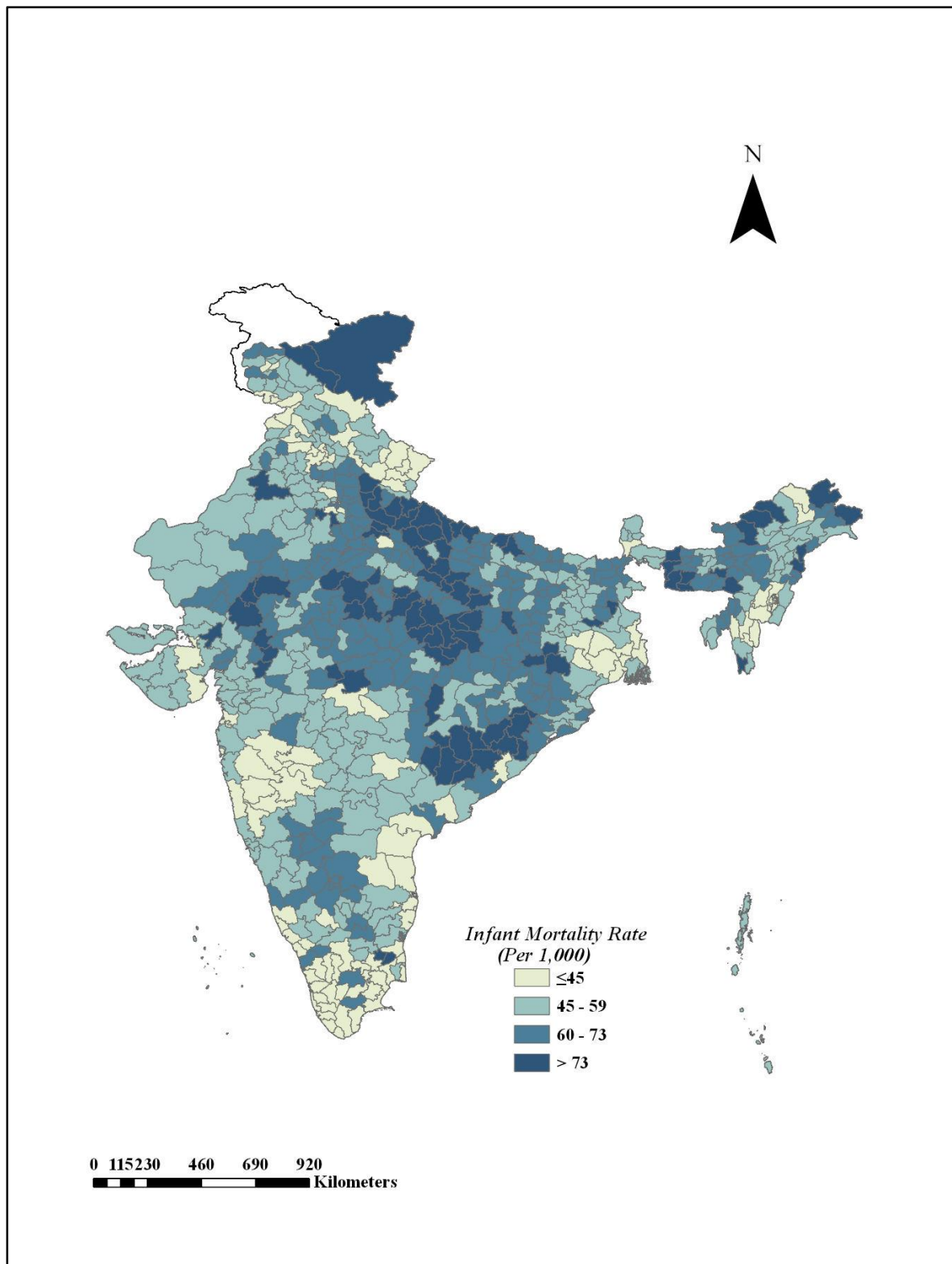
The highest decline in the infant mortality rate was noticed in the state of Jammu and Kashmir followed by Uttar Pradesh, Odisha, Madhya Pradesh, Haryana and Himachal Pradesh. All these states registered a decline of more than 15 points during the time period of 2011 to 2016. Most of these states are high focused areas for implementation of programmes and interventions as they are infamous for high IMR. A high decline in the IMR therefore indicates proper functioning of healthcare institutions. Among the EAG states, Uttarakhand is the lone state without any improvement. In the low mortality developed states, the rate of decline has been low with Kerala registering only 3 points decline during 2011 – 2016. However, Kerala has already reached a significantly low level of infant mortality, and remaining mortality can be attributed to the neonatal deaths which occur due to congenital or birth problems. The other states registering a low decline are Maharashtra, Tamil Nadu and West Bengal. Though these states registers a medium mortality rate, yet it needs to be reduced. Also, studies need to be carried out to ascertain the factors responsible for this low rate of decline and thereby make the necessary interventions.

### **3.3 Spatial Variation of Infant Mortality Rate in India, 2011**

True to its diverse socio-cultural and economic complex, the health scenario in the country also varies. The regional diversity is well reflected both among inter and intrastates. The IMR estimates of the states are given annually by the Sample Registration System. Several other data sources like the National Family Health Services also provides state-wise IMR by various socio-economic level. However, while up-to-date information about IMR at the state level is available, same cannot be claimed at the district level. The latest available indirect estimates for the same is of 2001. There exists a considerable variation in the level of socio-economic development across the districts within a state in India and sharp differentials in the health care indicators are also noticed. With the ushering in of decentralized planning, the district becomes the lowest unit for policy development. Taking into account of this, a district level estimate and thereafter analysis of the infant mortality rates in the country is carried out (Fig. 3.2) in order to assess the situation of infant health in the country at the lowest level.



**Map 3.1 Indirect Estimates of Infant Mortality Rate, India, 2011**



*Source: Computed from Census, 2011*

The map presents a grim picture of the infant health in India. Concentrated belts of very high IMR are noticed across the country. Most of the high IMR zones are found in the EAG states. The highest IMR is recorded by the district of East Kameng (110), followed by Kargil (108), Kurung Kumey (107), Anjaw (106) and Kandhamal (101). Barring Kandhamal, Odisha, all the other four districts are hilly districts with adverse climatic conditions, improper transport network and access to health care facilities, which explains the steep IMR. Kandhamal, on the other hand, is a tribal dominated district which forms a part of the high IMR zone in Odisha. The level of socio-economic development is quite low in the region, with most of the population engaged in primary activities.

Pockets of very high IMR (above 73) are found to be concentrated in Madhya Pradesh, Uttar Pradesh, and Odisha. A large number of districts of these states record a very high IMR of above 73. Most of western Uttar Pradesh, southern Madhya Pradesh and almost all the districts of Odisha, except the coastal zone falls under this category. Ironically, the highly urbanized districts of Allahabad, Visakhapatnam and New Delhi also fall under this category. Therefore, it can be inferred that urbanization does not essentially amount to better health, because of provision of better healthcare facilities. Other places include southern Assam, southwestern Rajasthan, snow-capped northern Kashmir, western and eastern Arunachal Pradesh, Malda in West Bengal and eastern Jharkhand. These zones of very high IMR are surrounded by the zone of high IMR (60 -73). Northern Chhattisgarh, Madhya Pradesh, Rajasthan, eastern most part of Maharashtra, eastern part of Karnataka, western part of Andhra Pradesh and some parts of Tamil Nadu falls under this region. All these zones of high mortality are characterized by low level of socio-economic development.

The low mortality zone of less than 45 infant deaths is found mostly along the coastal belt. The lowest IMR is found in Kannur, followed by Mainpuri, Palakkad, Ernakulam, Thrissur and Kasaragod. All these districts register an IMR below 25. The other places include Kerala, parts of Tamil Nadu, eastern coast of Andhra Pradesh, the coastal belt and surrounding districts in Maharashtra, southern West Bengal, south-eastern Punjab, northern Himachal Pradesh and parts of Manipur and Mizoram. The rest of the country registers a moderate IMR of 45 to 59.

A closer look at the map reveals a stark north-south divide in IMR of the country. The northern states recorded the high to very high IMR compared to southern states. Most of the districts in the southern states registered a moderate to low IMR except some districts in Karnataka and Andhra Pradesh. Coupled with low economic development and poverty, the absence of healthcare institutions and high malnutrition have led to higher infant mortality in the region (The Hindu, August 2017; The Times of India, January 2017). On the other hand, the districts in the northern part of the country have registered continuous zones of high and very high IMR. This scenario reflects the theory of north-south divide given by Dyson and Moore more than a quarter-century ago in 1983. They stated that there exists a north-south divide in the country in terms of kinship structure and demographic characteristics. While the southern region is characterised by high female literacy and autonomy thereby resulting in low fertility and mortality rate, the contrast is noticed in the northern part of the country. Marriage age is considerably low in the northern region thereby resulting in high fertility and mortality (Dyson and Moore, 1983). Bose (1996), stated that the lower birth rates and success of family planning in the southern states of Kerala, Tamil Nadu, Andhra Pradesh and Karnataka compared to the northern states, especially the BIMARU states of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh have led to the “*North-South Demographic Divide*” in the country. Other than high TFR and low contraceptive usage rate, the northern states also differ in terms of socio-cultural aspects like son preference, literacy, healthcare access and usage (Bose, 1996; Bose, 2000). Women in the southern states are found to be in a much favourable position enjoying an advantage over a number of factors like education, workforce participation and higher degree of autonomy compared to their northern counterparts (Dommaraju and Agadjanian, 2009). The district level Maternal and Child health services coverage gap was also found to be high in the northern regions of India (Rai et al., 2013). Women belonging to the lower class and in the rural areas were found to have low access to health services which in turn predicts the high under-five mortality rates in the regions (Kumar et al., 2013). The zones of high IMR are characterised by very low level of socio-economic development. Further, even in economically developed states Maharashtra, Punjab, Karnataka, Tamil Nadu and Andhra Pradesh zones of high mortality are found which portrays the uneven development within the states which needs to be taken care of.

### 3.4 Spatial Variation of determinants of Infant Mortality Rate

The spatial variation of IMR in India portrays concentrated zones of high mortality throughout the country. The factors leading to the high mortality rate needs to be investigated for better policy intervention. Infant mortality is a concern for both social scientists and medical professionals. High mortality often hinders the development of a nation. Therefore, a large number of studies have been carried out to ascertain the most crucial variables affecting infant mortality (Gokhale et al., 2002; Jain et al., 2013; Badari et al., 1991; Bhattacharya and Haldar, 2014; Fuchs et al., 2010). While social scientists have focused on socio-economic determinants and the causal relationship between them and IMR, biologists are focused on the processes leading to mortality. One widely recognized model is the child survival framework given by Mosley and Chen in 1984. The framework is unique in the way that it encompasses both the biological and social factors affecting mortality and can provide a measurement of both morbidity and mortality.

The framework identifies a few sets of variables, called the “proximate determinants” which affects child survival based on some presumed conditions. All the social and economic variables are supposed to operate through these determinants to affect child mortality. The proximate determinants are further categorized into:

1. *“Maternal factors: age; parity; birth interval.*
2. *Environmental contamination: air; food/water/fingers; skin/soil/inanimate objects; insect vectors.*
3. *Nutrient deficiency: calories; protein; micronutrients (vitamins and minerals).*
4. *Injury: accidental; intentional.*
5. *Personal illness control: personal preventive measures; medical treatment”*  
(Mosley and Chen, 1984).

In order to assess the determinants of infant mortality in India, the present study adopts the above framework. Data from the National Family Health Survey – 4 (NFHS - 4) has been used to portray the causal relationship between the dependent and the independent variables. However, due to unavailability of some of the variable used in the framework, the model has been modified accordingly by considering some other additional variables available. The variables used for the study are as follows:

1. Maternal factors:
  - a. Mothers receiving more than ten years of schooling.

- b. Mothers who have received full antenatal care (at least 4 ANC visits, one tetanus and 100 days of iron-folic acid).
  - c. Births attended by health personnel.
  - d. Mothers who have received post-natal care within two days of delivery.
2. Environmental Contamination:
- a. Households with improved drinking water source
  - b. Households with improved sanitation facilities
  - c. Households using clean fuel for cooking
3. Nutrient Deficiency :
- a. Children aged 6 – 23 months receiving an adequate diet
  - b. Children aged 6 – 59 months who are anaemic.
  - c. Pregnant women in the aged 15 – 49 years who are anaemic
4. Illness Control:
- a. Children having check-up within 48 hours of birth
  - b. Children aged 12 – 23 months who are fully immunized.
  - c. Children having diarrhea in the last two weeks preceding the survey
  - d. Children with diarrhea taken to healthcare facility
  - e. Children with Acute Respiratory Infection taken to healthcare facility.

So far, zones of high IMR have been identified. But there is a need to isolate the key factors behind the observed pattern. The simple linear regression, or the global regression assumes the relationship between the dependent and the independent variables to be constant across space which is not true. The influence of the independent predictors on the dependent variable varies across the country and therefore incorporation of this spatial dependence is necessary to identify the major determinants of infant mortality in a region (Shoff et al., 2011). Therefore, Geographically Weighted Regression (GWR) has been carried out to investigate the spatial relationship between the infant mortality and several socio-economic determinants. The GWR model has been established as a “powerful tool” for determining the spatial non-stationarity of the variables while taking into account their intrinsic spatial dependence (Tse Chuan Yang, 2013). In a socio-economically diverse country like India, it is necessary to identify the spatial effect of the predictors of IMR in order to formulate appropriate policies accordingly and therefore GWR has been preferred as the regression tool. Prior running the GWR, a correlation analysis

was carried out among the variables to ascertain the degree of correlation and detect multicollinearity. Accordingly, the variables which are mutually non-related are considered. The variables which displayed high correlation (more than 0.50) with infant mortality rate at 95 percent level of significance was chosen for the GWR analysis.

### 3.4.1 Descriptive Statistics and Global Regression Results

The global regression result demonstrates that the model explains more than 36 percent of the variation in IMR in India (Table 3.1). The mean and the coefficient value for each of the variables used in the model are also provided in table 3.1. Among all the environmental factors, improved sanitation facility displayed a higher correlation and is also found to have a negative relationship with infant mortality, highly significant at 99 percent level of confidence. The condition of sanitation practices in the country presents a gloomy picture with less than 50 percent of the households having access to improved sanitation facilities. Diarrhea is one of the leading cause of infant deaths worldwide. Improved sanitation facilities including covered drains, manholes and latrine facilities ensure safe disposal of faecal waste and prohibit contamination and growth of harmful bacteria in the surrounding environment (Bawankule et al., 2017). Children of households having no access to improved sanitation facilities are found to be at more risk of diarrhea. In India, even in the 21<sup>st</sup> century, 61 percent of the rural population and 10 percent of the urban population still practice open defecation (<http://www.teamswachhbharat.in/get-the-facts.php>). With the Swachh Bharat Abhiyan in progress, the Government strives to provide better sanitation facilities to the whole population, thereby reducing the environmental contamination and ensuring better health.

A child grows inside the mother's womb for nine months and therefore maternal health is one of the crucial determinant of infant health. Barring post natal care all the maternal factors reveal a significant relationship with the IMR. Women's education has always been held as crucial factor for social development of a country. The effect of women's education is multifaceted and its importance in enhancing both the mothers and child's health is immense. Women with higher levels of schooling are

found to be associated with better health and the same is reflected in the regression results (Chakraborty and Chaudhuri, 2007). A statistically significant inverse

*Table 3.1 OLS Regression Estimates of IMR in India*

	<b>Estimate</b>	<b>S.E.</b>	<b>Mean</b>
Intercept	87.65	3.47	
Improved Sanitation facility	-0.18***	0.03	48.10
Use of clean fuel for cooking	0.01	0.01	39.35
Women with 10 or more years schooling	-0.19***	0.06	34.62
Mothers receiving full ANC	-0.09**	0.04	21.56
Mothers receiving PNC	0.01	0.05	61.86
Births by health personnel	-0.14***	0.06	80.92
Children Fully Immunized	-0.04	0.03	61.70
Children suffered from Diarrhoea in the last 2 weeks	0.04	0.04	27.51
Children with Diarrhoea taken to health facility	-0.03	0.04	34.01
Pregnant women who are anaemic	0.02*	0.03	42.15
<b>R - Square</b>	<b>0.350</b>		

*Source: Calculated from NFHS – 4, 2015 -16; \*  $p \leq 0.1$ , \*\*  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$*

relationship of higher schooling with IMR is noticed in India. Mothers with higher education are found to better infant health as they are more likely to marry late, have a higher age at birth, access maternal healthcare services, have adequate child healthcare knowledge and therefore can take appropriate care of their child (Miah, 1993). The various preventive care meted out to the mother during her pregnancy is termed as antenatal care or prenatal care. Antenatal care is found to be effective in reducing not only infant mortality but also maternal mortality as well as morbidity (UNICEF, 2016; Panja et al., 2012). Though an inverse relationship at 95 percent level of significance was noticed with IMR, the mean for full ANC was found to be very low in India with less than one-fourth of the women availing full ANC which is alarming taking into account the high IMR in the country. While post natal care is also an important determinant of infant mortality as most of the deaths occur within the first few days of birth, no significant relationship was noticed with IMR. Delivery care is another important intervention which aims to reduce neonatal and maternal mortality and improve health. Emergency obstetric care often reduces the risk of

mortality by birth complications which emerges as one of the major contributors to infant and maternal mortality. Therefore, births by skilled health professional was suggested as an important intervention by the World Health Organization to reduce mortality as well as morbidity (<http://www.who.int/whosis/whostat2006BirthsAttendedBySkilledHealthPersonnel.pdf>). A highly significant inverse relationship was noticed as with increase in births assisted by trained health professional there is a reduction in infant mortality.

Among the variables for illness control and nutrient deficiency, only anaemic pregnant women revealed an inverse relationship statistically significant at 90 percent level of significance. Around 53 percent of pregnant women were found to be anaemic in India according to the National Family Health Survey, 2015-16 (IIPS and ICF, 2017). Iron deficiency among pregnant women is often related to high risk of pre-term births, post-partum haemorrhage and low birth weight among babies. Therefore high percentage of anaemic women increases the risk of higher infant mortality rate and malnutrition. India records some of the highest percentages of child malnutrition in the world. A World Bank study states “48 percent of children in India under the age of five are stunted, 43 percent are underweight, and more than one in four infants are born with a low birth weight” (Maitra and Ray, 2013). Malnourished children are at an increased risk of mortality by infectious diseases. While immunization and availing health care when suffering from diarrhoea are important preventive measures to reduce infant mortality, no significant association was noticed among the two in the regression.

### 3.4.2 Geographically Weighted Regression Results

While the global regression results explained around 36 percent of the variation in IMR in the country, it assumes all the predictors to be constant across the region which may not be correct. To understand the spatial variability of the predictors, therefore, a geographical weighted regression was carried out which studies whether the relationship between the dependent and the independent variables vary by region (Brundson et al., 1996). Other than providing the local regression coefficients, the analysis also provides the goodness-fit- measure of the model (Table 3.2).  $R^2$  is often considered as an important goodness-of-fit for the global models and values closer to



1 indicates a better fit of the model. However, the value of  $R^2$  is influenced by the number of variables and therefore Adjusted  $R^2$  is preferred as it makes some adjustment for the number of variables. Another important goodness-of-fit is the Akaike Information Criterion or the AIC, which unlike the  $R^2$  is a relative measure and is used to compare different models having the same predictor variables. Models with lower values of AIC are preferred as they have better predictive capacity (Charlton and Fotheringham, 2009).

**Table 3.2 Model Fitness Comparison**

<b>Fitness Parameters</b>	<b>OLS</b>	<b>GWR</b>
AIC	5012.7	4876.4
$R^2$	0.362	0.664
Adjusted $R^2$	0.350	0.558

*Source: Calculated from NFHS – 4, 2015 - 16*

According to the AIC values, the GWR model with a lower value fits better than the OLS or global regression model. Further, the  $R^2$  values also reveal greater predictive capacity of the GWR model. While the overall relationship between the dependent and independent variables are given by the OLS model, the GWR model investigates it into greater details. Compared to 36 percent of variation explained by the OLS model, the GWR model explains a much higher percentage - 56 percent of the variation in the infant mortality rate in the country.

The geographically weighted regression's 5 parameter summary and geographical variability of the predictors are given in table 3.3. The results reveal that the association between many of the independent variables and infant mortality are stationary across space, i.e., their relationship with IMR does not vary across the geographical region. Maternal factors like mothers availing full antenatal care and postnatal care, illness control like children having diarrhea and visiting health professional when having diarrhea and the nutritional factors like anaemic pregnant women are found to be stationary in the model. All the other variables are found to be non-stationary.

**Table 3.3 GWR 5-number parameter summary and Geographical Variability Test**

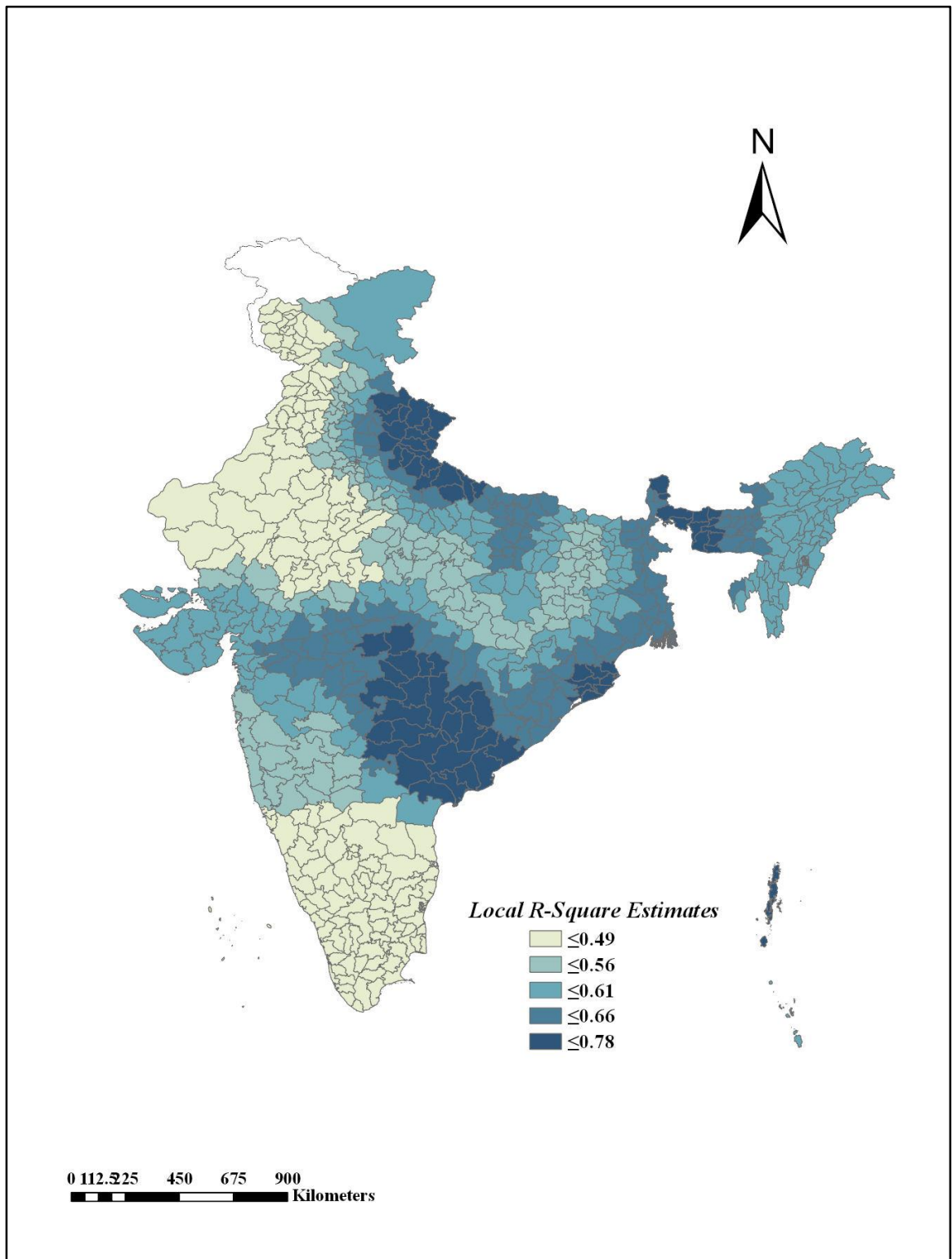
	<b>Min</b>	<b>Lower Quartile</b>	<b>Median</b>	<b>Upper Quartile</b>	<b>Max</b>	<b>Geographical Variability</b>
Intercept	42.08	80.99	95.95	105.60	133.71	Non-Stationary
Improved Sanitation facility	-0.67	-0.24	-0.14	-0.09	0.18	Non-Stationary
Use of clean fuel for cooking	-0.64	-0.22	-0.07	0.03	0.36	Non-Stationary
Women with 10 or more years schooling	-1.06	-0.46	-0.20	-0.04	0.58	Non-Stationary
Mothers receiving full ANC	-0.40	-0.11	-0.01	0.12	0.42	Stationary
Mothers receiving PNC	-0.42	-0.22	-0.04	0.10	0.39	Stationary
Births by health personnel	-0.86	-0.27	-0.01	0.15	0.38	Non-Stationary
Children Fully Immunized	-0.33	-0.20	-0.13	0.09	0.41	Non-Stationary
Children having Diarrhoea in the last two weeks	-0.33	-0.07	0.01	0.20	0.53	Stationary
Children with Diarrhoea taken to health facility	-0.46	-0.14	-0.04	0.03	0.39	Stationary
Pregnant women who are anaemic	-0.46	-0.04	0.01	0.06	0.20	Stationary

*Source: Calculated from NFHS – 4, 2015 - 16*

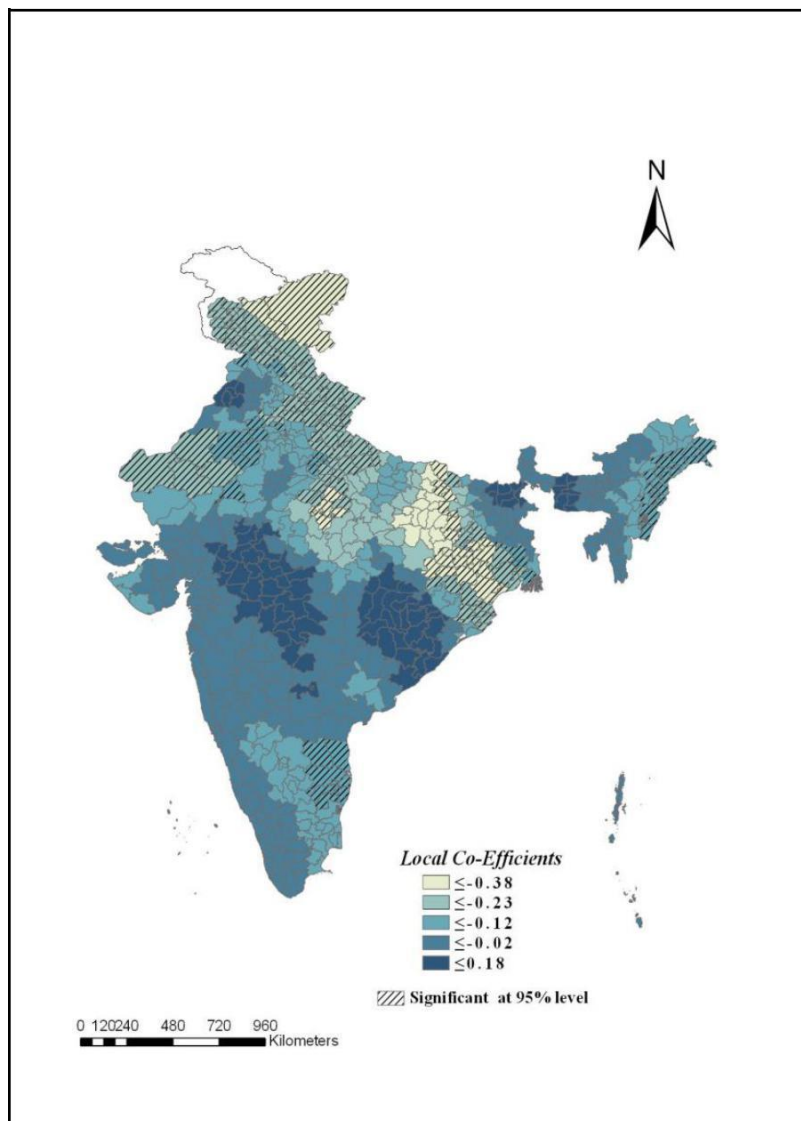
The estimated  $R^2$  values displayed in Map 3.2 reveals that the total variance explained by the GWR model ranges from 49 percent to 78 percent. Compared to the OLS results which explained 35 percent, the GWR model explains more than 50 percent of the variation in most parts of India. The map displays that barring the north-western and southern part of the country, where the variance explained is little less than 50 percent, the model fits well in most parts of the country, especially in the newly formed state of Telangana, coastal Andhra Pradesh, western Maharashtra, Odisha, Madhya Pradesh, Chattisgarh, West Bengal, Assam, all the north-eastern states, eastern and western Bihar, northern Uttar Pradesh, Haryana, Uttarakhand and Himachal Pradesh. In all these states more than 60 percent of the variance in IMR is explained by the model. However, in the southern states of Kerala, Tamil Nadu, Karnataka and Southern Andhra Pradesh and the north-western states of Rajasthan, Punjab, parts of Haryana and Jammu and Kashmir, the model explains less than 50 percent of the variance. These states may require additional predictors in the model to determine the variation of IMR in the region, when more exploratory data will be available.

Map 3.3 exhibits the spatially varying association between IMR and improved sanitation facilities. Consistent with the hypothesis, that improved sanitation leads to lower IMR, the eastern states of Bihar, Jharkhand, northern states of Uttar Pradesh, Himachal Pradesh, Jammu and Kashmir, parts of Rajasthan, north-eastern states of Nagaland, Manipur and Mizoram and southern part of Andhra Pradesh reveals a decrease in the IMR with increase in improved sanitation facilities. With 1 percent increase in improved sanitation, probability of 38 percent decrease in IMR was noticed in the tribal belts of Jharkhand and hilly areas of Jammu and Kashmir. Northern parts of Uttar Pradesh, southern Rajasthan, Himachal Pradesh, south-eastern West Bengal and north-eastern states registered a chance of 23 percent decrease in IMR with an increase in 1 percent of improved sanitation respectively. Access to improved water sources and sanitation facilities has always been a priority in India. The NFHS – 4 report states about 40 percent of the households in India do not have any sanitation facilities and therefore practice open defecation (IIPS and ICF, 2017). Open defecation is an age old problem in India, and it leads to contamination of water sources thereby leading to diarrhea – third largest cause of child deaths in India

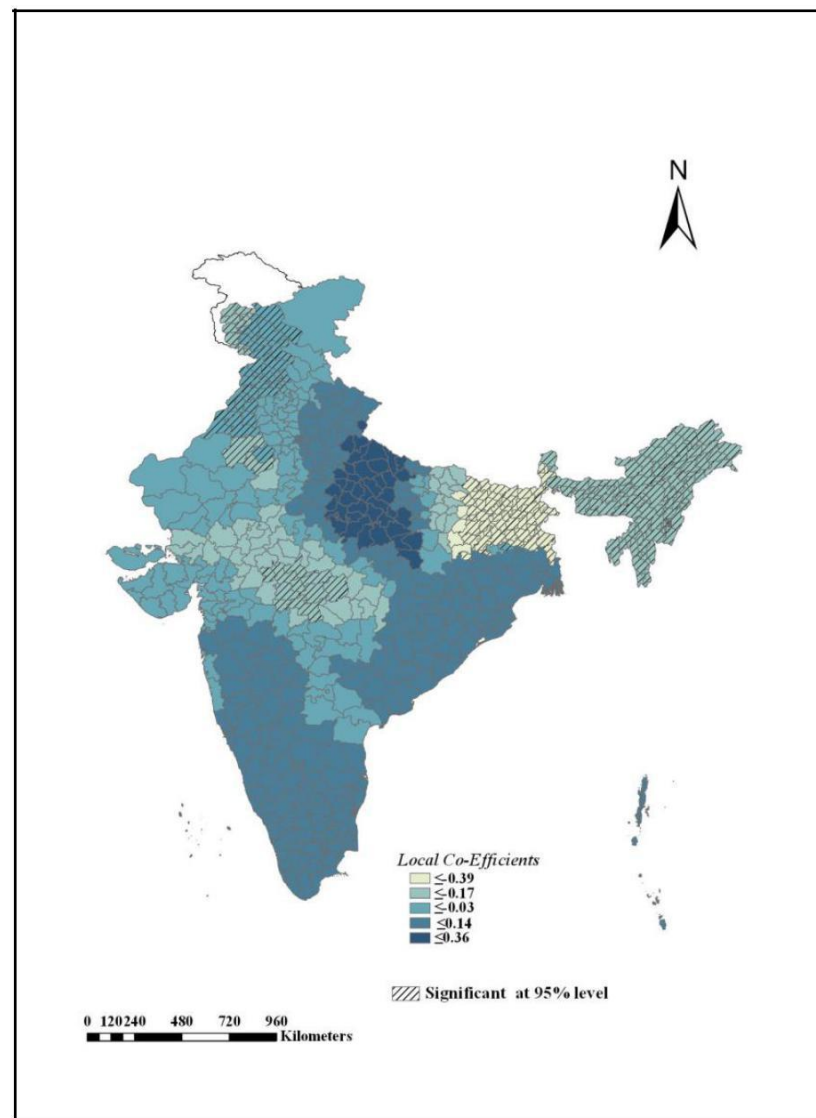
Map 3.2 Estimated Local  $R^2$  of Infant Mortality Rate, India, 2011



**Map 3.3 GWR estimates for Improved Sanitation Facilities**



**Map 3.4 GWR estimates for Usage of Clean Fuel**

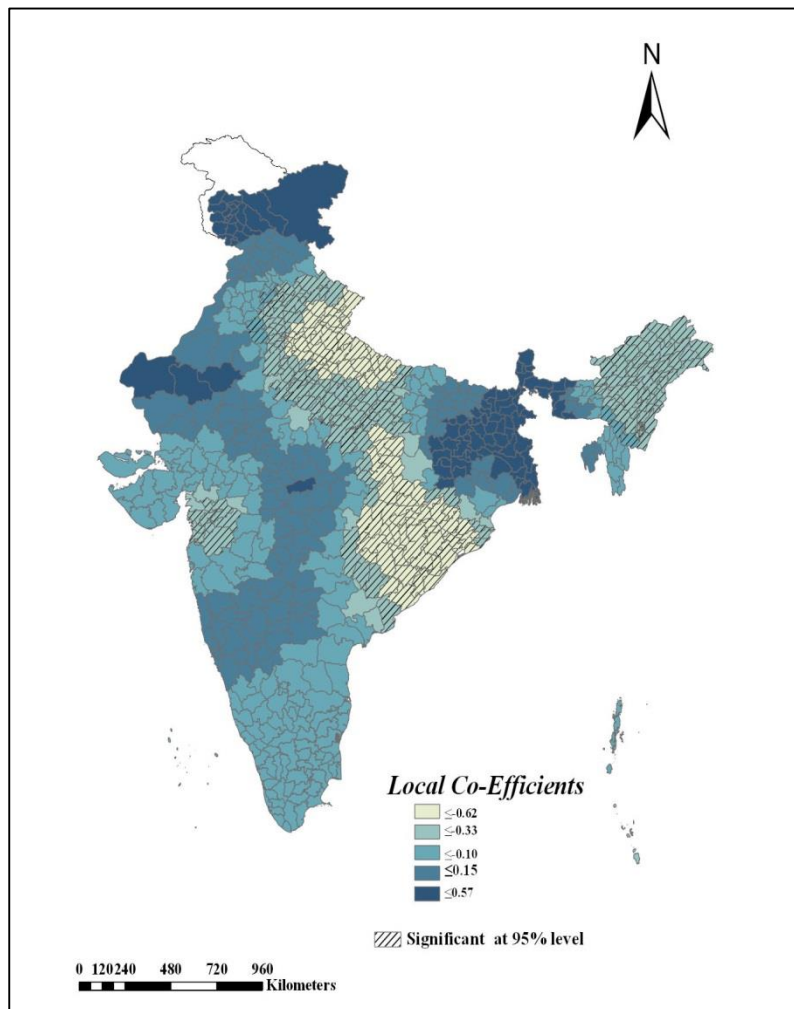


minarayan and Jayalakshmy, 2015). A study by Bill and Melinda Gates Foundation in Rajasthan, West Bengal, Karnataka, Uttar Pradesh and Madhya Pradesh reported that cases of diarrhea among children in the non-open defecation free area were 46 percent higher than the open defecation free area (Times of India, Oct 2017). These are also the states which reported a decrease in the IMR with an increase of improved sanitation.

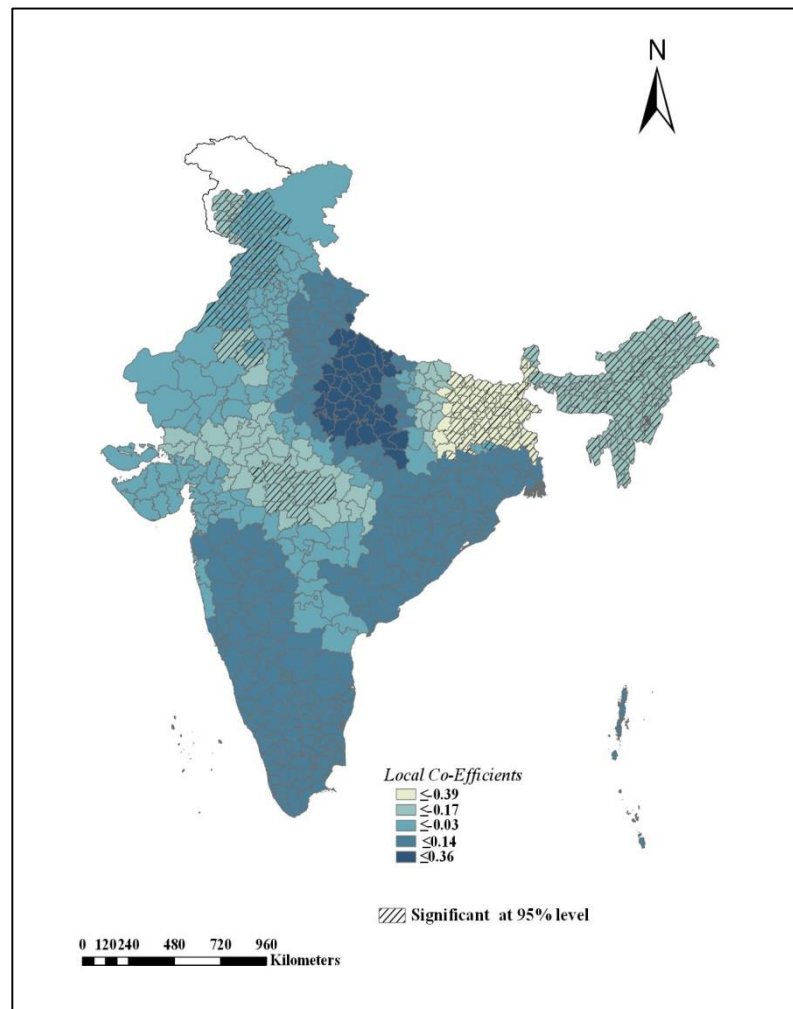
While results of the global regression did not reveal any significant association between use of clean fuel and IMR, the GWR estimates show a significant reduction in IMR with 1 percent increase in the use of clean fuel for cooking. While northern Bihar and West Bengal shows likelihood for 39 percent decrease in the IMR with 1 percent increase in usage of clean fuel, the entire north-eastern states and Assam, northern western part of Punjab, south western part of Jammu and Kashmir and the central part of Madhya Pradesh reports, chance of 17 percent decrease in IMR with 1 percent increase in usage of clean fuel. Household pollution due to low combustion of fossil fuels increases the risk of pneumonia, which is the largest cause of death among under-five children. Naz et al. (2017), in their study, reported strong associations between mortality and cooking fuel in Pakistan. Children under the age of five who are breastfed and the household uses coal and wood for cooking are found to be more susceptible to respiratory ailments. Large parts of Madhya Pradesh and northeastern states are found to be tribal dominated who rely more on forest resources like wood for cooking. The north western part of the country has large agricultural fields, and crop residue are often used as fuel which further aggravates the air pollution. Therefore, usage of clean fuels in these regions will reduce the IMR.

The benefits of women literacy are multifaceted. Higher years of schooling are associated with higher age at marriage, thereby higher age at birth which is beneficial for both the mother and the child. A land of traditional values, adolescent marriages followed by adolescent births are rampant in India and higher years of schooling proves to be an antidote to the evil practice. Further, while the women literacy rate stood at 65.46 percent in 2011, the distribution across the states was found to be quite uneven with the southern states reporting a higher percentage compared to the northern states (RGI, 2011). As stated before, women's autonomy is also found to have a profound influence on the health of the children and often education is the key to autonomy. Higher educated women are more likely to take decisions on their own

**Map 3.5 GWR estimates for Women having Schooling for more than 10 years**



**Map 3.6 GWR estimates for Births by Health Professionals**



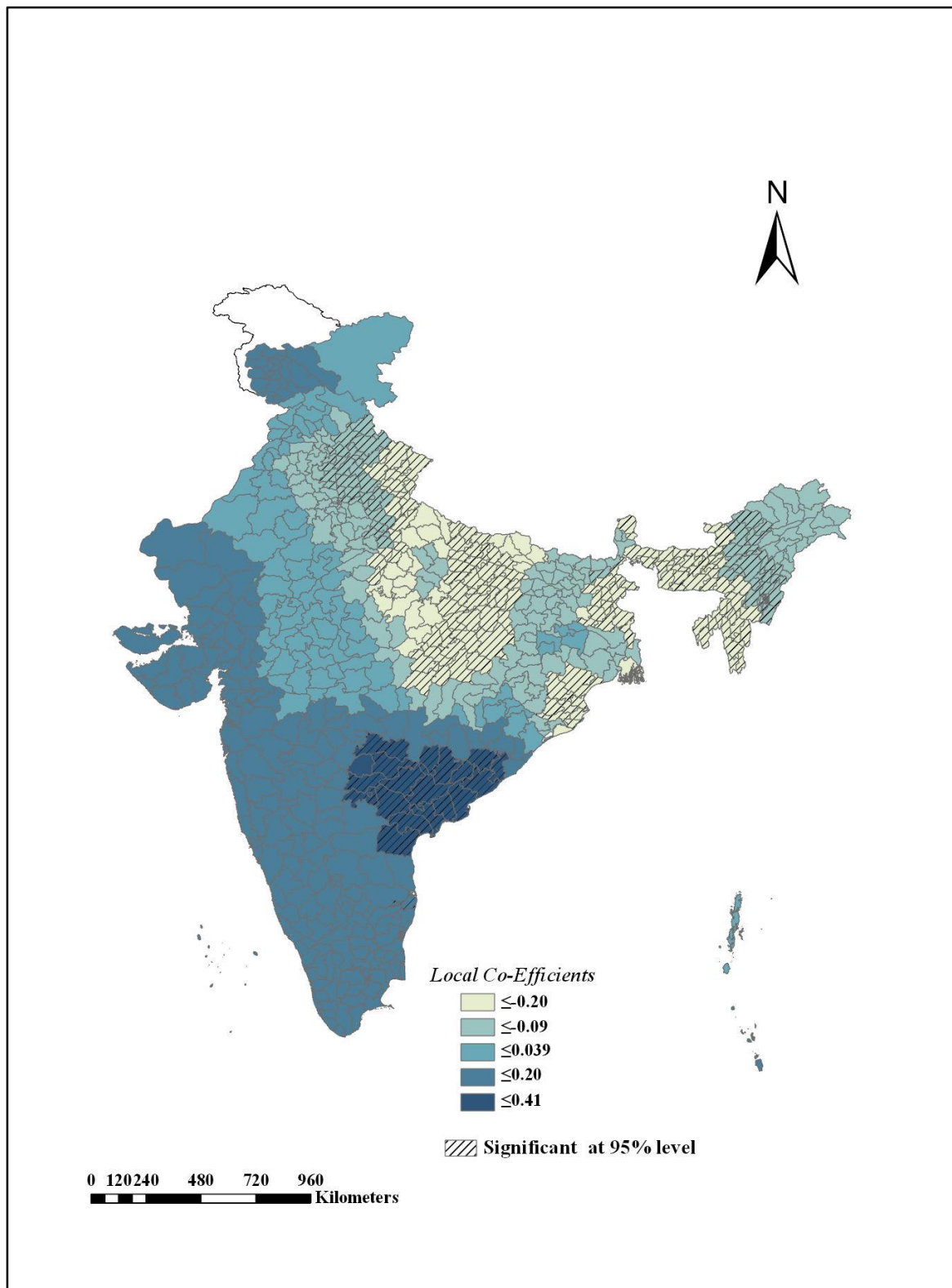
regarding the availing healthcare for both herself and the child. Also, higher educated mothers are more aware and have child health care knowledge (Bhattacharya and Haldar, 2014; Agnihotri, 2001; Shetty and Shetty, 2014; Jeejebhoy, 1995). Map 3.6 displays the significant spatial association between women having more than ten years of schooling and IMR. From the map, it can be observed, that in the low female literacy state of northern Uttar Pradesh, Himachal Pradesh, parts of Chhattisgarh, Jharkhand and Odisha, 1 percent increase in women schooling leads to chance of 62 percent decrease in infant mortality. The north-eastern states along with southern Uttar Pradesh and northern Madhya Pradesh too reveals a chance of 33 percent decline in IMR with 1 percent change in women schooling. The western part of Maharashtra and southern part of Gujarat also shows the probability of decline of 10 percent with 1 percent change in women schooling which is ironic given the high percentage of women literacy in the region.

The fourth round of the National Family Health Survey, 2015-16 reported around 40 percent increase in the births by health professionals within a span of 10 years in India. From 47 percent in 2005-06, it increased to 81 percent in 2015-16 (IIPS and ICF, 2017). Most of the neonatal deaths which occur within 24 hours of birth are due to asphyxia, birth complications and infections (WHO, 2011). Skilled birth assistance or births by health professional reduces the risk of both maternal and child mortality by post-partum haemorrhage, obstructed labour and other birth complications (WHO, 2008). Map 3.7 reveals the significant negative association between IMR and births by health professionals on the eastern coast of the country. It is found that with 1 percent increase in births by health professionals there is a probability of 41 percent decrease in the IMR in western Assam, the whole of West Bengal except the south-western districts, coastal Odisha, Andhra Pradesh, and Telangana. Few districts in north-eastern Rajasthan and western Uttar Pradesh also reported a strong negative association between the dependent and the independent variable.

Immunization is an important intervention for reducing child deaths from vaccine-preventable diseases like polio, measles, diphtheria, tetanus, tuberculosis which have been causing havoc in the past by claiming a large number of lives (Andre et al., 2007). Accounting for more than 20 percent of global child mortality, India organizes nine million immunization sessions each year targeting these infants and around 30 million pregnant women for routine immunization (UNICEF, 2016). The Universal



Map 3.7 GWR estimates for Full Immunization



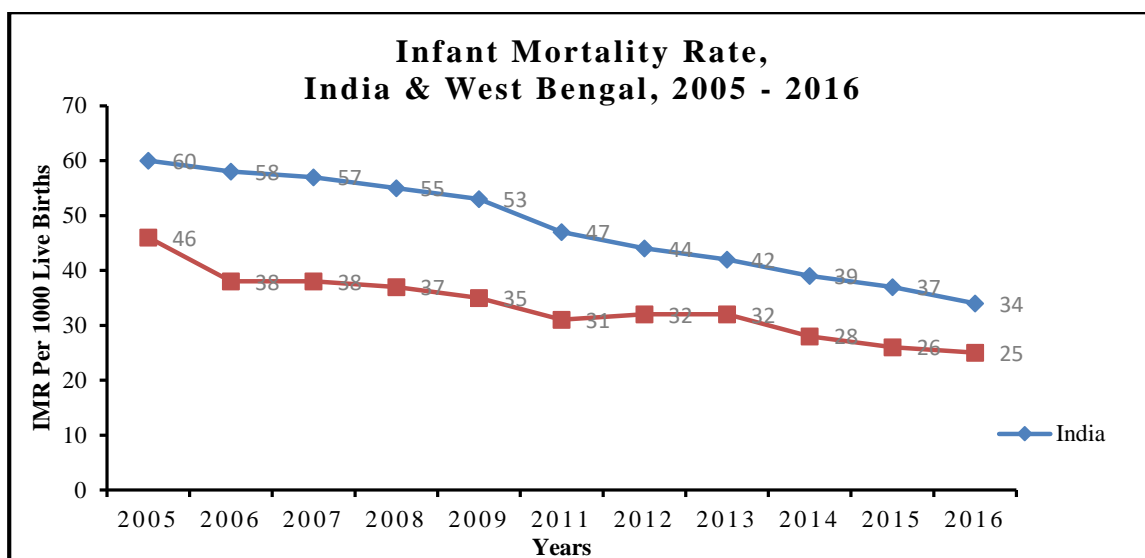
Immunization Programme was launched in 1985 in India to provide vaccinations, and since then it has been an integral part of the child health care programmes of the Government. Map 3.8 displays a significant negative spatial association between the predictor variable of immunization and IMR across the country. Uttar Pradesh, West Bengal, Assam, the north-eastern states of Meghalaya, Mizoram, Manipur, Odisha, Himachal Pradesh, all reveals a chance of 20 percent decrease in the IMR with 1 percent increase in immunization. The newly formed state of Telangana however, exhibits a positive association with immunization which needs further research.

Therefore, while the OLS regression results provide the significant determinants, the GWR results enabled to identify the location-specific factors affecting infant mortality in India. One striking feature of the result is that most of the non-stationary co-variates were found to have a significant association in the northern states of the country. The model does not predict well the regional variation of the association between the dependent and independent variables in the southern states. The north-south demographic, as well as socio-economic divide in India, has been discussed before. The southern states being at an advanced stage of demographic transition with substantially low IMR along with high socio-economic development, the factors playing an important role in affecting infant mortality needs more indepth analysis by incorporating more refined variables. However, the present model fit well for most part of the country where more than 70 percent of the population live.

### **3.5 A comparison of the IMR, India & West Bengal, 2005 - 2016**

West Bengal is the only eastern state to consistently record lower levels of infant mortality rate than the national average, for the past few decades. In the last half of the 20<sup>th</sup> century, the state witnessed a rapid decline in the mortality, most of which could be attributed to the decline in the infant and child mortality rate. Increase in immunization rates, anti-tetanus vaccination of mothers, expansion of maternal and child health care services and efficient service delivery by the health workers are listed as some of the major factors for the decline in the IMR (Amin and Basu, 2004).

Fig 3.2 Trends in IMR, West Bengal &amp; India, 2005 – 2016



Source: SRS Bulletins, Office of the Registrar General, 2005 – 2016

While India recorded a slow and steady decline since 2005, the reduction in infant mortality rate has been uneven in the state. After a sharp decline in the IMR in 2006, the state registered a plateau for next two year. Both the national average and the state registered a moderate decline in 2006, which could be attributed to the National Rural Health Mission launched in 2005. The massive change in the rural healthcare system brought in a plethora of new services for even the poorest section of the people. The ASHA – Accredited Social Health Activist brought gigantic changes in the healthcare scenario of the country by providing door to door medical services to people. Studies have recorded people giving credit to their services in bringing down the mortality rate by creating more awareness among people (Amin and Basu, 2014).

Barring a slight increase in the year 2012, the IMR in the state has declined continuously and stand at 25 - 9 points less than the national average in 2016. Time and again maternal education has been cited as a major determinant in bringing down the infant mortality (Maitra and Ray, 2013; Jain, 2013; Gokhale et al., 2002). Bengal has always witnessed high female literacy compared to the eastern states and many other states in the country. The 2011 census records 70.5 percent of female literacy rate in the state, higher than the national average of 65.46 percent (ORGI, 2011). Further, the state is in the phase of later demographic transition, recording a TFR of below the replacement level fertility of 2.1. The positive relationship between fertility

and mortality has been long recognized, with low fertility accounting in lower infant mortality. The same scenario exists in West Bengal too (Barua, 1987).

Maternal health care services like ANC, anti-tetanus injection is another important factor affecting infant mortality. Mothers availing ANC were found to have low infant mortality than mothers who do not. With the availability of Janani Suraksha Yojana from 2005, the state has recorded an increase in the percentage of women availing antenatal care and opting for institutional delivery which, further attributed in lowering the mortality rate in the state (Panja et al., 2012). However, the rate of decline has been slow in the state compared to the national average, at many points registering a plateau. While the overall IMR for India declined by 40 percent from 2005 to 2016, the state records a percentage decline of only 28.3 percent. Also, though the state average is low, some of the northern districts of the state like West Dinajpur, East Dinajpur, and Malda has been notorious for its high IMR in the last few decades. The high IMR in these districts increases the overall average of the state. This calls for a detailed study of the situation of infant health in the state to ascertain the reasons behind the regional variation and formulate policies and programmes accordingly.

### **3.6 Spatial and Temporal Variation of IMR in West Bengal, 1981 - 2011**

Globally, around two-fifths of the children dies within the first 28 days of their life. Rise in neonatal deaths in the recent years has been one of the major attributing causes to rising infant deaths (WHO, 2017). From fig 3.1, it can be inferred that though the IMR has gone down in the majority of the states in India, some of the high recording states have attributed to the rise in the overall average of the country. West Bengal has recorded a continuous low IMR than the Indian average. However, in the recent years, the state has registered either a stagnancy or decline in the rate of decrease of IMR. Long stable political regime in West Bengal has earned the appreciation for several pro-poor policies and land reforms, but not much has been discussed about the health conditions in the state (Maitra and Ray). Therefore, with the change of regime, there is a need to look into the scenario of health conditions in the state that has evolved with time and the factors that have contributed to the reduction of IMR in the state.

To assess the regional variation of IMR in the state, district level indirect estimation of IMR has been carried out using census data of the corresponding years. Keeping 1981 as the base year, the index value of all the other years have been kept constant. The year 1981 pictured an alarming situation of infant health in West Bengal, the state average being at 95 (Fig. 3.3). The highest IMR was recorded by the northern district of Malda, 128 per 1000 live births, way too high than the state average. Half of the then sixteen districts - eight districts registered an IMR higher than the state average. The northern part of the state comprising of Malda (128), Koch Bihar (127) Jalpaiguri (127) and West Dinajpur (116) recorded the highest mortality rates, followed by Murshidabad (104), Medinipur (104), Birbhum (103) and Nadia (99). The hilly district of Darjeeling was the only northern district to comparatively fare well with an IMR of 89. The state capital, Kolkata recorded the lowest IMR of 57 followed by Howrah (56) and Hooghly (62). All the other districts, North 24 Parganas (87), South 24 Parganas (87), Bankura (83), Barddhaman (79) and Purulia (75) registered a moderate an IMR of 76 - 90.

In 1991, the state witnessed a stark decline in the IMR with 62 per 1000 live births, registering a decline of more than 30 points than the previous decade (Fig.3.4). Few districts also shadowed the same pattern. The highest decline was noticed in the district of Jalpaiguri (127 to 79), followed by Malda (128 to 96) and Darjeeling (89 to 58). However, the number of districts registering an IMR more than the state average increased to 11, with North 24 Parganas (77), South 24 Parganas (76) and Birbhum (87) enlisting in the group. The highest IMR was recorded by Koch Bihar (98) followed by Malda (96), West Dinajpur (89), Birbhum (87) and Nadia (80). The other districts recording higher than state average of 62 are Jalpaiguri (79), North 24 Parganas (77), Murshidabad (77), South 24 Parganas (76) and Medinipur (73). Kolkata recorded lowest with 45, followed by Hooghly (47), Purulia (55), Darjeeling (58), Barddhaman (61) and Bankura (63).

Surprisingly, a rise in the IMR was noted in 2001, with the state recording 68 deaths per 1000 live births in 2001 from 62 in 1991 (Fig 3.5). The rate of decline of IMR in the districts was also low, with some of the districts recording an increase. An important geopolitical event in the state that took place in the decade was the addition of another district with the bifurcation of West Dinajpur into Dakshin Dinajpur and Uttar Dinajpur. The same pattern as of 1991 was noticed in 2001 too. The highest

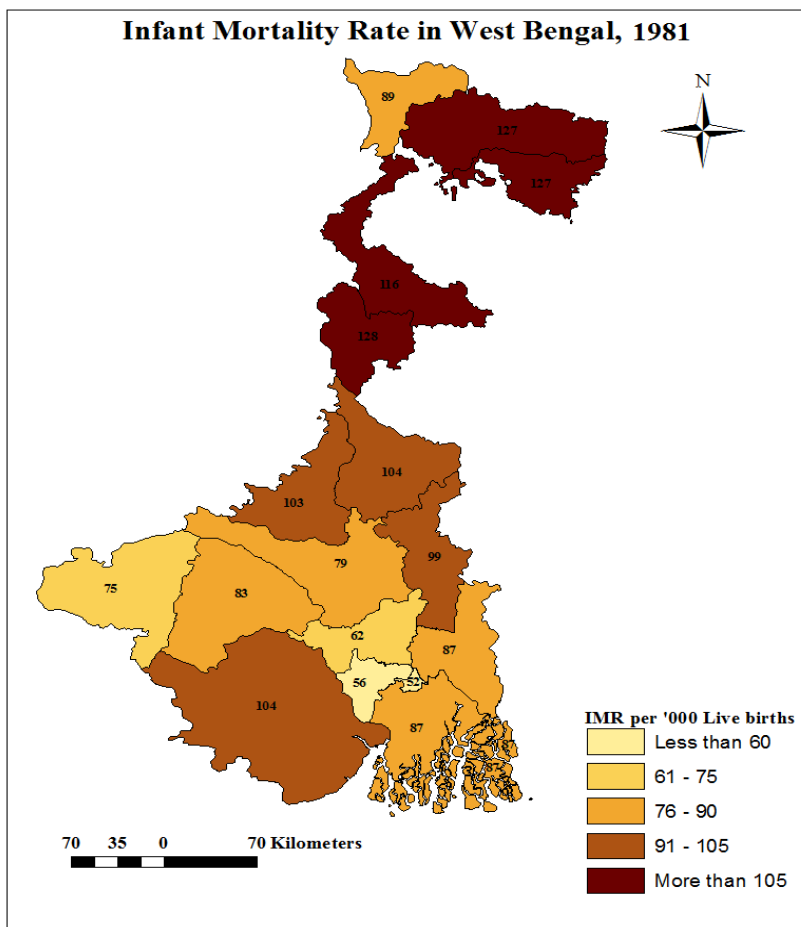
IMR was recorded in Koch Bihar (87), followed by Malda (86), Dakshin Dinajpur (82), Uttar Dinajpur (82), Jalpaiguri (82), Murshidabad (78), Birbhum (71) and Nadia (70). The latest addition to this group was Darjeeling, which in the last two decades recorded IMR below 60, recorded an IMR of 69 in 2001. An increase in IMR was also noticed in the southern districts of the state, with Kolkata reporting more than double the IMR than of 1991 (28 to 65). This was followed by Howrah (45 to 57), Hooghly (47 to 58) and Purulia (55 to 56). Barring Purulia, interestingly, all the four districts which witnessed an increase recorded the lowest IMR in the preceding decades. IMR reduced in South 24 Parganas recorded an IMR 66 respectively. Bardhaman recorded the same as 1991 (66) while Bankura registered a decline to 54 from 63.

The temporal pattern of IMR in West Bengal has been quite uneven, with several ups and downs. The state recorded the lowest ever IMR in the last decades, 46 in 2011, a reduction of more than 20 points from 2001 (Fig. 3.6). The decade also witnessed the division of Medinipur into Paschim Medinipur and Purba Medinipur thereby adding another district in the state. All the districts registered an IMR below 60, with the majority of them, following the state pattern recorded a decline of more than 20 points. Ten districts recorded an IMR above the state average with the highest IMR in Malda (58), followed by Dakshin Dinajpur (56), Uttar Dinajpur (52), Murshidabad (53), Kolkata (54), Jalpaiguri (49), Bardhaman (49), Birbhum (49), South 24 Parganas (48), North 24 Parganas (44) and Koch Bihar (47). The lowest was recorded by Bankura (37), Hooghly (38) and Paschim Medinipur (40).

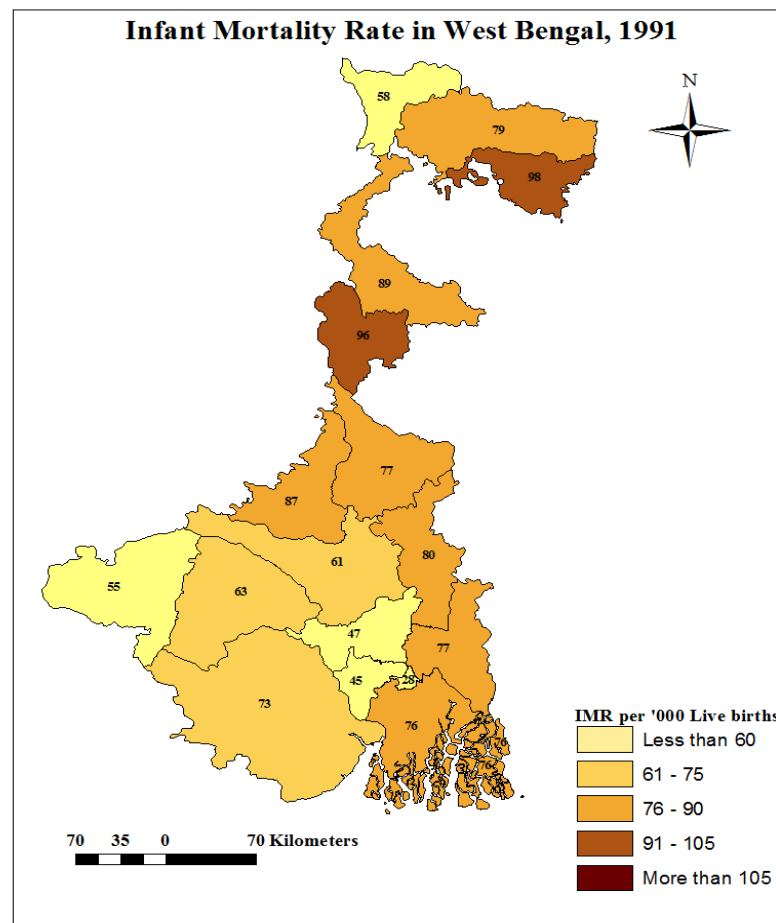
In a span of 30 years, West Bengal reduced its infant mortality rate by more than fifty percent. The districts also registered a varying percentage of decline. The highest decline was noticed in the district of Koch Bihar (63%) followed by Jalpaiguri (61%), Nadia (58%), Dakshin Dinajpur (55%), Bankura (55%) and Malda (54%). Most of these districts are notorious for their high IMR and in spite of a reduction of more than half they continue to register some of the highest IMRs in the state.

In the districts with consistently low IMR, the rate of decline was not very high. In fact, the capital Kolkata recorded an increase in the IMR from 1981 to 2011. Though the IMR in the district fell in 1991, thereafter it has recorded a substantial increase. Kolkata's neighbouring district, Howrah also recorded a low rate of decline in its IMR. This comes as a shocking revelation as it contradicts the popular theory that

Map 3.8 Indirect Estimates of Infant Mortality Rate, 1981



Map 3.9 Indirect Estimates of Infant Mortality Rate, 1991



urban places are more likely to have better child health status due to access to better healthcare facilities. Kolkata is the most urbanized district of West Bengal and it has been the hub of economic activities in the state. The district boasts of some of the finest health infrastructures in the country, yet the IMR was found to be rising in the city. Rise in the neonatal deaths has been cited as the major reason for this ([http://shodhganga.inflibnet.ac.in/bitstream/10603/163848/12/12\\_chapter%204.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/163848/12/12_chapter%204.pdf)).

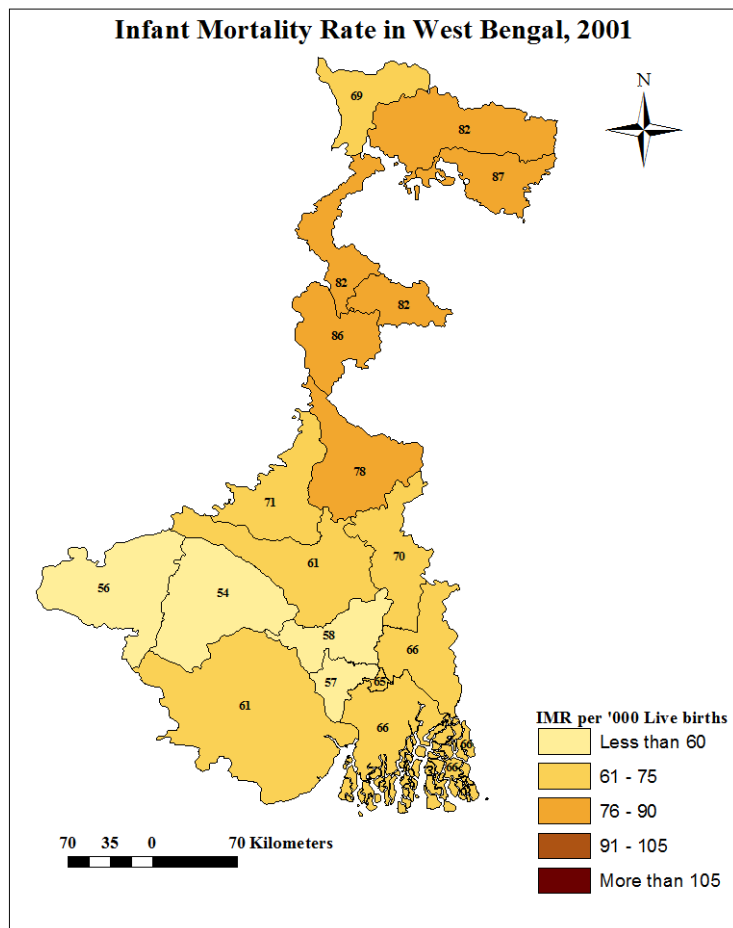
Due to its better neonatal care units compared to other districts, people from the neighbouring states visit the hospitals in large numbers. However, due high inflow of patients the hospitals could not function their services properly accounting for rise in the number of deaths (The New York Times, 2014). The district recorded the lowest IMR in 1991. Post liberalisation, due to the expansion of economic activities, the transport network has also developed. This lead more people to move to the city to avail the better healthcare facilities leading to huge patient load on the hospitals. Also, by the time the child is brought to the hospital often it is too late.

An important revelation from the maps is the stark north-south divide that can be discerned in West Bengal. Most of the districts in the north have always registered a high IMR, compared to its southern counterparts. This can be attributed to the fact that the southern districts of West Bengal are more urbanized compared to the northern districts. Urbanization has always been accounted as synonymous with high level of socio-economic development, access to better healthcare facilities, good infrastructural facilities related to housing, education and also better sanitation and hygiene. All these factors are interlinked with reduced morbidity and better health (Klauuw and Wang). With the state registering only 31.9 percent of urban population, the urbanisation is quite concentrated in and around the capital, Kolkata. This can be verified by the fact that only the neighbouring districts of Haora and North 24 Parganas register an urban population of more than 50 percent followed by Barddhaman, Hugli and Nadia. Among the hilly districts, Darjeeling records the highest percentage of urban population followed by Jalpaiguri. All the other districts record low urbanization.

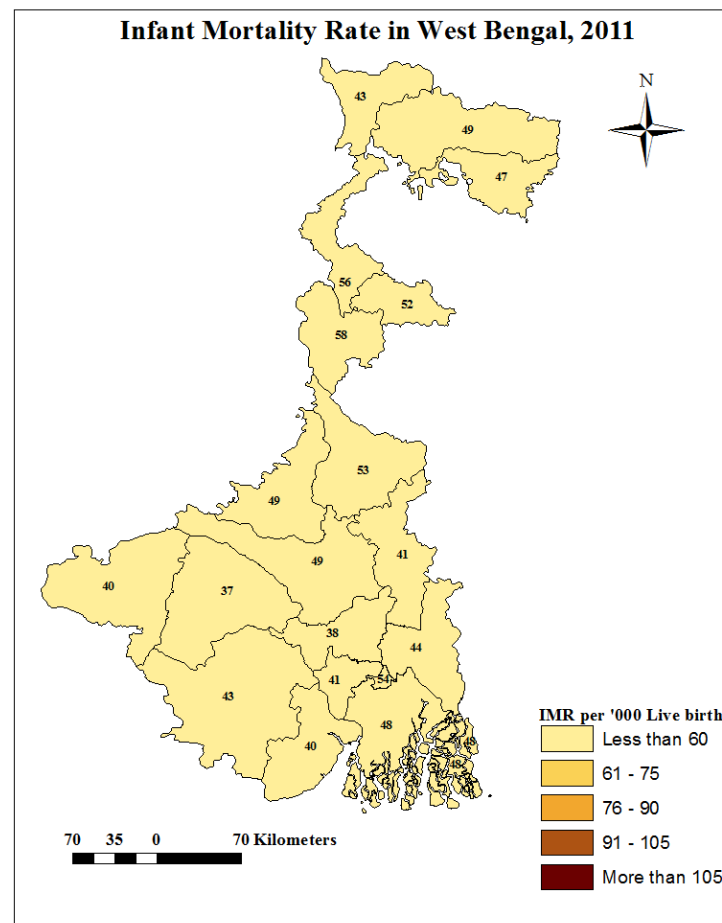
Urbanization results in better employment opportunities resulting in high income of the people. However, development cannot be always measured by income and quality of life also needs to be taken into account. A study by Bhattacharya (1998), noticed existence of a strong association between urbanization, industrialization and human



3.10 Indirect Estimates of Infant Mortality Rate, 2001



3.11 Indirect Estimates of Infant Mortality Rate, 2011



development in West Bengal. Urbanized places with more people in the tertiary and secondary sector was found to have higher human development than districts engaged more in primary sector. The pattern of distribution of IMR was followed in human development too, and in 1981, the districts of Malda, Koch Behar and West Dinajpur recorded the lowest HDI while Kolkata, Howrah and Hooghly ranked high. The same pattern was noticed in 1991 too, with Malda recording the worst HDI. The high IMR in these districts is reflected in the HDI. However, since 2001, the highly urbanized Kolkata has also been recording high IMR due to high influx of patients from the other districts.

As discussed in chapter 1, the northern districts record a high crude birth rate (CBR) and Total Fertility Rate (TFR) than the others. Malda, which constantly records the highest IMR, has a TFR of 2.9, much higher than the state average (Table 1.3). The State TFR has further reduced over the years. In 2013, the state registered a TFR of 1.6, with urban areas at 1.2 and rural areas at 1.8, all of which are far below the replacement level of 2.1 (Niti Aayog). A low, TFR is often associated with a decline in the IMR, as the fertility of women and mortality of children are found to be positively correlated. Studies have shown that prenatal and infant deaths are higher among women who had a large number of pregnancies (Barua, 1987). Less number of children allows the mothers to take care of their child and also reduce the maternal complications that arise from multiple births thereby reducing the number of infant deaths.

Several studies have tried to document the relationship between various socio-economic and developmental factors with infant mortality. An important socio-economic determinant in that case is mean age at marriage of the mother and age at which they give birth. It is a well-known fact, that adolescent pregnancy, i.e. births before the age of 19, is harmful for both the mother and the child. Infant deaths are found to be high among low age mothers. An early marriage exposes the girl to a longer span of reproductive age and also early childbirth which is detrimental for the health of both mother and child (Miah, 1993). An adolescent is not physically well developed to give birth and therefore leads to low birth weight of babies which in turn is one of the major factors of infant mortality. From the table 3.4 we can infer that over the years both the mean age at marriage and age at childbirth have increased from DLHS -3 to DLHS – 4. All the districts registered mean age at marriage above

the legal age of 18 with the lowest of 18.3 in Murshidabad to highest in Kolkata (23.4). Except for Bardhaman, all the districts recorded an increase in the mean age at marriage. The highest increase was noticed in Kolkata followed by Malda, Purulia and Koch Bihar. Along with the increase in mean age at marriage, the percentage of births before the age of 19 or at adolescence has also declined over the years. DLHS - 4 records the lowest percentage of adolescent births in Kolkata, followed by Jalpaiguri and Uttar Dinajpur. The highest percentage decrease of adolescent births from DLHS - 3 to DLHS - 4 is noticed in the district of Paschim Medinipur followed by Koch Bihar, Malda and Murshidabad. Though these districts have registered a high IMR all throughout since 1981, they have also shown a considerable decline in their IMR in 2011.

**Table 3.4 Mean age at Marriage and Adolescent Births, West Bengal**

Districts	Mean Age at marriage		Births before 19	
	DLHS - 4	DLHS - 3	DLHS - 4	DLHS - 3
<b>Bankura</b>	18.5	17.9	12.8	17.6
<b>Bardhaman</b>	18.7	19.1	14	19.2
<b>Birbhum</b>	18.5	17.4	12.8	25.3
<b>Dakshin Dinajpur</b>	19.4	18.1	6.7	24
<b>Darjeeling</b>	21.5	20.7	6.5	8
<b>Haora</b>	20.3	19.5	5.4	11.4
<b>Hugli</b>	19.7	19.4	8.4	14.3
<b>Jalpaiguri</b>	21.4	20.1	3.9	14.9
<b>Koch Bihar</b>	19.9	18.4	7.6	23
<b>Kolkata</b>	23.4	21.2	3.6	6.1
<b>Malda</b>	19.2	17.3	7	19.4
<b>Murshidabad</b>	18.3	17	11.6	24.8
<b>Nadia</b>	19.3	18.8	14.9	22.6
<b>N 24 Parganas</b>	19.8	19.3	21.5	14.3
<b>Paschim Medinipur</b>	19.4	18.2	7.4	23.8
<b>Purba Medinipur</b>	19	18.3	13	13.3
<b>Puruliya</b>	19.5	17.7	6.1	18.5
<b>S 24 Parganas</b>	19	18.4	12.1	18.1
<b>Uttar Dinajpur</b>	19.4	18.1	4.5	13.4

Source: DLHS - 4, 2015-16

Mother's education has always been stressed as an important factor for better child health. Educational attainment of parents, especially of mothers, has had a significant negative relationship with levels of childcare and infant (Amonker and Brinker, 1997). As stated in Table 3.4, the female literacy rate are found to be quite low in some of the districts. It is lowest in Uttar Dinajpur (36.5%) followed by Malda

(41.2%) and Murshidabad (47.6%) while the highest is found in Kolkata and surrounding districts of Haora and Paschim Medinipur. This can be attributed as one of the main factors for the high IMR in these districts. Education empowers women with better knowledge about child health care along with better sanitation and hygiene practices which are important interventions in reducing child and infant mortality (Gokhale et al.,2002; Shetty et al., 2014).

Along with literacy rate, the years of schooling are also found to have a profound influence on the health of the child. In India, literacy refers to the ability to read and write above the age of seven. However, being mere literate does not lead to a better health status. Women

**Table 3.5 Factors affecting Infant Mortality Rate**

Districts	Women with 10yrs Schooling	Full ANC	Post Natal Check-up within 48 hrs.	Births by health personnel	Pregnant Women Anaemic	Full Immunization
<b>Bankura</b>	23.2	40.5	31.7	87.9	66.7	96.2
<b>Bardhaman</b>	26.4	29.2	36	88	51.8	82.3
<b>Birbhum</b>	22.1	16.4	35.4	88.2	39.8	91.4
<b>Dakshin Dinajpur</b>	21.7	19.8	21.5	81.7	78.3	83.2
<b>Darjeeling</b>	32.2	33.6	39.3	94.6	0	84.2
<b>Haora</b>	33.1	31.7	38.4	92.2	40.2	73.8
<b>Hugli</b>	26.2	24.6	33.5	91.7	0	88.4
<b>Jalpaiguri</b>	22.7	19.6	36.9	86.5	0	81.7
<b>Koch Bihar</b>	20.9	17.4	24	88.7	65.3	76.6
<b>Kolkata</b>	49.6	32.9	33.1	97.6	0	66.7
<b>Malda</b>	19.2	12.2	14.5	61.6	53.1	69.5
<b>Murshidabad</b>	22.2	17.1	14.9	69.8	47.5	78.9
<b>Nadia</b>	24.6	33.6	30.2	90.8	45.8	93.2
<b>North Twenty Four Parganas</b>	35.2	16.9	17.7	93.2	0	88.7
<b>Paschim Medinipur</b>	24.3	20.6	35.9	84.6	58.1	92.2
<b>Purba Medinipur</b>	28.6	23.1	18.6	87.8	52.9	92.6
<b>Purulia</b>	15.7	23.5	35.4	79.9	80.7	87.4
<b>South Twenty Four Parganas</b>	22.8	16.2	21.1	67.2	50.2	94.8
<b>Uttar Dinajpur</b>	17	4.3	25.1	58.4	69.7	66

Source: NFHS – 4, 2015 -16

with higher years of schooling or higher level of studies are found to have better child health than women who are just primary educated. Higher education delays the age at marriage and subsequently age at birth of the mother, thereby enhancing the health status of the child (Miah, 1993; Jain, 1985). Though the state boasts of comparatively high female literacy compared to the rest of India, a look into the number of years of schooling portrays a dismal picture. Only four districts recorded more than 30 percent of women having 10 years of more schooling – Kolkata, North 24 Parganas, Howrah and Darjeeling. The high IMR districts of Malda and Uttar Dinajpur recorded the lowest with less than 20 percent of their women having more than 10 years of schooling. Taking into account this fact, the West Bengal government launched the “*Kanyashree Prakalpa*” – a conditional cash transfer benefit provided to adolescent girls from the poorer section of the society to pursue higher education, provided they remain unmarried (Saha, 2015). Initially, the project targeted to bring down drop – out rate of girls from school. However, the backwash effects of the project resulted in increase in age at marriage of girls, thereby empowering women as well as reducing the infant mortality in the state as seen in 2016. Though the scheme was successful, the rate of success varied with the urban conglomeration of Kolkata and neighbourhood states recording the highest benefit, while districts of Malda, Murshidabad, Uttar Dinajpur, and South 24 Parganas still lag behind (Ghara and Ray, 2017).

Along with education, maternal health care during pregnancy is also an important determinant of IMR. In her study of determinants of infant mortality, Visaria (1985) has pointed out place of delivery, antenatal care and health care practices after birth as some of the major factors affecting infant mortality. Difference in utilization and practice of these factors has given rise to inter-regional differences. States like Jammu and Kashmir, Rajasthan, and Bihar where the percentage of institutional delivery as well as full antenatal care is low are found to have high IMR compared to other states. This situation can be perceived in the districts of West Bengal too. Full antenatal care – 4 ANC visits, at least one anti-tetanus vaccine and minimum 100 days of iron-folic intake is crucial for the better health of both mother and child. It ensures regular check-up of the mother thereby resulting in early detection of danger signs and averting mortality. As seen from table 3.2, the percentage of full ANC is quite low in the state with even Kolkata registering only 33 percent of women receiving full ANC.

The lowest percentage is noticed in Uttar Dinajpur, followed by Malda, South 24 Parganas, Birbhum and Koch Bihar.

Delivery by health professionals ensures better health of both mother and child. The immediate care meted out to mother after delivery including cutting of cord to the wrapping of the baby as well as breastfeeding within 2-3 hours is ensured through proper health personnel. Also, hygienic practices by health professionals reduce contamination as well as chances of infection. This reduces the risk of both neonatal as well as maternal mortality rate. All the districts registered a high percentage of births by health professionals, except Uttar Dinajpur and Malda. The implementation of the JSY scheme has increased the percentage of institutional births in the state. Women availing JSY are found to be more likely to access ANC and opt for institutional delivery than non – beneficiaries (Panja et al., 2012).

Post-natal check-up within 48 hours of birth is also an important factor affecting infant health. Check up within 48 hours by health professionals is beneficial as mothers are advised for better care of the child as also checked for any danger signs. In spite of a high percentage of delivery by health professionals, the districts recorded a low percentage of PNC checkup. The lowest percentage was again recorded by Malda and Murshidabad. Anaemia is another crucial factor leading to high maternal and child mortality rates in the country, and West Bengal is no exception. Low intake of proper diet and malnourishment is one of the major reasons of anaemia, and during pregnancy, it increases the likelihood of low birth weight resulting in undernourishment and proper development of the child. It is a vicious cycle contributing to the high morbidity and mortality (Maitra and Ray). Table 3.5 presents a dismal scenario of anaemic pregnant women in the state. While some of the districts like Kolkata, Darjeeling, North 24 Parganas, Hooghly and Jalpaiguri accounts for zero percentage of anaemic pregnant women, the percentage is as high as 80 in Purulia to 78 in Dakshin Dinajpur, 60 in Uttar Dinajpur and 65 in Koch Bihar. High TFR coupled with low birth spacing and high adolescent births may be cited as of the contributing factors along with improper nutrition (Barua, 1987).

Full vaccination ensures preventive care against many diseases in childhood thereby leading to better health. Data shows that while most the district recorded a high percentage of children being fully immunized, highly urbanized districts like Kolkata

showing a mere 67 percent. The district registers an immunization percentage less than even the worst performing district of Malda (69.5%). The lowest percentage was recorded in Uttar Dinajpur at 66 percent. The huge number of migrants in Kolkata, mostly belong to the labourer class and resides in slums. Due to continuous movement and less awareness among them, the tracking and monitoring the children for immunization becomes difficult resulting in low rates of immunization (Agarwal et al., 2005).

### **3.7 Conclusion**

Despite its failure to attain the millennium development goal of reducing the infant mortality rate by two-thirds, India had made a considerable progress. Varying levels of socio-economic development across states in the country have resulted in pockets of high infant mortality. However, as inferred from the discussion, none of the factors can be individually held responsible for high IMR in the state. All the factors are interlinked and an improvement in one leads to improvement in the other. Maternal education stands out as the most important factor affecting health, as it ensures improved knowledge, awareness and better usage of healthcare facilities. Immunization and births assisted by skilled health professionals also emerge as other key factors. Various components of the maternal and child health programmes when used judiciously bring down the mortality rate and leads to better health of the child. Therefore, policies should not only be directed towards reducing IMR, rather an all-around effort is a need for an increase in maternal education, rising of age at marriage and thereby birth. All these factors significantly affect the health of the child and will help in bringing down the IMR further.

## Chapter 4

### *Availability & Accessibility of Health Infrastructure in Malda*

#### 4.1 Introduction

The holistic development of a country is measured not only by its economic growth but also the health of its people. Health is often recognized as a fundamental right of the population as it determines the quality of future human capital. In 1997, the World Health Organization gave a call to all the Governments for ensuring attainment of better health for its citizens by the year 2000. Recognizing the importance of health, 4 of the 18 Millennium Development Goals, 2015 of the United Nations aimed at better health and well-being of the population, which was further incorporated into 5 Sustainable Development Goals, 2030. The MDGs made commendable progress in the reducing mortalities and ensuring health and well-being of all, but still much needs to be done especially in the developing and underdeveloped countries. Carrying forward the arduous task of good health and well-being for all, goal 3 of the Sustainable Development Goals, 2030, therefore aims to reduce maternal and child mortality, eradicate communicable diseases, address the emerging health issues, strengthen the existing health care system and ensure access to affordable healthcare for all (<http://in.one.un.org/page/sustainable-development-goals/sdg-3-2/>).

India, home to 1.3 billion population, is the second most populous country in the world accounting for 18 percent of the world's population (<http://www.un.org/en/sections/issues-depth/population/>). The huge population base of the country is also characterised by diverse socio-cultural aspects which dictates the varying health needs of the people across regions. Identifying and addressing the health needs of such a heterogeneous group is a challenging task. Since Independence, health has always been given a priority in the five-year plans. However, despite the remarkable improvement in some of the health indicators, the provision of public healthcare services in the country presents a grim picture.

In the past few decades, the economic growth of the country has been fascinating, earning it the title of the “emerging economy.” However, much of this growth was based on the progress of macro indicators like GDP and real income (Maitra and Ray, 2013). India still lags behind in health outcomes like malnourishment and nutrition



not only in South Asia but also in comparison to some of the African countries. The percentage of GDP spent on public health expenditure was only 1.4 percent in 2014, less than half of the average GDP of 3 percent spent in middle and low-income countries of the world. The neighbouring countries of Nepal (2.3 percent), Bhutan (2.6 percent) and Afghanistan (2.9 percent) even registered a higher percentage of GDP spent on health compared to India (Global Health Observatory Data, 2018). Though a state subject, the central also allocates funds and implement various programmes for the proper provision of public health services. Nevertheless, inspite of a widely distributed public health infrastructure, the state of India's health services are ailing, which often planners blame on the crunch of funds (Dalal and Dawad, 2009).

The economic development of the country is augmented by a skilled workforce, and to have a healthy human resource, accessibility to affordable healthcare services is a prerequisite. Perhaps, inequality in India is most prominent in access to healthcare services. An effective health system of a country should be able to deliver better healthcare infrastructure and human resources to deliver the services at an affordable cost to its people, mainly to the socio-economically disadvantaged ones who tend to have high mortality and morbidity levels (Bhattacharya, 2013). With 70 percent of its population living in rural areas in India, most of the healthcare facilities are found to be concentrated in the urban areas depicting the existence of an unfavourable health system for the poorer sections of the society. Further, the mere existence of infrastructure does not ensure utilization of services. While the creation of health infrastructure depends on the population of the region, the quality of services provided depends on the economic development of the region as often reluctance of the medical personnel to relocate to remote areas is noticed. Lack of medical personnel and proper health infrastructure have plagued much of the public healthcare institutions in the country resulting in delivery of low-quality health services and low utilization subsequently (Bhargava et al., 2005).

## **4.2 Evolution of Healthcare System in India**

India has been a cradle to some of the ancient civilizations of the world. The vast geographical expanse, varied climate and rich resources of the country attracted

invasions of foreign rulers and gave rise to different dynasties over time which resulted in the diverse socio-cultural complex of the present. The medical system in India evolved over centuries through the amalgamation of the knowledge and culture of these different societies. The oldest known medicine system in the country is “*Ayurveda*” which dates back to 5000 years during the Vedic age. This branch of medicine is believed to be developed by the sages through “*divine revelations*” which was transmitted orally and later into books and uses herbs and dietary changes as part of its disease management (Mishra et al., 2001).

With the advent of Persians and Arabs, a new system of medicine was brought into the country by the Middle-east physicians known as *Unani* system. Soon after its introduction, this system got rooted into the indigenous medical system and flourished maximum during the Mughal period. Both the systems evolved over time, preserving its traditional strengths and adapting to the contemporary scientific developments over time (National Health Portal, 2015). However, with the incursion of European countries and Christian missionaries and in India, the *Ayurvedic* and the *Unani* system of medicine lost its glory due to the loss of patrons and introduction of western medicine in the country (Tabish, 2000). Thus began the era of ‘modern medicine’ in India.

Though the Portuguese introduced the system of modern medicine in India, it was the British and French who established the first hospitals during the 17<sup>th</sup> century. Prior to that, the evidence of hospitals was found during the reign of Ashoka. With the expansion of the British rule, medical schools were opened in the country and expansion of the healthcare system took place. The Government of India Act, 1919 and 1935 further decentralized the healthcare system and granted autonomy to the provincial legislatures for the provision of healthcare services. However, hospital care was provided and reserved mainly for the military personnel, and British officials and provision of public health was limited to sanitation and hygiene in cities. Further, most of the health facilities were found to be concentrated in the urban areas, thus portraying an urban bias which exists even today. As stated, with ushering of new development and modernization, the ancient practice of Unani and Ayurveda became almost extinct, with much of the practitioners shifting to small towns and rural areas where modern medicine did not yet penetrate (Jan Swasthya Abhiyan, 2006). Hence,

the development of healthcare services in the rural areas have been neglected since the pre-independence period resulting in weak public health infrastructure and the high rural-urban gap in demographic indicators.

The Health and Development Committee, popularly known as the Bhole Committee in 1946 for the first time emphasised the need to reduce the rural-urban imbalance in the health system of the country. It accredited the shortage of the existing healthcare infrastructure as one of the major reasons for poor health status of India and recommended a three-tier health care system at the grass-roots level to provide curative and preventive health care to inhabitants in both the rural and urban areas (Kumar and Gupta, 2012). This became the basis of the healthcare system in the following years. Immediately post-Independence the country faced a crunch for qualified medical personnel with the withdrawal of British officers. Further, in line with the recommendations of the Bhole Committee, the three-year licentiate post matriculation medical course was abolished in order to produce highly trained doctors which further added to the scarcity. Several medical colleges and hospitals were set up to cater to the need. However, the irony lies in the fact that while the community resources were utilised to train these “highly qualified” doctors, most of them showed reluctance in providing services to the vast majority of the population in the rural areas. Thus, the rural health care system continued to suffer (Banerji, 1976).

At the time of independence, the country was plagued with high population growth and mortality rates. Therefore, the initial five-year plans focused less on public health and specific programmes like family planning remained in focus in order to bring down the fertility rate. The year 1977 witnessed a major change in the health policies with the incorporation of Maternal and Child Health programme in the family planning programmes and thereafter several programmes like Universal Immunization Programmes, Reproductive and Child Health Programmes came into being (Datar et al., 2007; MoHFW, 2005). However, it was not until the National Healthcare Policy of 1983, that the loopholes were identified and need for a primary healthcare system was felt as the programmes did not yield the desired results. A decentralised healthcare system, with focus on low costs, involvement of volunteers and paramedics and community was recommended.

The 1980s saw a rapid expansion of the health infrastructure, but they remained grossly underutilised due to the paucity of medical staff, irregularity of the existing ones, poor services, and inadequate supplies ((Dalal and Dawad, 2009; Bhattacharya and Haldar, 2014). The liberalisation and globalization policies of the 1990s further worsened the unsatisfactory condition of the health system. Under the influence of international agencies, the public health system narrowed down to certain “preventive-promotive services and selective interventions,” coupled with the parallel and unregulated growth of the private medical sector. Acknowledging the shortcomings of the public healthcare system, the new Health Policy of 2002, stated goals like *"increase utilisation of public health facilities from current level of less than 20 percent to more than 75 percent"* (National Coordination Committee, 2006), but no large-scale measure to revive and strengthen the ailing system was taken.

A major restructuring of the healthcare system took place in 2005, with the launch of National Rural Health Mission (NRHM), under the flagship of the UPA government. The programme aimed to improve the skewed access to healthcare services, especially in the rural areas and provide affordable and better healthcare services for the poor, women and children. Recognizing the lack of proper and quality medical infrastructure in the rural areas as the key reason for high inequality in the health outcomes, some major states like Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Jammu and Kashmir, Manipur, Mizoram, Meghalaya, Madhya Pradesh, Nagaland, Orissa, Rajasthan, Sikkim, Tripura, Uttarakhand and Uttar Pradesh, where the level of health infrastructure was poor, were targeted as the *high focus states* so that maximum effort could be diverted towards them. Following the launch of the programme, decentralisation and expansion of the health infrastructure along with an increase in the medical personnel were carried out. Much progress has been made post-NRHM as noticed by the reduction in the key health indicators of Infant and Child Mortality Rate, Maternal Mortality rate, the percentage of malnourished children as well as an increase in the antenatal care registration, institutional delivery, etc. (Singariya, 2013).

### **4.3 Public Health Infrastructure in India**

True to its physical and socio-economic diversity, the health and development scenario in the country has never been uniform. The regional diversity in states is reflected both in inter as well as intra-district variation. While the urban areas are endowed not only with secondary and tertiary public health infrastructure but also with a vast network of private providers; the rural areas depend mostly on the primary health sector of the government and therefore hold a great significance as they are accessible, available and affordable for rural people (Sankar and Kathuria, 2014). Health and socio-economic development being closely intertwined, it is impossible to achieve one without the other, and while the economic development of the country is gaining momentum, the health system is at crossroads today. Along with income growth, inter-sectoral linkages among different sectors are necessary for achieving better health outcomes (Fay et al., 2005).

The analysis of the health systems has always been based on the performance of the health indicators like IMR, life expectancy at birth or HDI. However, this approach did not take into account the differences in the healthcare institutions and their efficient use. In a study by World Health Organization, it was found that in spite of same economic and educational development, regions vary in terms of development in health outcomes due to inefficient use of health infrastructure (WHO, 2000). Government initiatives in public health in India have seen some noteworthy success in demographic processes, but still, the achievements are moderate in comparison to developed countries. The study on overall health system performance of 191 countries in the world in 2000 by WHO, ranked India at 112 (Tandon et al., 2000).

Public health infrastructure plays a key role in achieving demographic goals, especially in the poor and developing countries as often people cannot afford expensive private healthcare service and therefore tend to neglect or resort to quacks. This further aggravates the grave situation of poor health status. Studies have documented improvement in the maternal and child health, decrease in IMR and MMR in villages having access to proper health infrastructure (Fay et al., 2005; Datar et al., 2007, Paria, 2013). Post Independence and especially after the National Health Policy of 2002, decentralization of the health system and extensive growth in the number of health infrastructure in the country took place. With the 73<sup>rd</sup> and 74<sup>th</sup> amendment, districts became the focus of planning and interventions. As the states

and districts were at different stages of development, community participation was encouraged for better planning and implementation of programmes (Bhargava et al., 2005). Yet, the shortfall cannot be met.

The public health infrastructure in the country is far from satisfactory and the delivery of services is constrained by several factors like weak referral system, non-availability of workers, shortage of funds, etc. All these have led to appallingly low utilisation of the healthcare services. More than half of the women in NFHS-3 reported the absence of nearby health facilities, inconvenient services time, poor quality service and low attendance of health workers as the major reason for non-utilization of the public healthcare facilities (Dalal and Dawad, 2009). Further, while the availability of health infrastructure is a necessary factor for better health, it is not sufficient, and accessibility emerges as another equally important factor. Referral services are quite low in the rural areas. The public transport to PHCs and SCs are infrequent and irregular. Poor and delayed referral service compel people to access the nearest private healthcare system (Jana and Harata, 2016). The absence of proper accessible and quality emergency obstetric care is cited as one of the major reason for maternal deaths in West Bengal (Paria, 2013). This situation is true for the heterogeneous urban population too. Even though urban areas are equipped with better healthcare facilities and transportation system, location, operating time and other factors do not favour the urban slums which account for more than 30 percent of the urban areas.

The unsatisfactory performance of the health services often compels people to access private healthcare services, paying higher user fees and thereby escalating out of pocket expenditure. The per capita public health expenditure in the country was found to be Rs. 931 in 2013-14 only, registering a nominal increase of Rs. 621 in 2009-10 (National Health Profile, 2016). The out-of-pocket health expenditure for India was found to be very high at 89.2 percent for the year 2014 by WHO (Global Health Observatory Data, 2018) which depicts the alarming situation of public healthcare in the country. However, a study by the Institute for Health Metrics and Evaluation, University of Washington, of 25 countries, ranked India at 6<sup>th</sup> with 65.6 percent of out of pocket health expenditure (<http://indianexpress.com/article/india/of-indias-healthcare-spend-23-out-of-patients-pockets-study/>). However, despite the differences in the percentage in both the studies, the percentage of health expenditure is still very

high for a country like India where around 70 percent of the people live in rural areas, and 22 percent of people are below the poverty line (World Bank, 2016). The National Health Profile, 2016 stated that while the share of out of pocket expenditure on health of the total consumption was 5.5 percent in the urban areas, it rose to 6.7 percent in rural areas during the year 2011-12.

The proliferation of the private health sector, along with no proper monitoring or evaluation system of the Government has resulted in high prices for health services in the private sector. Often, patients are found to be advised for unnecessary laboratory tests of very high cost which increases the economic burden of the household (Bhattacharya, 2013). The National Sample Survey data reveals the average cost of treatment in the private sector being 2.1 times more than public health sector (India Health report, 2003). While income of the households appears to be one of the key determinants, the utilization of the public services is also found to be dependent on the severity of disease, regional development, and peer group. Biasness towards the use of private healthcare services even among the poorest households are found to be a result of the perception that government health services are not of good quality and not much attention and care is provided to the patient (Kumar and Prakash, 2011).

### **4.3.1 Structure of the Healthcare System**

The healthcare sector is one of the largest sectors of the Indian economy in terms of both employment generator and service provider. Sharing a fair percentage of the world's disease burden, the health sector in the country is incessantly growing. Taking into account, the diverse culture of the country and varying levels of development, the Indian Constitution marks health both as a State as well as a Center subject. Each state has its own healthcare system which comprises of both the public and private services. While the state ensures proper functioning of the healthcare system, the Centre helps in monitoring, guiding, policy framing and funding national health interventions (Wennerholm et al., 2013). In case of health, the term infrastructure takes on a broader role than mere physical infrastructure and is described as the “*basic support for the delivery of public health activities.*” The primary health care system in rural India consists primarily of public health facilities, with provisions of private practitioners, NGOs and charitable trusts. The healthcare system in the rural areas in

India has been developed as a three-tier structure based on predetermined population norms (Figure 1.3) and comprises sub-centers (SC), primary health centers (PHC), and community health centers (CHC) , that vary markedly in their staffing and delivery of health care services (Table 1.3).

#### **4.3.1.a Sub-Centres (SCs)**

Sub Centre is the most peripheral institution and forms the first point of contact between the community and the primary healthcare system. It is supposed to cater to a population of 5000 in the plain areas and 3000 in the hilly areas. Each sub-center is designated to have one Auxiliary Nurse Midwife (ANM) and one male Multipurpose Worker [(MPW) M]. The NRHM provided for another additional ANM on contract basis known as the second ANM. The second ANM needs to be resident of the area covered by the SC and undergoes 18 months training in Nursing School same as the ANMs. For monitoring of the SCs, a Lady Health Worker is appointed with the charge of six SCs. The sub-centers provide basic drugs for minor ailments and are also expected to provide services about nutrition, immunization, maternal and child health, family welfare, diarrhea control, and control of communicable diseases. Usage of various mediums of interpersonal communication to bring about behavioural change in reproductive and hygiene practices is also supposed to be carried out by the sub-center. Being the first point of contact, the sub-center is the most important health institution for monitoring and prevention of communicable ailments, as well as for promoting better health and creating awareness regarding various issues like sanitation, birth control etc.

#### **4.3.1.b Primary Health Centres (PHCs)**

The second tier of the healthcare structure, it is the first contact point between the community and the medical practitioners, covering a population of 30,000 in the plain areas and 20,000 in the hilly areas. It provides curative, preventive and promotive services to the rural population along with the promotion of better health and hygiene, institutional deliveries and benefits of maternal and child health services. Grossly underutilised due to poor quality of infrastructure and low and inefficient manpower, the PHCs underwent a major transformation under the NRHM. They are expected to



be equipped with essential infrastructures like 24 hours provision of water supply, electricity, laboratory, labour room, telephone emergency vehicles and four to six beds for inpatients. Staffed by two doctors, four General Nurse-Midwives (GNMs), one laboratory technician and health assistants the PHCs are supposed to function for 24 hours and provide facilities for normal deliveries. Regular and adequate supply of essential drugs and equipment like vaccines, IFA tablets, deep freezer, vaccine carrier, BP instrument, etc. was also ensured ([www.pitt.edu/~super4/40011-41001/40361.ppt](http://www.pitt.edu/~super4/40011-41001/40361.ppt)). Due to limited facilities and expertise, complete and emergency obstetric emergency care cannot be provided by the PHCs. However, since NRHM, many of the PHCs have been upgraded to First referral Units which have specialized equipment and kits to provide emergency obstetric care (PEO, 2011). The state governments establish and maintain the PHCs under the Minimum Needs Programme (MNP)/Basic Minimum Services Programme (BMS).

#### ***4.3.1.c Community Health Centres (CHCs)***

According to the Government of India norms, per 1 lakh to 1.2 lakh population, there should be a Community Health Centres (CHC) which forms the uppermost tier of the health system. It serves as a referral centre for four PHCs and is the first major institution providing curative services to more than 80 percent of the ailments. The CHC is manned by four medical specialists, Surgeon, Physician, Gynaecologist, and Paediatrician along with two General Duty Medical Officer. Norms require a CHC to have thirty in-door beds with OT, X-ray, Labour Room, and Laboratory facilities. The Block Medical Officer of Health (BMOH) acts as the superintendent of the CHC and is assisted by the Block Public Health Nurse (BPHN) and Public health Nurse (PHN). All the national programs like control and prevention of vector-borne diseases, leprosy, TB, etc. are implemented at this level. The CHCs are also supposed to have a Blood Storage facility for emergency and also to act as First Referral Unit in situations of delivery complication. In West Bengal, CHCs are equivalent to and known as Rural Hospital (RH) or Block Primary Health Centre (BPHC).

Other than the health personnel and paramedic staff of the three-tier health system mentioned above, there also exists the Accredited Social Health Activist or ASHA. To ensure community participation and track health events at the household level of a

huge population is not possible by one ANM and one male health worker. Therefore, the NRHM introduced the ASHA who works at the community level. A woman resident of the village, in the age group of 25–45 years, with formal education up to 8<sup>th</sup> standard and with good communication and interpersonal skills are appointed as ASHA ([www.pitt.edu/~super4/40011-41001/40361.ppt](http://www.pitt.edu/~super4/40011-41001/40361.ppt)). Her work includes maintaining close contact with the community, tracking the reproductive health of eligible couples, ensure proper care of the child and create awareness of various important health interventions of the government. The ASHAs play a very important role in transforming the health situation of an area as she is attached to the people on a very grassroot level. Norm requires one ASHA per thousand population and they have to undergo various training at different phases.

#### **4.4 Present Situation of Public Health Infrastructure in India**

The National Rural Health Mission in 2005 ushered in a lot of changes in the public healthcare in the country. With a focus on the empowered action group of states, the programme was envisaged to increase the number of healthcare institutions and health personnel for ensuring proper delivery of the health services even to the remotest part of the country. While the programme has made laudable progress, the need is yet to be met. Table 4.1 shows the number of SCs, PHCs and CHCs during the ninth (1997-2002) and twelfth plan (2012-2017), and gives an insight into the progress made by various states post NRHM period, i.e., 2005. As of March 2016, there are 1,55,069 SCs, 25,354 PHCs and 5,510 CHCs in India. A majority of the states have had an increase in the number of health infrastructure during the period. Some of the states, like Andhra Pradesh, Bihar, and Madhya Pradesh have registered a decrease in the number of health institutions during the twelfth plan which is due to the division of existing states and creation of new states during the period. The demographically advanced state of Kerala also registered a fall in the both the SCs and PHCs during the period, due to the Standardization of the Health Institution in 2009 in the state (Rural Health Statistics, 2016). The state of Assam also reveals a decrease in the number of SCs during the time period. Upgradation of the existing health structures was cited as a reason for this by the state (Rural Health Statistics, 2016).

The highest increase in the number of SCs during the period was registered by Tripura (91.7 percent). Among the bigger states, Jammu and Kashmir (65 percent) recorded the highest increase followed by Rajasthan (45.2 percent), West Bengal (27.6 percent), Gujarat (21 percent) and Karnataka (14.6 percent). All these states registered an increase more than the national average of 12.9 percent. In terms of PHCs, most of the bigger states registered a decline during the time period. Barring states which have been divided, other states like West Bengal (-28 percent), Kerala (-12.7 percent), Punjab (-11.8 percent), Tamil Nadu (-4.7 percent) and Odisha (-3.5 percent). All these states reported upgradation of the PHCs to CHCs as the major cause of the decrease. This fact is further ascertained by the increase in the number of CHCs in these states. Tamil Nadu (434.7 percent), West Bengal (252.5 percent), Uttar Pradesh (149.4 percent), Rajasthan (117.1 percent), and Kerala (114.3 percent) – all the major states have registered an increase in CHCs of more than 100 percent during the time period. This conveys that both the lowest and highest tier of the health system witnessed a massive increase in post-NRHM, compared to the intermediate tier of PHCs. With the launch of the program, PHCs were revamped and upgraded to CHCs thus strengthening the referral system and emergency services.

Despite the rejuvenation of the health care system after 2005, the requirements of the overgrowing population of India could not be met. Recognizing the poor state of public health infrastructure as one of the key reasons for poor health and high infant and maternal mortality, the implementation was focused on the north-eastern and empowered action group of states which met limited success. The shortfall was calculated according to the required population norms. Delhi's public health infrastructure poses a depressing picture with the capital recording highest shortage of infrastructure in all the three tier. Bihar (47.8 percent) records the highest shortage of SCs after Delhi (68.7 percent), followed by Jharkhand (34.8 percent), Uttar Pradesh (34.2 percent), Madhya Pradesh (26 percent), Haryana (22 percent), Maharashtra (26 percent), Assam (21 percent) and West Bengal (20.7 percent). All these states registered a shortage more than the national average of 19.6. In case of PHCs, the highest shortage was noticed in Jharkhand (66.1 percent), followed by Delhi (61.5 percent), West Bengal (57.8 percent), Bihar (41.9 percent), Madhya Pradesh (41.1 percent) and Uttar Pradesh (32.7 percent). The state of the CHCs was found to be worst with the majority of the states reporting a high shortage compared to the other

**Table 4.1 Increase in number of SCs, PHCs and CHCs from 1997-2002 to 2012-17**

Sl. No.	State/UT	Sub-Centres			Primary Health Centres			Community Health Centres		
		1997 - 2002	2012 - 2017	% increase	1997 - 2002	2012 - 2017	% increase	1997 - 2002	2012 -2017	% increase
1	Andhra Pradesh	10568	7659	-27.5	1386	1075	-22.4	219	193	-11.9
2	Arunachal Pradesh	273	304	11.4	65	143	120.0	20	63	215.0
3	Assam	5109	4621	-9.6	610	1014	66.2	100	151	51.0
4	Bihar	14799	9729	-34.3	2209	1802	-18.4	148	148	0.0
5	Chhattisgarh	-	5186	-	-	790	-	-	155	-
6	Goa	172	212	23.3	19	22	15.8	5	4	-20.0
7	Gujarat	7274	8801	21.0	1032	1314	27.3	252	322	27.8
8	Haryana	2299	2576	12.0	403	474	17.6	65	110	69.2
9	Himachal Pradesh	2069	2071	0.1	302	518	71.5	65	79	21.5
10	Jammu & Kashmir	1700	2805	65.0	337	637	89.0	53	84	58.5
11	Jharkhand	-	3953	-	-	327	-	-	188	-
12	Karnataka	8143	9332	14.6	1676	2353	40.4	249	206	-17.3
13	Kerala	5094	4575	-10.2	944	824	-12.7	105	225	114.3
14	Madhya Pradesh	11947	9192	-23.1	1690	1171	-30.7	342	334	-2.3
15	Maharashtra	9725	10580	8.8	1768	1811	2.4	351	360	2.6
16	Manipur	420	421	0.2	69	85	23.2	16	17	6.3
17	Meghalaya	413	431	4.4	85	109	28.2	13	27	107.7
18	Mizoram	346	370	6.9	58	57	-1.7	9	9	0.0
19	Nagaland	302	396	31.1	46	126	173.9	9	21	133.3
20	Odisha	5927	6688	12.8	1352	1305	-3.5	157	377	140.1
21	Punjab	2852	2951	3.5	484	427	-11.8	105	150	42.9
22	Rajasthan	9926	14408	45.2	1674	2080	24.3	263	571	117.1
23	Sikkim	147	147	0.0	24	24	0.0	2	2	0.0
24	Tamil Nadu	8682	8712	0.3	1436	1368	-4.7	72	385	434.7
25	Telangana	-	4863	-	-	668	-	-	114	-
26	Tripura	539	1033	91.7	58	94	62.1	11	20	81.8
27	Uttarakhand	-	1847	-	-	257	-	-	59	-
28	Uttar Pradesh	20153	20521	1.8	3808	3497	-8.2	310	773	149.4
29	West Bengal	8126	10369	27.6	1262	909	-28.0	99	349	252.5
30	A& N Islands	100	123	23.0	18	22	22.2	4	4	0.0
31	Chandigarh	13	17	30.8	0	3		1	2	100.0
32	D & N Haveli	36	56	55.6	6	11	83.3	1	0	-100.0
33	Daman & Diu	21	26	23.8	3	4	33.3	1	2	100.0
34	Delhi	42	26	-38.1	8	5	-37.5	0	0	-
35	Lakshadweep	14	14	0.0	4	4	0.0	3	3	0.0
36	Puducherry	80	54	-32.5	39	24	-38.5	4	3	-25.0
	<b>All India</b>	<b>137311</b>	<b>155069</b>	<b>12.9</b>	<b>22875</b>	<b>25354</b>	<b>10.8</b>	<b>3054</b>	<b>5510</b>	<b>80.4</b>

Source: Rural Health Statistics, 2016

**Table 4.2 Shortfall in Health Infrastructure as per 2011 Population of India**

Sl. No.	State/ UT	SCs	PHCs	CHCs
1	Andhra Pradesh	*	10.2	35.5
2	Arunachal Pradesh	4.4	*	*
3	Assam	21.0	*	36.6
4	Bihar	47.8	41.9	80.9
5	Chhattisgarh	*	*	19.7
6	Goa	*	*	0.0
7	Gujarat	*	*	0.0
8	Haryana	22.0	13.8	19.7
9	Himachal Pradesh	*	*	*
10	Jammu & Kashmir	*	*	*
11	Jharkhand	34.8	66.1	22.0
12	Karnataka	*	*	36.8
13	Kerala	*	*	*
14	Madhya Pradesh	26.0	41.1	32.8
15	Maharashtra	21.7	17.7	34.5
16	Manipur	17.3	*	15.0
17	Meghalaya	43.2	4.4	3.6
18	Mizoram	*	*	*
19	Nagaland	13.0	*	*
20	Odisha	18.4	0.8	*
21	Punjab	14.9	26.1	*
22	Rajasthan	*	*	*
23	Sikkim	*	*	50.0
24	Tamil Nadu	*	*	*
25	Telangana	*	13.0	40.6
26	Tripura	*	13.8	25.9
27	Uttarakhand	*	*	0.0
28	Uttar Pradesh	34.2	32.7	40.4
29	West Bengal	20.7	57.8	35.1
30	A & N Islands	*	*	*
31	Chandigarh	*	*	*
32	Dadra & Nagar Haveli	0.0	*	100.0
33	Daman & Diu	*	*	*
34	Delhi	68.7	61.5	100.0
35	Lakshadweep	*	*	*
36	Puducherry	31.6	*	*
<b>All India/ Total</b>		<b>19.6</b>	<b>22.4</b>	<b>30.3</b>

Source: Rural Health Statistics, 2016; \* = no shortfall

two-tier. Delhi recorded a 100 percent shortage, i.e. no CHCs in the capital, followed by Bihar (80.9 percent), Telangana (40.6 percent), Uttar Pradesh (40.4 percent), Karnataka (36.8 percent), Assam (36.6 percent), Andhra Pradesh (35.5 percent) and West Bengal (35.1 percent). From table 4.2, it can be inferred that in spite of the widespread expansion in the EAG states, there remains a shortfall as reported.

However, an important cause for the same could be the persistent high fertility and population growth in the states. A paradoxical situation noticed is the high shortage of infrastructure in West Bengal. The state consistently reported a shortage above the national average, especially in the number of CHCs. The state with an IMR less than the national average and TFR of less than 2.1 is one of the demographically advanced states in the country. The healthcare infrastructure figures reveal the poor state of the public health in the state which is quite unlikely given the long communist regime in the state. As Nag (1983) pointed out, lack of political awareness, awareness of health rights are some of the reasons of low status of public health in West Bengal compared to Kerala, both being ruled by the communists, the latter having better public health scenario in the state.

#### **4.5 Availability of Health Infrastructure in West Bengal**

The health system in West Bengal at present is at crossroads. On one hand, the public health infrastructure is in a dismal state, plagued by poor service delivery, lack of trained health personnel, low attendance of health workers, etc. leading to low utilization. On the other hand, the proliferation of private health services without proper licensing, monitoring and evaluation system of the government has led to high out of pocket expenditure of the people. Post liberalisation, the state has seen a high inflow of foreign investment in the health sector, the World Bank being the largest investor. In order to bring efficiency, World Bank proposed reforming the health sector of the state through privatisation, while the state opined for more of a public approach which will be beneficial for the common people along with an increase in efficiency (Soman, 2002). However, opting for a public-private partnership (PPP) model has seen a spurt in the out-of-pocket health expenditure in the state. Inefficiency on the part of the government health department in checking the rapid growth of private healthcare and lack of proper and strict vigilance on them has resulted in arbitrary charges and malpractice of medical care. With the decrease in the government spending on healthcare over the years, the out of pocket expenditure has increased catastrophically as more and more shift to private healthcare services (Bhattacharya, 2013).

With around 70 percent of its population living in rural areas, West Bengal has records 10369 SCs, 909 PHCs, 349 CHCs, 37 sub-divisional hospitals and 22 district hospital as in March 2016 (Table 4.3). The southern districts of South 24 Parganas, North 24 Parganas, and Paschim Medinipur are found to have higher number of health infrastructure compared to the northern districts of Malda, Jalpaiguri, Koch Bihar. Though availability of health infrastructure depends on the population of the area, often it is found to be concentrated in areas developed areas already having facilities (Paria, 2013). The southern districts of the state are found to be more developed, being closer to the capital Kolkata and therefore explains the high concentration of infrastructure. The private sector in the state also plays an important role in delivering health service in the rural areas. However, they portray a more complex

**Table 4.3 Number of Health Infrastructure in West Bengal, 2016**

Sl. No	State / Districts	Sub Centres	PHCs	CHCs	Sub Divisional Hospital	District Hospital
1	Bankura	564	69	22	1	1
2	Bardhaman	765	105	35	3	1
3	Birbhum	484	58	19	1	2
4	Dakshin Dinajpur	248	18	8	1	1
5	Darjeeling	230	22	12	2	2
6	Haora	448	43	15	1	1
7	Hugli	672	60	18	3	1
8	Jalpaiguri	301	25	7	1	1
9	Koch Bihar	406	29	12	4	1
10	Malda	511	34	16	1	0
11	Medinipur(W)	858	82	29	2	1
12	Medinipur(E)	706	53	24	3	2
13	Murshidabad	832	69	27	4	0
14	Nadia	469	47	17	2	1
15	North Twenty Four Parganas	742	52	22	3	2
16	Puruliya	485	52	20	1	1
17	South Twenty Four Parganas	1068	60	30	3	2
18	Uttar Dinajpur	344	18	9	1	1
19	Alipurduar	236	13	7	0	1
20	<b>WEST BENGAL</b>	<b>10369</b>	<b>909</b>	<b>349</b>	<b>37</b>	<b>22</b>

Source: Rural Health Statistics, 2016

picture. While there is a large proportion of private practitioners in the state, the Government sector has very little control or information about them. Along with NGOs, charities, trusts, nursing homes, there also exists another type of doctors who are graduates with or without formal health training who provides medicines and suggestions to the common people. They are often recognized as ‘pro-poor’ or ‘quacks’ (Soman, 2002).

Proper utilization of healthcare services is viable through the existence of healthcare infrastructures. In the previous discussion, it was revealed that West Bengal recorded a consistent shortage of health infrastructures, much above the national average. Table 4.4 provides testimony to the fact. Barring Howrah, all the districts in the state reported a high percentage of shortage all throughout the three tier of the healthcare infrastructure. The shortage of SCs was found to be higher in the northern districts

**Table 4.4. Percentage of Shortage of Health Infrastructure in West Bengal**

Sl. No	State/Districts	SCs	PHCs	CHCs
1	Bankura	28	46	31
2	Bardhaman	27	40	19
3	Birbhum	30	49	33
4	Dakshin Dinajpur	34	71	48
5	Darjeeling	30	59	10
6	Haora	*	28	*
7	Hugli	10	51	42
8	Jalpaiguri	62	81	78
9	Koch Bihar	21	66	44
10	Malda	35	74	51
11	Paschim Medinipur	35	62	46
12	Purba Medinipur	22	65	37
13	Murshidabad	29	65	44
14	Nadia	40	64	48
15	North Twenty Four Parganas	19	66	42
16	Puruliya	30	53	28
17	South Twenty Four Parganas	14	71	42
18	Uttar Dinajpur	41	81	63
19	<b>WEST BENGAL</b>	<b>28</b>	<b>61</b>	<b>41</b>

Source: Calculated from Census 2011 and RHS, 2016

with Jalpaiguri (62 percent) recording the highest, followed by Uttar Dinajpur (41 percent), Nadia (40 percent), Malda (35 percent), Paschim Medinipur (35 percent) and Dakshin Dinajpur (34 percent). All these districts recorded a shortage higher than the state average of 28 percent. The southern districts, closer to Kolkata are found to have a lower shortage. Koch Bihar (21 percent) is the only northern district to record a



shortage below the state average. The shortage of Primary health centres was found to be highest among the three tier. West Bengal records a high shortage of 61 percent of PHCs in 2016. The shortage of PHCs was found to be highest in the districts of Uttar Dinajpur and Jalpaiguri at 81 percent, followed by Malda (74 percent), Dakshin Dinajpur (71 percent), Koch Bihar (66 percent), and North 24 Parganas (66 percent). The same pattern as of the SCs was noticed with all the northern districts barring Darjeeling recording above the state average. CHCs in West Bengal are known as Block Primary Health Centres (BPHC) or Rural Hospitals (RH). The highest shortage was again noticed in Jalpaiguri (62 percent), followed by Uttar Dinajpur (63 percent) and Malda (51 percent).

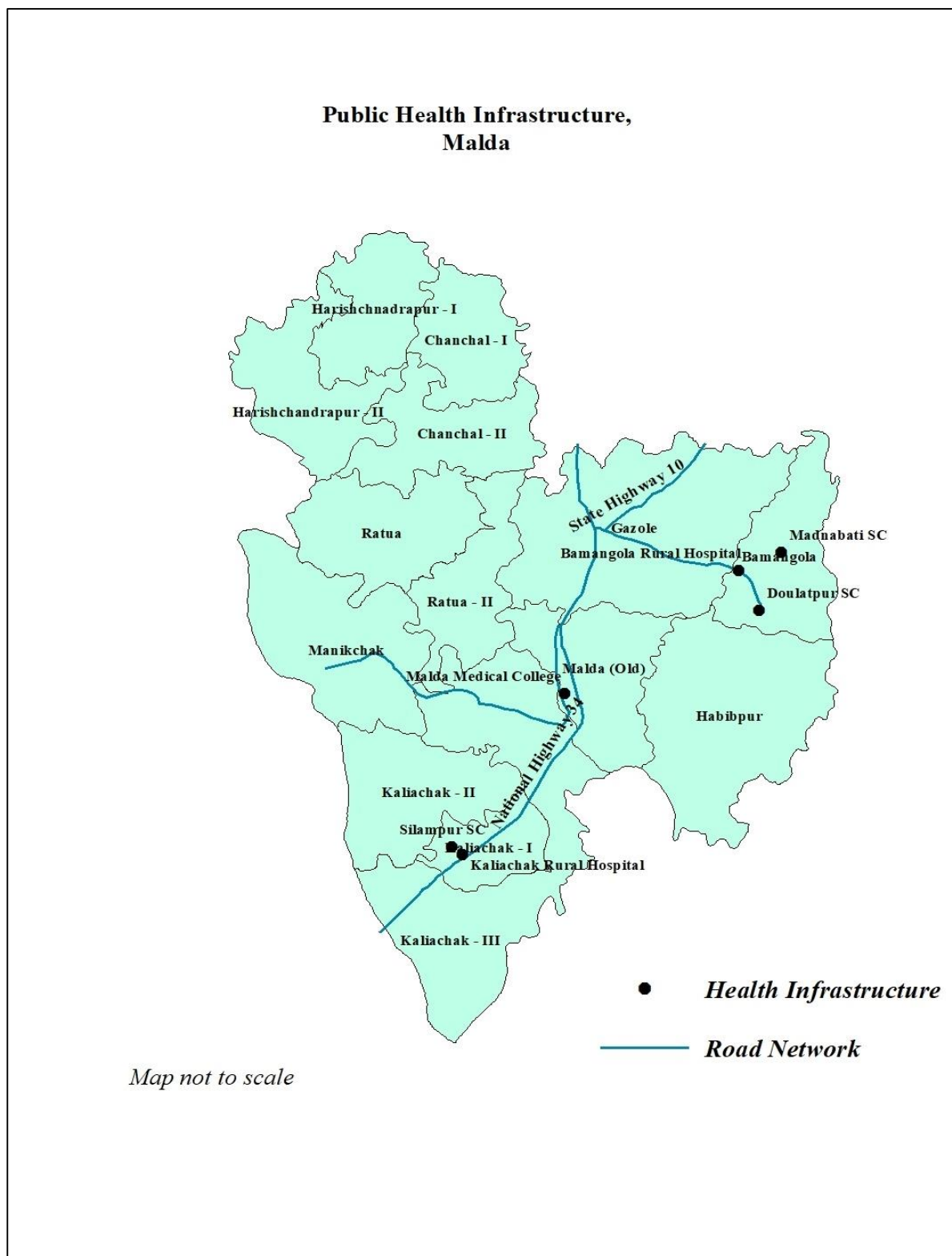
#### **4.6 Availability of Health Infrastructure in Malda, West Bengal**

##### **4.6.1 Sub-Centres**

Along with high infant mortality rate, the district of Malda also records a low utilization rate and a high shortage of public health infrastructure. Studies have documented that presence of infrastructure in villages are found to have a profound influence on the health of the child (Datar et al., 2005; Fay et al., 2005; Paria, 2013; Jana and Harata, 2016). Therefore, availability of infrastructure plays a key role in infant health. In this chapter, analysis of the data pertaining to health infrastructure collected from the field has been carried out to assess the level of health infrastructure available in rural areas of Malda.

For the study, two blocks were selected from Malda district. The sample size was selected according to the population coverage of the Sub Centres. Due to the sparse and dispersedly population in Bamangola, the sample was collected from two SCs, namely Doulatpur and Madnabati, to retrieve information of the desired sample size. In case of Kaliachak – I, one SC, Silampur, provided enough sample size. Information about the nearest PHC of both the blocks could not be made available, as, in case of Bamangola, the PHC was closed every time it was visited while in Kaliachak – I the health personnel was unavailable. The rural hospital in Kaliachak – I is situated within a distance of 200 meters of the SC and acted as a referral unit. For Bamangola, the rural hospital was situated at a distance of 10 km and 13 km from the Doulatpur and Madnabati SC respectively. The highest unit of public healthcare system in the district

Map 4.1 Public Health Infrastructure in Malda



**Table 4.5 Population covered and connectivity of SCs**

<b>Name of the Sub-centre</b>	<b>Silampur</b>	<b>Doulatpur</b>	<b>Madnabati</b>
Population covered	9,388 (+4388)	7,687 (+2687)	6,412 (+1412)
No. of villages catered	7	7	13
Average distance from villages (in km)	1.14	1.07	2.04
Distance of the farthest village (in km)	2	2.5	4.5

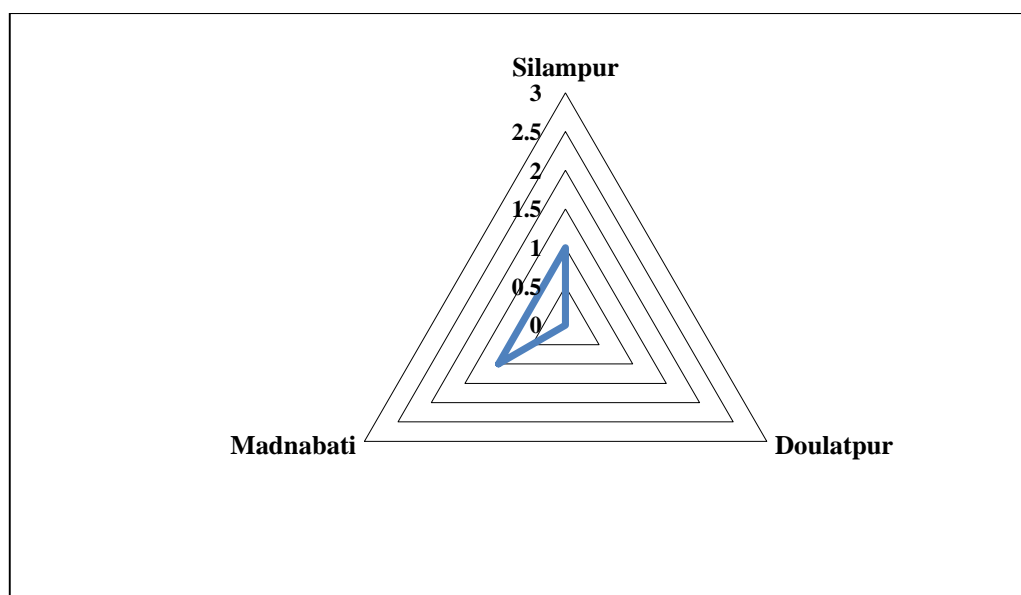
*Source: Primary Survey*

is the medical college situated in the town of Malda, 80 km from Bamangola and 25 km from Kaliachak – I.

As seen from the table above, all the SCs cater to a population much above the prescribed limit of 5,000 population in plain areas. Among the three SCs, Silampur has the highest population coverage. Kaliachak – I record the highest population with a high TFR in 2011 among all the districts of Malda (Table 1.4) and this is well reflected in table 4.5 with Silampur catering to almost double the prescribed population limit. On the other hand, Bamangola, with a considerable tribal population is sparsely populated and has the lowest population among all the blocks. The size of the villages is also quite small in the block, with Madnabati having 13 villages with a smaller population than Silampur, which has 7 villages with a much higher population.

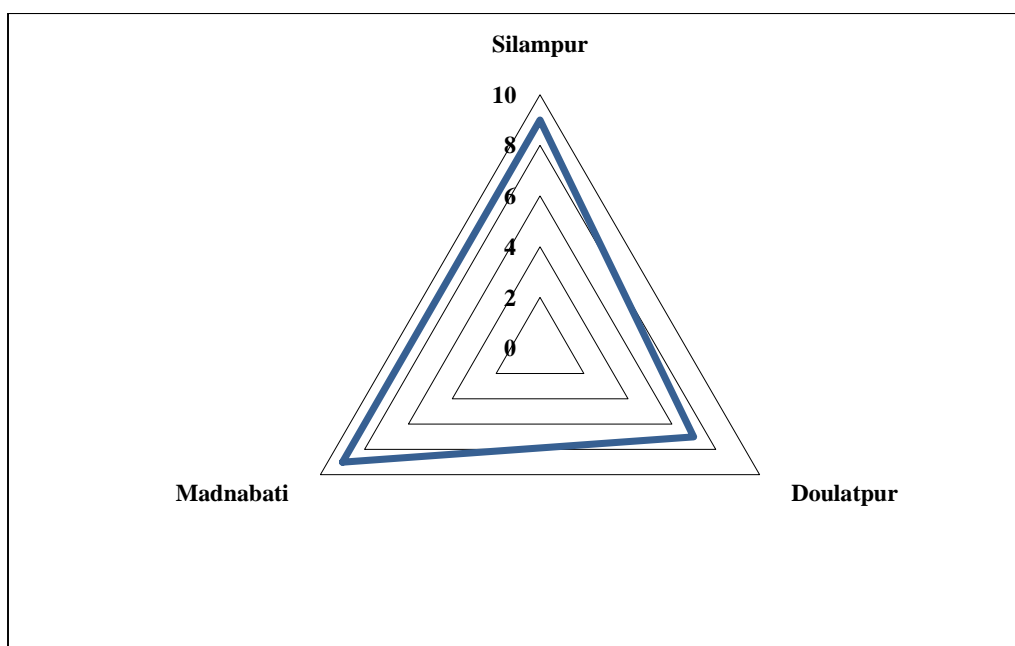
In order to portray the efficiency of each SC on certain variables, five indexes are created and plotted on the web diagram. Each diagram shows the position of one SC with respect to the other to SCs and also enables to identify the most efficient one. Accessibility is an important factor for utilization of healthcare services. Most of the neonatal and maternal deaths have been recorded due to delay in reaching the healthcare institution (Paria, 2013). Villages with health institutions within 2 to 5 km are also found to have a higher likelihood of children getting vaccinated (Datar et al., 2005). While the distance of the farthest village in Silampur is 2 km, it is 4.5 km for Madnabati and 2.5 for Doulatpur.

Figure 4.1 Connectivity Index of the Sub-centres



Source: Primary Data

The connectivity index was created by taking into account the number of villages connected by pucca road, availability of public or private transport and accessibility throughout the year. Malda is cut through several big and small rivers. In monsoon, these rivers swell and completely cut off accessibility of some villages which poses an obstacle during an emergency like transportation of mother to the instruction during delivery. All the SCs have at least one village which is cut-off during the monsoon season. Silampur and Doulatpur report one village in each, where the roads get muddy and become unfit for transport other than foot march during the monsoon. However, in case of Madnabati, one village, separated from the rest by the *Tangon* River, is inaccessible not only in monsoon season but also throughout the year. Due to the absence of any pucca bridge, no vehicle can pass through and only mode of transportation is walking. The patient is brought to this side of the river either by walking or carrying in a cot and thereafter, the referral system can be used. Barring one village in Doulatpur, all the villages are connected by pucca road in SCs. Also, 90 percent of the villages reported the availability of public transport in the all the SCs. The connectivity index portrays Doulatpur SC having the lowest connectivity compared to the other two SCs of Madnabati and Silampur. The absence of pucca road and public transport in all the villages are the major reason for poor connectivity in Doulatpur.

**Figure 4.2 Human Resource Index of the Sub-centres**

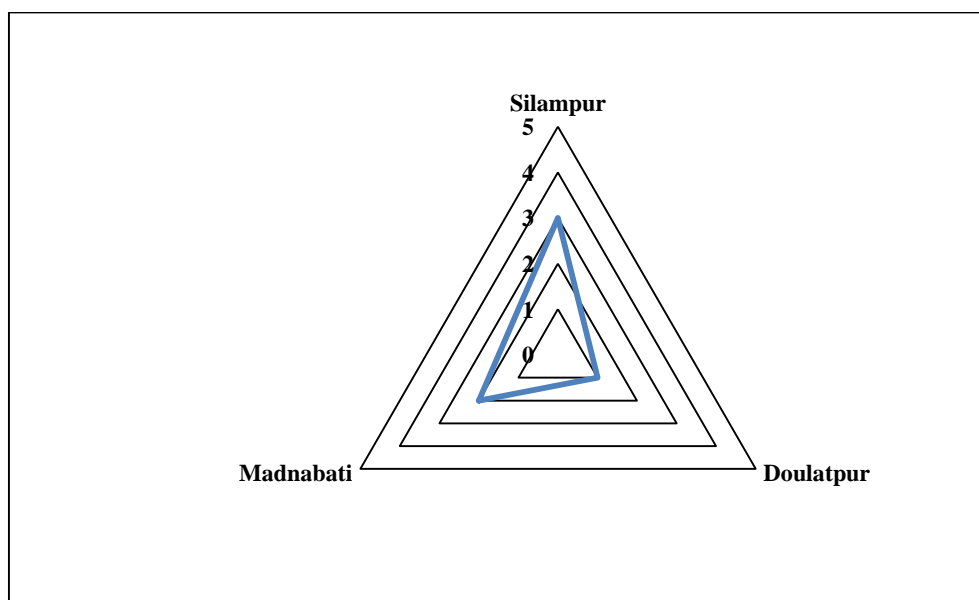
*Source: Primary Data*

The dearth of health personnel and low attendance of the existing ones is one of the key reasons for low utilization of public healthcare services. Further, the mere presence of health staff does not ensure better delivery of service. Service quality is often affected by the training and qualification of the staff. The human resource index, therefore, took into account not only the availability of staff but also the necessary training received by them. While all the SCs had an ANM, none of them were equipped with a male worker as per the norms. Also, Silampur with the highest population did not have an additional ANM which is present in other SCs. The ASHAs act as the main interface between the people and the healthcare units and all the SCs recorded the presence of them. Regular training related to child and maternal health, TB patients, family planning is provided to the healthcare workers by the Government for providing efficient and improved health services. Except for Doulatpur SC, workers of the other SCs have received all the training. Though none of the SCs portrayed the highest index value of 10, the human resource index ranks Doulatpur having the least efficient human resource as seen in Figure 4.2.

Infrastructure availability in the institutions is important for its proper functioning. Availability of a pucca building, 24 hours electricity and water along with some essential furniture are required for smooth functioning of the health institution. All

these variables along with the presence of labour room and bathroom facilities are taken into account for calculating the index. The infrastructure index shows that none

**Figure 4.3 Infrastructure Index of the Sub-centres**



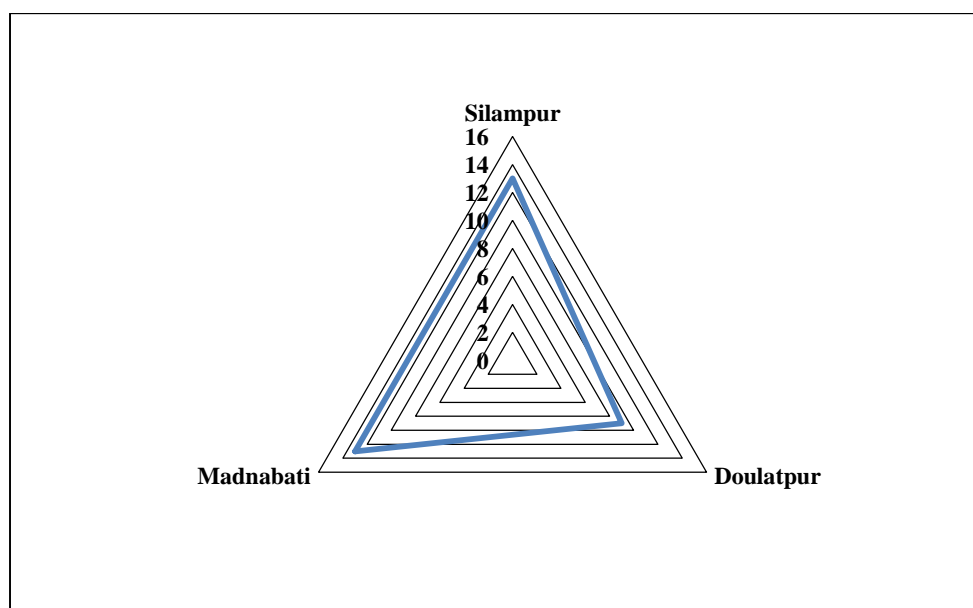
*Source: Primary Data*

of the SCs has provision of good infrastructure with Doulatpur reporting the worst. As SCs are the first tier of the rural healthcare system, availability of labour rooms in the SCs often reduces the risk of death due to delayed labour as they are situated closest to the villages. Except Silampur none of the SCs have provision for delivery. The reason cited for this was proximity to the PHC in Bamangola for both Doulatpur and Madnabati, wherein the distance from the PHC was 1.5 km and 7 km respectively. In order to reduce the pressure on the adjacent rural hospital nearby the provision of labour room may have been provided in Silampur. In Doulatpur, the SC is situated in a single room rented by the local youth club. The new government building constructed for the SC has not been inaugurated and is being used by the political parties, irrespective of several requests made the ANM to the concerned people. Though Madnabati SC is situated in government building it does not have provision for delivery or 24 hours water supply or electricity. In terms of furniture, Doulatpur has the least provision as it has only one room for check-up as well as storage of equipments. Barring Doulatpur, bathroom was available in both the other two SCs. The ANM of Doulatpur reported unavailability of bathroom as a major hindrance for providing services to pregnant mothers. Often they are asked to bring

the urine sample from home due to lack of a bathroom. While, Silampur had the provision of ANM quarter, Doulatpur and Madnabati did not have any such provision. However, the Silampur ANM stays in Malda and travels daily to the SC. No usage of ANM quarters was due to the political turmoil and unsafe environment adjoining the SC, as reported by the ASHAs of the Silampur SC.

Availability of basic equipment is necessary for quick examination and determination of health. Further, these are necessary to provide some basic diagnostic tests and are

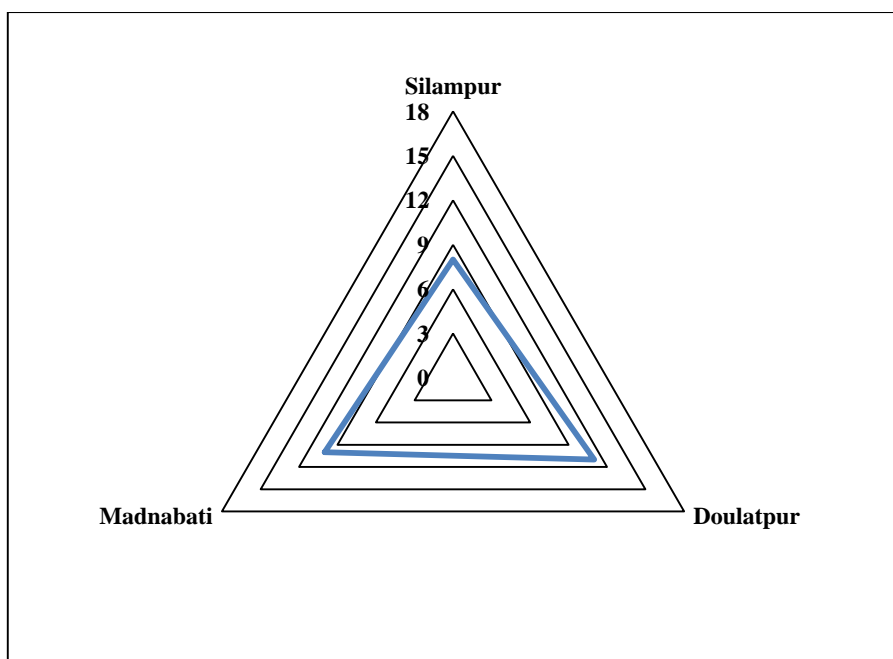
**Figure 4.4 Equipment Index of the Sub-centres**



*Source: Primary Data*

often provided at free of cost or meagre payment. In rural areas, the diagnostic centers are quite less in number and often do not provide quality services due to low knowledge and training. Also, higher user fees discourage poor people from accessing the services (Chakraborty and Frick, 2007). Therefore, the government health centres have provision for some essential and basic examinations like blood pressure check, hemoglobin test, etc. From figure 4.4, it is evident, that except Doulatpur, most of the essential equipment is available in Silampur and Madnabati. Though none of the SCs reported having the highest value, the index ranks Doulatpur having the least availability of equipment, while Madnabati and Silampur are on the same plane.

Along with medical check-ups, SCs also provide some basic medicine and drugs. The medicines related to antenatal care and common ailments of the child, like diarrhea,

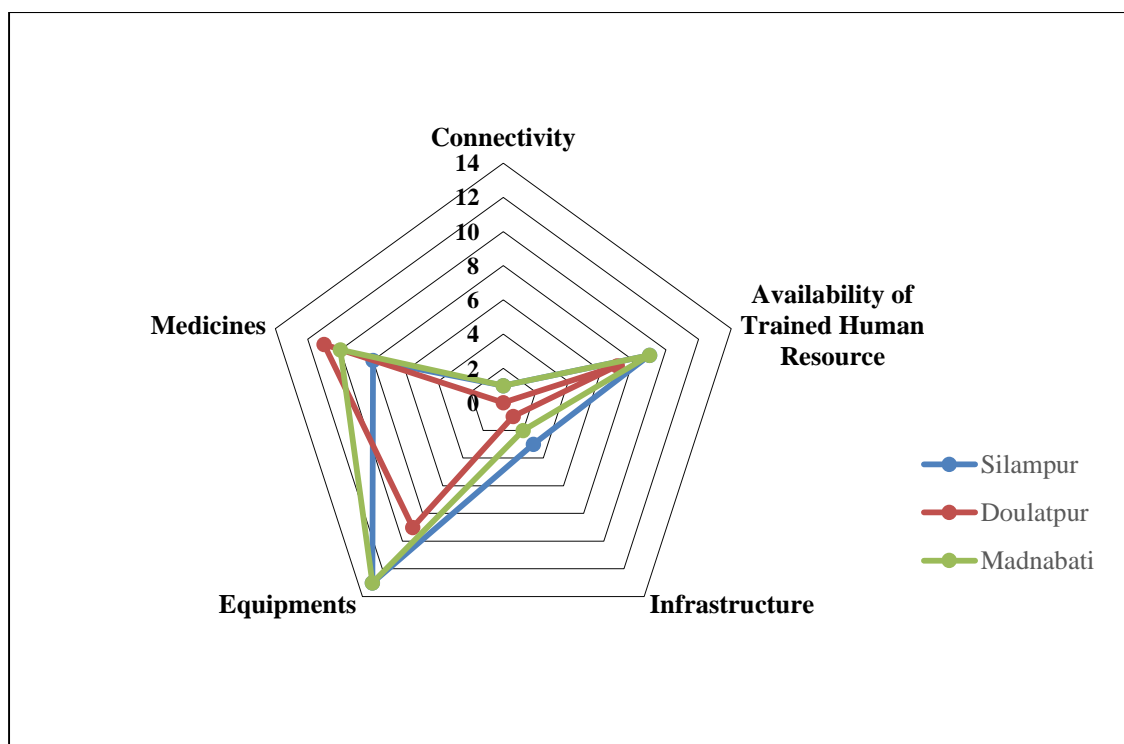
**Figure 4.5 Medicine Index of the Sub-centres**

*Source: Primary Data*

cold are provided by the sub-centres. While the essential Drug Kit-A and B was not available in storage at Doulatpur & Madnabati, other essentials items like IFA tablets Vitamin A solution & ORS packets were present. On the contrary, Silampur SC had all basic essential drug or items except IFA tablets. At the same time, other additional drugs items for intra-natal care like Gentamycin, Magnesium sulfate, Ampicillin, Metronidazole and Misoprostol are not present in Silampur sub-centre. While medicines and other consumables goods like Primaquine or syrup Paracetamol, Testing strips for Glucose and proteins in Urine are present in all the SCs surveyed, some medicines like Anti tubercular drugs, diagnostic kit for malaria were available only in Silampur and Madnabati SC. The index reveals the poor state of medicine storage in all the three SCs. The score was quite low for all, Silampur recording the least. While in infrastructure and equipment, Doulatpur portrayed a low efficiency, medicine storage was found to be highest in the SC. Proximity to the PHC can be cited as a possible reason for this.



Figure 4.5 Efficiency Index of the Sub-centres



Source: Primary Data

All the indexes measured the SCs on the availability and quality of their services. However, in order to have a holistic picture of most efficient SC, a web diagram has been constructed by converging all the indexes into one Efficiency index (Fig. 4.6). The graph shows all the points where the SCs lie on each of the indexes. On overall, Doulatpur SC emerges as the worst performing, while Madnabati is the best among the three. Silampur SC portrays a moderate efficiency. Despite, Doulatpur and Silampur being in proximity to PHC and RH, Madnabati performs the best. The SC reveals a good infrastructure and quality human resource thereby providing good delivery of services.

#### 4.6.2 Rural Hospitals

In the absence of data for PHC, we analyse the availability and services provides by the Rural Hospitals or community health centres in the blocks. Malda has 16 CHCs or rural hospitals, out of which two are situated in each of the surveyed block (Table 4.3). The Bamangola Rural Hospital, situated in Mudipukur is a fairly big hospital serving around 1,50,481 population. It has an all-weather communication to all the

villages except 1 or 2 which remain cut off during the monsoon. However, a bridge is under construction for ensuring better accessibility. The farthest village is situated 19 km from the hospital, while the Malda Medical college hospital is around 65 km

**Table 4.6 Population Covered and Connectivity of Rural hospitals**

	<b>Silampur</b>	<b>Bamangola</b>
No of PHCs catered by this CHC	3	2
Population covered	4,14,287 (+2,94,287)	1,50,481 (+30,481)
Distance between DH and CHC (in KM)	23	65
Distance of the farthest village (in KM)	25	19
All weather communication for all the villages	Yes	Yes

*Source: Primary Survey*

away. The Silampur rural hospital, on the other hand, is situated a kilometer away from the busy national highway 34, connecting south Bengal with the Northern districts. Situated in the most populous block, the rural hospital serves a population of 4, 14,287, almost three times the population of Bamangola. Barring 1-2 villages, it also has an all-weather connection with all the villages. Malda medical college is nearer to this hospital being situated at a distance of only 23 km. Both the rural hospitals are well connected by pucca road and public transport facilities as well as private vehicles. Malda medical college acts as a first referral unit for both Silampur and Bamangola. However, Bamangola has a hospital constructed at Bulbulchandi, which is supposed to be the First Referral Unit of the RH, but it is still not functional.

Regarding health personnel, no specialists were found in both the rural hospitals. While Bamangola rural hospital has 5 general physicians, Silampur had only 4 general physicians at the time of the survey. In Bamangola, the BMOH acts both as the gynecologist as well as a pediatrician. Both the hospitals have regular piped water supply as well as power supply. Inverter facility is also available. Computers and internet facilities are also provided for managing hospital data as well as outsourcing. Compared to Bamangola, manpower was found to be low in Silampur with many vacant posts not been filled up. In spite of high population pressure, the hospital is grossly under-staffed. In terms of quality, though the paramedical staff of both the

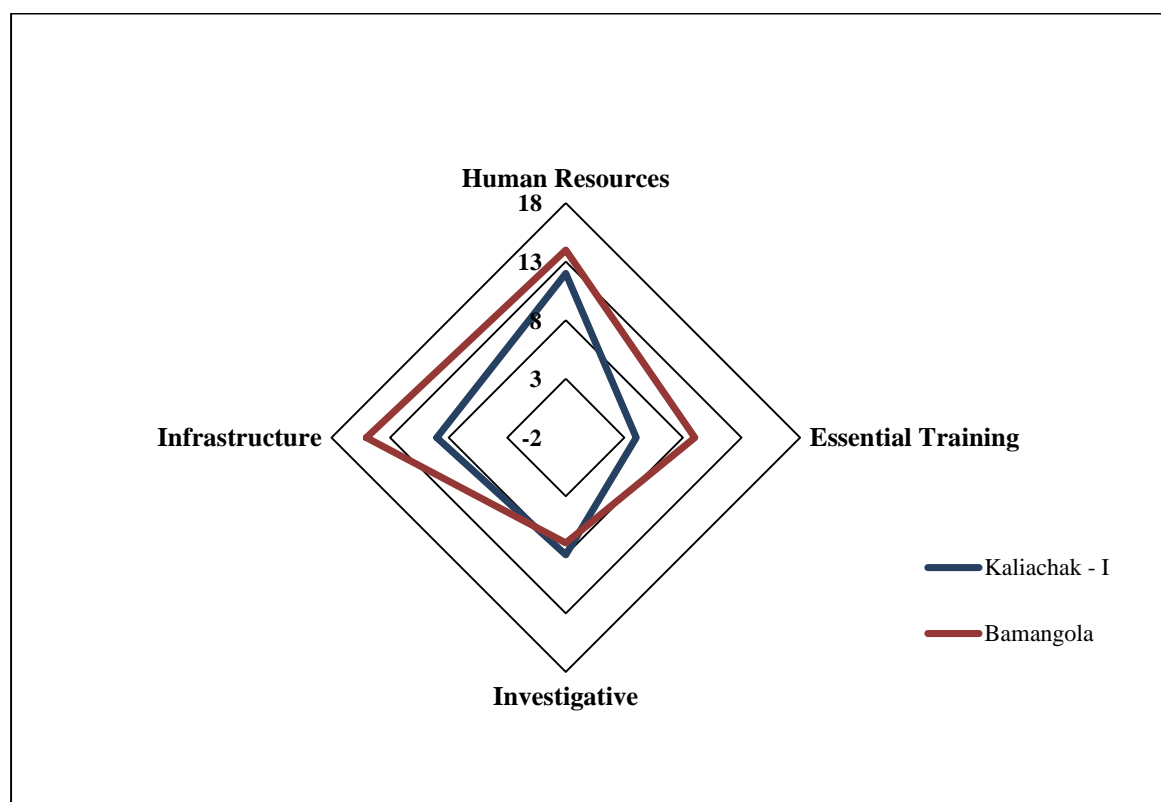
hospitals was found to be well-trained, doctors at Bamangola was found to be more trained than Silampur (Appendix 5).

Rural hospitals are the lifeline of the people in the region. The only district hospital being situated far away from both the blocks, the rural hospitals act as referral units for minor cases. Except for cesarean delivery, most of the institutional deliveries are conducted in these hospitals. They provide both inpatient and outpatient health services to people for more than 80 percent of the ailments. Therefore, the availability of proper equipment and facilities are essential in the hospital to cater to the need of the population. In terms of investigative facilities, while Bamangola has facilities for X-Ray and ECG, Silampur reported none. Nowadays, ultrasound is regarded as important and essential especially for the pregnant mothers to detect the abnormalities or risk during pregnancy or of the baby. Neither of the rural hospitals was found to be equipped with this facility. The household survey reveals that almost 70 percent of the mothers had an ultrasound during their last pregnancy which had to be done at their own expense. This increases the out-of-pocket expenditure for poor families, and many were, therefore, unable to avail of this facility. Unavailability of this ultrasound facility in the rural hospitals has led to many private diagnostic centers charge exorbitant prices which make them more unviable for the poorer sections.

Bamangola rural hospital has a 30-bed capacity, while for Silampur it is 60, with more intake for female patients than male patients. This arrangement has been made keeping in mind the high number of deliveries in the block of Kaliachak – I. The hospitals also have provision for drug dispensing and drug storage, though majority of the respondents complained that more than half of the prescribed medicines are never available in the hospital (Appendix 6). While Bamangola reported presence of a fully operated operation theatre, no operation theatre was available in Silampur, and all the surgical cases were referred directly to Malda Medical College. Labor room was available in both the hospitals. The labor room of Bamangola Rural Hospital is treated as the model labor room in West Bengal after being transformed by the collaboration of WHO and UNICEF. Nevertheless, only normal deliveries are performed here. All caesarean and complicated cases are referred to the medical college. Same is the situation for Silampur. Both laboratory and blood storage facilities were absent in Bamangola, while Silampur reported a fully functional

laboratory. Availability of cold chain in both the hospital ensures babies born in the hospital being discharged only after prescribed immunization (Appendix 7).

**Figure 4.5 Efficiency Index of the Rural Hospitals**



*Source: Primary Survey*

The discussion above reveals both the hospitals have a shortage in some or the other services. Therefore, for a better comparison of the service delivery of the hospitals, the efficiency index was created taking into account all the variables responsible for proper functioning of the system. Fig 4.6 shows that Bamangola Rural Hospital fares much better than Kaliachak in most of the aspects. Other than investigative facilities, in terms of infrastructure and essential training, the gap between Bamangola and Silampur is quite evident, with the former being in a much better place. In terms of human resources, though the gap is not wide, still Bamangola has better provision than Silampur. Nestled in a quaint locality with a low population coverage, Bamangola Hospital fares better due to lower patient pressure than Silampur. The hospital is situated over a large area and is well maintained. Proper sanitation facilities and hygienic surrounding were observed. On the other hand, with a very high population coverage, the Silampur hospital reveals a very dismal state of health service. The sanitation condition of the hospital was found to be very poor, with dogs

cohabiting with patients in the wards. High population pressure has resulted in sharing of beds. The hospital was also found to be dimly lit, with no proper maintenance of the building. The dearth of staff, proper infrastructure and poor hygiene and sanitation condition has resulted in low efficiency and service delivery of the hospital.

#### **4.6.3 Malda Medical College and Hospital**

Catering to a population of more than 40 lakhs, Malda Medical College serves as the highest public hospital for the entire district. Established soon after independence, the district hospital was transformed into a medical college in 2011, by the West Bengal Government. The hospital registers a footfall of more than 1,000 patients per day and has a high population pressure. Being the only highest public healthcare institution in the district, the hospital had the highest bed turnover rate (*number of patients discharged per bed in a year*) of 149 in 2015 (DHS, GoWB, 2016) among the 13 medical colleges in the state. With a capacity of 1000 beds, the hospital has 127 beds for pediatric and 132 beds for mothers (ANC, delivery, PNC) respectively which is quite low keeping in account the large population base.

The hospital is situated in a Government building, with 24 hours water and electricity supply. More buildings were being constructed at the time of survey to serve as OPDs. It is well connected by the public as well as private transport facilities. The hospital has provision for two ambulances which are mainly used for official works or outsourcing, and 15 *Matri Jans* are provided to the hospital for transportation of pregnant women. Though residential facilities are available, very few of the health personnel are found to utilize it. The hospital is well staffed with more than 110 doctors, of which 22 are obstetrician and 14 pediatricians. However, a dearth of nurses and para-medic staff has been noticed. The head nurse reported that inspite of vacant seats and lack of nurses, the posts have not filled since the last two years prior to the survey. Thereby, the huge pressure of patients often leads to poor service delivery. The Superintendent of the hospital stated repeated requests made to the higher authorities for recruiting the vacant seats have fall on deaf ears. In terms of investigative facilities, the hospital is equipped with fully functional laboratory and blood bank. Proper sanitation and cleanliness were noticed in the rooms and wards, while the OPD and premises were very dirty, with people sitting and lying in the

corridors. The hospital records a huge inflow of OPD patients every day and sometimes the doctors are not available without prior notice, thereby resulting in chaos. Repeated violence and chaos are noticed in the hospital premises often due to trivial matters like the absence of doctors, refusal of hospital administration to admit patients without proper papers, etc. which pollute the environment of the hospital.

*An in-depth interview was conducted with the Assistant Head of the Paediatric Department, Malda Medical College and Hospital, regarding the status of infant health and factors associated with, in the study area. The doctor attributed both supply and demand side factors for the poor infant health in the region. Maternal factors like high illiteracy, low age at marriage (15-16 years) and thereby low age at birth are cited as the key determinants of infant health. Further, low awareness, low acceptability of Government programmes along with poor sanitation was also stated by the doctor as factors affecting infant health. He opined that the fathers are often not concerned about the health of the child. It is the sole responsibility of the mother to take care of the child and visit the doctor when the child is ill. This often results in delayed medical care of the child as mothers are either unwilling or cannot travel long distances alone to visit the doctor. Therefore, they resort to the quacks which only aid in worsening of the situation most of the time.*

*The children in Malda are also found to be undernourished, which he attributed to the inefficient working of the Integrated Child Development Services and Anganwadi. Poor quality of food served to the children in the ICDS centers, do not provide the essential nutrients to the growing children which make them undernourished, with a weak immune system more susceptible to diseases. The absence of a sub-divisional hospital along with poorly developed peripheral healthcare system in the district increases the pressure on the medical college hospital by manifolds. The only sub-divisional hospital available at Chanchal block of the district is also not functional. Further, the limited number of beds, lack of logistics and high inflow of patients, even from the neighbouring districts and state (Bihar) have led to poor service delivery by the hospital. Increase in the number of public campaigns by the Government to spread more awareness among the people, improvement in the peripheral health infrastructure to reduce the pressure on the medical college and increased literacy of the mothers were suggested by the doctor as some possible ways to bring down the IMR and improve child health in the region.*

#### **4.7 Conclusion**

The public health infrastructure in Malda is far from being satisfactory. The district has an acute shortage of healthcare institution at all levels. The medical college being the only hospital has a lot of patient pressure, which was cited as the main reason for poor service delivery by the medical superintendent. Between the blocks, health infrastructure in Bamangola is much better than in Silampur. Both the rural hospitals and SCs were found to be better in Bamangola. While Doulatpur SC has some shortcomings, it is fulfilled by the nearby PHC. The Silampur SC shows a higher degree of efficiency compared to the rural hospital. Grossly understaffed and lack of infrastructure has led to the poor condition of the hospital. The unavailability and poor service delivery, therefore, urge people to shift towards private healthcare services leading to underutilization of Government healthcare. Household survey reveals a higher percentage of women in Kaliachak – I availing private healthcare services compared to Bamangola, which displays the poor state of public health care in Kaliachak.

## Chapter 5

### *Accessibility, Availability and Utilization of Maternal Health Care Services in Malda*

#### 5.1 Introduction

The World Health Organization reports that globally, around 830 women die every day due to preventable causes like pregnancy and childbirth complications and 99 percent of these deaths are concentrated in the developing countries (WHO, 2016). While motherhood is a significant event in the life of a woman, it can also be life-threatening when proper pre-natal services are not accessed. Some of the direct causes of maternal death include haemorrhage, obstructed labour, infection and unsafe abortion. Most of these are preventable by timely medical intervention and availing healthcare services during pregnancy. Since 1995, the maternal mortality rate has reduced by 44%, and the sustainable development goals (SDGs) aim to reduce it to less than 70 per 100,000 deaths by 2030. With 99% of maternal deaths being concentrated in the developing countries, with Sub-Saharan Africa accounting for more than half and south Asia about a third, it reflects the gross inequities in access to healthcare services and the widening gap between rich and poor. Maternal health care utilization like availing of antenatal care, skilled birth delivery and post-natal care are found to be profoundly low in most of the developing countries thereby registering a high maternal and child death (Mahajan and Sharma, 2014).

There is a consensus that utilization of maternal health care services reduces infant and maternal mortality (Usmani, 2013; Chakrabarti and Chaudhuri, 2007; Basu, 1990; Ghosh et al., 2015). According to the World Health Organization, maternal health refers to the “*health of the women during pregnancy, childbirth and post-partum period*” (WHO, 2018). Mother’s health appears to be a decisive factor of infant health as it displays a linear relationship with the health of the child. The growth and development of the foetus in the womb is determined by the various healthcare services accessed and received by the mother throughout her pregnancy. Therefore, in order to prevent adverse pregnancy outcomes and reduce avoidable maternal and infant deaths, the health policies and programmes in India have always been focused on maternal and child health. Since independence, both the central and state



governments have strived towards providing better healthcare provisions to all its citizens, especially mothers, by formulating new policy frameworks and expanding and renovating the existing healthcare services. The emphasis on maternal health further gained momentum with the inclusion of reduction in the maternal mortality as one of the major goals of Millennium Development Goals. Despite being one of the first countries to formulate maternal health policies and programmes, the maternal health in the country presents a grim picture. India recorded a maternal mortality ratio of 167 in 2015, which roughly translates to 45,000 maternal deaths annually and 5 per hour (WHO, 2016; UNICEF, 2017).

Delivered by the sub-centers, primary health centres and community health centers in the rural areas and municipal and government hospitals in the urban areas, the maternal and child health services in India have been able to bring down the mortality level significantly from 212 in 2002 to 167 in 2015 (<http://unicef.in/Whatwedo/1/Maternal-Health>). However, taking into account the Sustainable Development Goal of 70 maternal deaths per 1,00,000 births, India still has a long way to go. The fact that around 45,000 women in India die due to preventable pregnancy and childbirth causes, mostly due to post-partum haemorrhage, emphasises the need for prenatal care and deliveries under medical supervision in a sanitised environment (The Indian Express, June 2016).

The maternal healthcare services encompass the various preventive services provided during pregnancy, provisions of safe delivery and post-delivery care for both the mother and child. The pre-natal or antenatal care during pregnancy educates the women about nutrition, safe delivery, and postpartum care, and also allows identification and monitoring of women who have a high-risk pregnancy (Ram and Singh, 2005). As reported, most of the maternal deaths in India occur due to post-partum haemorrhage and therefore access to obstetric services from trained health personnel is a pre-requisite for better health of both the mother and the infant (WHO, 2018). Along with differences in availability and access to health facilities, the utilization of maternal healthcare services varies across regions, influenced by a number of socio-economic and demographic factors like age and education level of the mother, birth order, religion, caste, place of residence and economic status of the household (Navaneetham and Dharmalingam, 2002). NFHS – 4 records higher percentage of mothers in the younger age group of less than 20 years, residing in

urban areas, higher educational level and lower birth order to receive antenatal care from a skilled provider compared to their counterparts (IIPS and ICF, 2017).

The regional disparity in access and utilization of maternal health care services result in varying levels of infant mortality across the country. Barring the demographic and economic determinants, different cultural values, practices, taboos and social framework affects the utilization of healthcare services too. Caste differentials in utilization of maternal healthcare services and infant mortality are very much evident in India. Along with the absence of health facilities, often people from the lower caste are barred from accessing health services or discriminated which limit the utilization of the services (Dommaraju et al., 2008). A study by Brainerd and Menon (2015), states that maternal health care utilization and child health are often governed by the religious affiliation of the mother. Muslim women with constrained autonomy, are less likely to have control over household resources and decision making regarding their health. This explains the lower percentage of Muslim women availing obstetric services (Brainerd and Menon, 2015). Utilization is also found to be low among adolescent mothers. A curvilinear pattern is noticed for utilization of health services and age of the mother with mothers in the age group of 20 – 34 found to have highest percentage of usage (Singh et al., 2011).

Childbirth is a complex process and hence along with prenatal care, availing safe delivery by trained medical personnel and post-partum care within 48 hours is also important. Most of the maternal deaths are avoidable with timely intervention and care. Paria (2013), found that absence of proper accessible and quality emergency obstetric care along with inefficient referral system are some of the key reasons for maternal mortality in West Bengal. Hence, it is advised that the emphasis of the safe motherhood programmes should not only be on women availing antenatal care, but also on the necessity of skilled delivery assistance and emergency obstetric care. NFHS - 4 reports 93 percent of the women in India, who received four or more ANC visits had delivery by skilled birth compared to 60 percent who didn't receive any ANC (IIPS and ICF, 2017). The World Summit for Children (1990) called for overall development of women through education and access to proper healthcare services during pregnancy in order to reduce maternal and infant deaths as well as morbidity (<https://www.unicef.org/wsc/goals.htm#Women's>). With 79 percent of the women

availing ANC, having institutional delivery and 65 percent of women receiving post-natal care, a significant improvement in the maternal health of the country is witnessed. However, to achieve the sustainable development goal of less than 70 maternal deaths per 1,00,000 live births, still much needs to be done. The present chapter shed light on the accessibility and utilization of healthcare services by mothers in the study area, assessed through factors like distance to health facilities, availing of ANC and PNC and place of delivery.

## 5.2 Demographic and Socio-economic Characteristics

The study comprises two blocks of Malda, which are different in terms of demographic, socio-economic as well as developmental factors. A brief introduction of the mother's background characteristics by the socio-economic and demographic profile is presented in table 5.1. A high percentage of adolescent mothers are found to be present in the district, with Bamangola reporting higher percentage than Kaliachak – I. Most of the mothers are in the age group of 20 – 24 followed by the age group of 25 -29. Despite the mean age at marriage of the district being 19.2 years (Table 3.1), both the blocks record a high percentage of women married before the age of 18. While more than 60 percent of the women in Bamangola got married before the age of 18, almost an even distribution of age at marriage across the age groups was noticed in Kaliachak – I, with a slightly higher percentage for women married before 18.

Mother's age at birth is one of the key determinants of infant mortality. Births before the age of 19 or adolescent births are detrimental for both the mother and the child. In a traditional society like India, where early marriage is still widely prevalent, adolescent pregnancy is an immediate consequence, as women are encouraged by the family to bear a child in order to "*tie her to the household*" (Sethuraman, Barua and Kurz, 1995). Table 5.1 reveals a substantially high percentage of adolescent mothers in the study area. 55.6 percent of the total births in Kaliachak –I and 33.8 percent of total births in Bamangola are born to adolescent mothers, with Kaliachak – I reporting almost 20 percent even below the age of 16. The lowest percentage of births are recorded above the age of 21. This is quite alarming keeping in mind the consequences of adolescent birth. Pregnancy and motherhood for a body that is not been adequately nourished and has not yet fully developed can have fatal

consequence. Immaturity of the pelvic bones and birth canal often leads to obstructed labor resulting in stillbirths or death of the mother (Haberland, 1998; WHO, 2001).

**Table 5.1 Demographic and Socio-economic Profile of the respondents**

	<i>Kaliachak - I</i>	<i>Bamangola</i>
<b>Age of the mother</b>		
15-19	12.9	19.9
20 - 24	49.0	51.1
25 - 29	25.7	20.8
30 & above	12.4	8.1
<b>Age at Marriage</b>		
Below 18	39.0	62.3
At 18	30.5	17.9
Above 18	30.5	19.7
<b>Age at first birth</b>		
Less than 16	18.4	7.6
17 - 18	37.2	26.2
19 - 20	26.5	43.3
21 and above	17.9	22.9
<b>Educational qualification of Mother</b>		
Illiterate / Primary	44.8	32.7
Middle and Secondary	38.1	43.5
Higher Sec & Above	17.1	23.8
<b>Educational qualification of husband</b>		
Illiterate / Primary	46.7	46.2
Middle and Secondary	36.7	38.6
Higher Sec & Above	15.7	15.2
<b>Number of children</b>		
1	47.1	55.2
2	30.0	35.4
3 & above	22.9	9.4
<b>Religion</b>		
Hindu	19.0	65.0
Muslim	81.0	32.7
Others	0.0	2.2
<b>Caste</b>		
Scheduled Caste	6.2	25.6
Scheduled tribe	0.0	24.7
OBC	26.2	7.6
Others	67.6	42.2
<b>Type of House</b>		
Pucca	49.0	26.5
Semi – Pucca / Kutcha	50.9	73.5
<b>Working Status</b>		
Yes	38.6	19.7
No	61.4	79.8
<b>Standard of Living</b>		
Low	45.4	35.0
Medium	22.2	30.9
High	32.4	34.1
<b>N</b>	<b>210</b>	<b>223</b>

Source: Primary Survey, 2015 – 16

Education is often argued as the single most important determinant affecting health of infant and mother both. A high percentage of women are found to be illiterate or only primary educated in both the blocks. While Bamangola records a substantial percentage (23.8) of women completing higher secondary and above, the percentage for Kaliachak – I is only 17.1. The education of the father is also important as educated husbands are more likely to take an interest in the healthcare decisions of the family and provide the best. In the study area, almost half of the husbands in both the blocks are found to be illiterate or primary educated. Agriculture being the prime source of employment in the region, the households are found to be predominantly engaged in agriculture or as agricultural labourers. Low income and abject poverty result in men joining the workforce at a very tender age because an extra hand is always helpful in increasing the earning of the family. Therefore the males in the study area are found to be comparatively less educated than the females. Birth order of child is another important factor affecting mortality as higher birth order is found to have poor health status. Due to low knowledge and risk associated with first birth, women are found to be utilizing more health care services for their first pregnancy compared to the subsequent ones. This results in low utilization and care for the higher order births thereby resulting in low infant health status (Bhattacharjee et al., 2013). Kaliachak – I record 22.4 percent of mothers having more than three children, while for Bamangola mothers having single child or first order births was found to have the highest percentage.

Kaliachak – I has a predominantly Muslim population with 81 percent of its population being Muslim, while Bamangola has 65 percent of Hindu population. Bamangola also records a high percentage of scheduled population, with almost 50 percent of its population being scheduled caste and scheduled tribes. In Kaliachak – I, while scheduled tribes are absent, scheduled caste population form a meagre part of the total population, and most of the population are in the general category.

The economic status of an area reflects much of its development. The basic necessity like housing is important in determining an infant's health. Kuccha or dilapidated houses or houses with mud walls or floor are found to have an adverse effect on the health of the child as the environment is not beneficial and increases the chance of acute respiratory diseases. While Kaliachak – I is found to have almost equal proportion of semi-pucca and pucca houses, Bamangola reports majority of the houses

being semi-pucca / kuccha. The semi – pucca houses have cemented floor, with asbestos walls and ceiling of either straw or tiles.

Working status of mother reflects the amount of time she can devote to childcare. Working mothers are more likely to spend more time on childcare than non-working mothers. Most of the working women in Malda are engaged in agricultural activities or tobacco rolling. A high percentage of mothers are found to be working in Kaliachak – I, majority of whom are engaged in tobacco rolling at house. This proves to be harmful for the child, as he is expected to be with the mother while she is working, therefore, suffer more from acute respiratory infections. Only 20 percent of the mothers are found to be working in Bamangola, with majority being engaged as agricultural labourers. The standard of living index has been constructed using various economic variables. It is found that most of the households in Kaliachak –I have low standard of living, followed by people having high standard of living. In Bamangola, the distribution is found to be almost equal in all the categories.

***Cause of Death: Low Age at Birth, Repeated Pregnancies & Congenital Disorder***

***Case 1***

*Married at the age of 14, Momina Bibi (Kaliachak – I) has a miscarriage at the age of 15. She had her 2<sup>nd</sup> child at 17. The child born was of low birth weight of 2kgs and was kept in an incubator at Malda Medical College for four days. Though the baby is healthy, she used to suffer from frequent cold. The mother had her 3<sup>rd</sup> pregnancy, when she was 19. She received all the ANC services from both the Sub-Centre as well as a private practitioner in Malda. At seven months she had ultrasonography, which revealed the foetus has congenital disabilities. However, due to late stage of pregnancy, the baby could not be aborted and she gave birth to the baby in Malda medical college. The baby had a hole in one kidney, while the other was totally damaged and was kept in an incubator. Due to kidney failure, the baby passed away after seven days.*

### 5.3 Accessibility to health institutions

The mere existence of health care facilities does not ensure high utilization of services as accessibility to the health institutions also play a decisive role. Physical accessibility to health institutions has been found to be a major hindrance for better utilization of health services. The primary health care system of the country was built on the basis of the population in a region by the Government. However, often women have to travel long distances to reach the health institutions which deter the women from accessing health services (Bhargava et al., 2005). The primary healthcare system in the rural areas is designed to provide basic healthcare services to the rural population. The absence of a proper referral system often forces the women to travel long distances to higher medical facilities regarding obstetric emergency, resulting in higher risk for both the child and the mother (Paria, 2013). Fisseha et al. (2017), found that women who have to travel longer distances for accessing maternal and child health services are less likely to use skilled delivery services in northern Ethiopia. Along with distance, mode of transportation is also another important factor utilization. Households with lower economic status depend on public transport to reach facilities and absence of proper mode leads to lower utilization (Tsawe and Susuman, 2014). Therefore, distance to health services along with mode of transportation plays a crucial role in determining the utilization of health services as well as the health of the people in the region.

#### *5.3.1 Nearest available health facilities and distance to the facilities*

Majority of the households in the survey area reported sub-centre to be their nearest health facility and a very less percentage reported Primary Health Centre (PHC) as their nearest. Sub-centre is the lowest level of health institutions made to cater to a minimum population of 5000. Therefore, they are more easily available than any other government facilities. However, these centres also fall short in terms of accessibility for villages which are sparsely populated. While keeping in accordance with the population norm, some of the villages situated as far as 5 km are also included within the area of the existing sub-centre. It is not

**Table 5.2 Nearest available health facilities and average distance to the facilities**

<b>Nearest available health institution</b>	
PHC	2.3
Sub - centre	69.3
VHND	28.4
<b>Distance of nearest Health centre from households</b>	
Less than 1 km	43.6
Between 1 - 2 km	48.3
More than 3 km	8.1
N	433

*Source: Primary Survey*

possible therefore for both the service providers as well as receivers to interact effectively. Hence, the concept of Village Health Nutrition Day was introduced in NRHM to reach out to the left out villages. This is held once in every month wherein the villagers, especially women and child interact with the health professionals and obtain basic services and information. Bamangola, which is sparsely populated, has many villages which are quite far off and women access maternal, and child health care like ANC, vaccination in these camps. For Kaliachak –I, however, the number of these villages are less as they are densely populated and the SC is quite nearby. Along with the availability, distance is also an important factor for accessibility. Almost 50 percent of the households reported that the nearest facility is situated within 1-2 km, while 43.6 percent reported the nearest facility within a kilometer. While this is a positive factor indicating the nearness of health facilities, much of these medical facilities are not equipped to handle emergencies and therefore they are referred to Malda Medical College situated 80 km away from Bamangola and 25 km away from Kaliachak – I, which poses a hindrance in availing emergency medical services.

### **5.3.2 Mode of transport and Timing to reach Health Facilities**

In the rural areas, women have to travel long distances to avail medical services. Mode of transportation is another obstacle in accessing healthcare services. Nearly 70 percent of the women have to travel by foot to reach the health centres. 17 percent of the women travel by bicycle or own two-wheeler while only 8.1 percent use public transport which includes auto and bus. Malda is located in the highly fertile Gangetic plain. In Bamangola, villages are interspersed with large agricultural fields with a thin



kuccha road dissecting them and joining the villages with the main road. For Kaliachak – I, since it is densely populated, small and dingy streets give in to the main road. Both the blocks are not very suitable for the entry of public transport inside the village. Women either have to walk or take a pull cart or auto to the main road or then take a bus to reach the hospital. Situations become worse when the women are pregnant or the infant is ill. They have to travel long distances to avail the public health facility. Unavailability of timely referral services often leads people to hire private vehicle which increase their expenditure. Poor people who cannot afford private vehicle go for indigenous vehicles like pull cart. A case study reports that a woman gave stillbirth due to

**Table 5.3 Mode of transport and Timing to reach Health Facilities**

<b>Mode of Transportation</b>	
Foot	69.7
Bicycle	9.5
Pull Cart	5.1
Bus Service	8.1
Own 2 wheeler	7.6
<b>Time taken to reach health facility</b>	
Less than half an hour	62.4
Almost an hour	37.6
N	433

*Source: Primary Survey*

complications which she faced while being transferred to the hospital from home. The bumpy ride along the narrow lanes and dusty roads of the village on the pull cart further aggravated the problems, and the baby being unable to bear heavy shocks died in the womb. This brings out the problem of the absence of a proper mode of transportation in the area. Around 60 percent of the women reported that it takes less than half an hour to reach the facility while remaining 40 percent reported it takes more than an hour to reach the facilities. However, these facilities include only the government health institutions. Private health facilities are not taken into account which are more easily available and to which most of the people resort to when the baby is sick.

***Cause of Death : Lack of Transportation & Distance to Health Facilities***

***Case 2***

*Susmita Devi (Bamangola) was eight months pregnant when she started developing frequent abdominal pain. She visited the doctor at the Primary Health Center, who advised her more rest. However, being a nuclear family comprising her husband and herself, she was not able to get more rest. After two weeks into her eight months pregnancy, she started having labour pain and was taken to the primary health center. She was admitted in the hospital and the doctor discharged her the next day stating that the due date is still late. Two days back from the hospital, she again started having labour pain. This time, the husband did not pay much heed and asked her to have patience. It was only after she was writhing in pain and fainted, they took her to the hospital. However, the ambulance was not available this time. Her husband arranged for a cycle van, locally known as “bhotbhoti” to transport her to the hospital. The house situated in the interior of the village, is accessible by a mud road, which is uneven and bumpy at many places. By the time, she reached the hospital; she delivered a stillborn baby. The doctor blamed the bumpy ride on the rickshaw and delayed visit to the hospital as the key reason for the death, as the jerks prove fatal to the child.*

***Case 3***

*Laxmi Devi (Bamangola) got married at the age of 14. Her husband is a fisherman and she weaves fish-net in the house. Her house is situated across the Tangon river in the farthest village of Madnabati Sub-Centre. The river does not have a pucca bridge and has to be crossed by a wooden slab during the summers and by boat during monsoons. Due to long distance and transportation problem, they seldom visit the government health facilities and rely on the quack of the village. She got pregnant at the age of 15 which resulted in miscarriage after 3-4 months. Post-miscarriage she again conceived after five months, which too resulted in a miscarriage at four months. The quack which she visited regularly advised her to not conceive for a year. However, within six months she was pregnant again at the age of 17. She went for two ANC check-ups at the Sub-Centre and simultaneously visited the quack. Laxmi had a premature baby at seven months. The mother had a home delivery by the traditional dais, as they did not think it was necessary to deliver at the health facilities. The baby*

*developed “blue baby syndrome” and died 2-3 hours after birth. No doctor or medical personnel was called for checkup.*

#### **Case 4**

*Ruksana Bibi (Kaliachak – I) got married at the age of 15. Her husband is a labourer, while she makes “bidi” at home. She had her first baby at the age 16, which was premature and born at seven months. The baby suffers from frequent bouts of cold. When her first baby was nine months old, she got pregnant with her second baby. The ASHA reported that despite her advice, the couple does not practice any contraception because of the husband’s dislike. When advised to maintain a gap between two children, they replied “it’s by God’s grace.” Ruksana suffered from poor health with anaemia, low blood pressure and low weight. She received her ANC simultaneously from the Silampur Sub-and the village quack. She also got an ultrasound done at six months. The mother delivered her baby at home due to delay of the ambulance, after which she was shifted to Silampur Rural Hospital. The baby developed breathing difficulties and was referred to Malda Medical College, wherein he died in the evening. While Silampur is situated close to Malda Medical College, the National Highway 12 connecting the rural hospital to Malda often has long traffic jams, making the journey of 30 mins prolonged to 1.5 – 2 hours. This result in delayed transport of the patient, which happened during this case too. The doctor reported that the baby was brought very late to the hospital after the crucial time for intervention has passed.*

#### **5.4 Utilization of maternal healthcare services**

The very first country in the world to launch family planning programme, maternal and child health services was properly integrated and implemented in the policies only after 1955 in India. Prior to that, the services were unevenly distributed through maternity homes and midwives (Singh, 1997). These programmes and policies aiming at better maternal and child health, are disbursed through the Government health facilities and utilization of these services are a key determinant of the health status of the mother and the infant. This section discusses the various components of maternal health care services accessed by the mothers in the study region.

### 5.4.1 Antenatal Care Services

The maternal healthcare services encompass a wide range of services, most important being the pre-natal care. The importance of prenatal or antenatal care in reducing both maternal and infant mortality has been stressed time and again by the World Health Organization. Antenatal or pre-natal care refers to the pregnancy-related preventive interventions provided by skilled medical personnel in the medical facility or at home. The Safe Motherhood Initiative, 1987 stresses basic antenatal care for all pregnant women, as designed by the Government of India. Ideally, antenatal care is supposed to monitor pregnancy, recognize high-risk pregnancy and provide treatment along with counselling and advice on preventive care, nutrition, delivery and post-partum care. The Reproductive and Child Health Programme recommend at least four antenatal check-ups, two tetanus toxoid injections and at least 100 days of iron-folic acid to prevent and treat anaemic to be provided to pregnant women as part of antenatal care (MOHFW, 1997).

**Table 5.4 Percentage of Women receiving different types of Antenatal Care**

<i>ANC Indicators</i>	<i>Kaliachak - I</i>	<i>Bamangola</i>
Three or more ANC check Up	90.2	91.0
100+ days of IFA tablets	51.9	51.8
At least one tetanus toxoid injection	94.7	94.5
Full ANC	45.0	43.7
<i>N</i>	205	222

*Source: Primary Survey*

Table 5.4 depicts the different components of antenatal care received by women in the two blocks. Both the block records around 91 percent of their women having three or more ANC check-ups. This record is collected from the pregnancy and vaccination card given to the mother during their registration in the SC. It records all the check-ups and services provided to the mother throughout her pregnancy and to the child until the age of five. Apart from the check-ups in the SCs most of the women also go for a check-up with a private practitioner at least for once during their pregnancy. Rural areas have a difficult time attracting and retaining private practitioners and therefore the private healthcare sector in the rural areas are found to be ill-developed. The available private practitioners are often found to be low educated, practicing without any proper medical certificate. Hence, data about the private healthcare

institutions have not been collected for the study. Around 50 percent of the women reported consuming IFA tablets for more than 100 days given to them from the SC. Many of them reported sickness, forget to take as some of the reasons for not taking the medicine. However, since the information about the visit to the private facilities has not been captured, many of the women who consumed tablets or medicine from them are not known. The percentage of women having at least one tetanus toxoid injection is also high for both the blocks. Summing up the above three components, full ANC has been calculated, which shows that only around 45 percent of the women in blocks receive full ANC, which calls for more action. However, low consumption of iron-folic acid among the pregnant women, may have attributed to the low percentage.

Utilization of ANC is affected across regions by various socio-economic and demographic characteristics of women. Table 5.5 reveals the utilization of different type of ANC by these characteristics of women in the surveyed region. While with the increase in mother's age, the number of ANC visits reduces, for full ANC it can be seen that the percentage of mother's availing full ANC increases with age and then decreases. This may be attributed to the fact that women are applying their past experiences and knowledge of childbirth to inform other women and thereby influence their utilization of ANC. Several studies have noted that with an increase in the number of children there is a decrease in the use of healthcare facilities, which could be because of socio-economic dynamics and its implications on intra-household distribution of resources. The same process is noticed in case of Malda too, with all the components registering a decrease in percentage with the increase in the number of children. Education of the mother has always been portrayed as a catalyst in influencing health. Education not only increases awareness among women but also empowers the women to take decisions on her own which are beneficial for the baby and herself. The phenomenon is reiterated in case of Malda too. Percentage of mothers availing full ANC increases with increase in education from primary/illiterate to higher secondary and above. Positive effects of schooling on maternal utilization of healthcare have been well documented in literatures (Dutta et.al, 2013; Ghosh et.al, 2015). Education of the spouse also emerges as an important factor, as with increase in spouse's education, the utilization of services by the women increases in all the three components. This could be due to the fact, that higher education

Table 5.5 ANC by background characteristics of women

<i>Background Characteristics</i>	<i>Three or more Visits</i>	<i>At least one tetanus injection</i>	<i>IFA for at least 100 days</i>	<i>Full ANC</i>	<i>Sample Size</i>
<b>Mother's Age</b>					
15-19	92.8	100.0	52.1	43.7	69
20 - 24	92.1	92.5	49.3	44.0	214
25 - 29	87.8	94.8	60.0	50.0	98
Above 30	86.4	95.5	45.5	34.1	44
<b>Birth Order</b>					
1	95.0	98.5	50.7	48.3	200
2	90.2	91.5	51.4	42.5	143
3+	81.3	90.2	53.7	36.6	80
<b>Mother's Education</b>					
Illiterate & Primary	86.1	95.7	49.1	41.9	166
Middle & Secondary	93.7	93.1	50.0	42.4	174
Higher Sec & Above	93.1	95.5	60.7	52.8	87
<b>Husband's Education</b>					
Illiterate & Primary	88.1	94.1	44.6	38.4	201
Middle & Secondary	91.9	94.9	55.8	47.2	161
Higher Sec & Above	95.4	95.5	64.2	55.2	65
<b>Age at marriage</b>					
Below 18	86.6	95.4	51.4	42.1	217
At 18	96.1	89.4	49.0	41.3	103
Above 18	93.5	98.1	55.6	51.9	107
<b>Religion</b>					
Hindus	92.4	96.7	57.3	50.3	185
Muslims	89.0	93.3	47.9	40.3	237
<b>Caste</b>					
Scheduled caste	92.9	98.6	61.4	55.7	70
Scheduled tribe	92.7	90.9	41.8	34.5	55
OBC	87.3	94.4	55.6	41.7	71
Others	90.5	94.3	50.2	44.1	231
<b>Standard of Living</b>					
Low	91.2	96.5	55.2	49.4	170
Medium	92.1	89.3	40.9	36.5	114
High	88.6	96.4	56.3	44.1	140
<b>Exposure to Media</b>					
No exposure	82.6	91.3	39.1	26.1	23
At least some exposure	91.1	94.8	52.6	45.4	404
<b>Working status of mother</b>					
Working	83.1	91.8	49.6	36.0	124
Not Working	93.7	95.7	52.9	47.9	302

Source: Primary Survey

leads to better job and thereby improvement in the standard of living and therefore the women can have better access to health facilities. In the survey area it has been found that women whose spouse is engaged in private jobs or services are more prone to visit private health practitioners as they believe private institutions provide better service. Age at marriage is always an important factor affecting utilization. With increase in age women are more likely to receive more education, have better awareness and higher autonomy and decision making power than women in the lower age group. This is well reflected in the table (table 5.5) with the percentage of mothers availing all components of ANC increases with increase in age at marriage. A study shows that in India one's belonging to a particular social group (in terms of religion or caste) has an important effect on utilization. The utilization of maternal health care by caste has mixed results in the study area. Sociologists have observed that caste always act as a barrier in availing healthcare services in rural areas. Muslims women showed a lower percentage of availing services than the Hindus, which can be attributed to the higher autonomy enjoyed by Hindu women. Women in low standard of living are found to utilize more healthcare services than the high category. This is due to the fact that the data for ANC pertains to women who have accessed the government health institutions. Women with higher standard of living are more likely to visit the private facilities and therefore their utilization of government services is low. Exposure to mass media enhances awareness among women. In the study area, it can be found that women with at least some exposure to mass media are found to have a significant increase in availing ANC that woman who had no exposure. Similar results are found for working status of women. Longer working hours often lead to low utilization of ANC services and these is well reflected in the table.

#### *5.4.2 Place of availing ANC and type of care received*

It has been noted that in spite of several government policies and programmes the utilization of services from the government institutions remain underutilized. Table 5.6 shows that almost 98 percent of women receive at least one antenatal care from the SC or VHND. Along with receiving ANC from SC these women also pays a visit to the private facilities. A majority of the women has visited the private doctor at least once during their last pregnancy.

**Table 5.6 Medical facilities from where pregnant women received ANC for their last pregnancy**

<i>Type of Medical Facilities**</i>	<i>Kaliachak - I</i>	<i>Bamangola</i>
Government Hospital	1.90	3.14
CHC/Rural Hosp.	7.62	2.69
PHC	0.95	2.69
SC/VHND	96.67	97.76
Private Hosp./Nursing Home	1.90	3.59
Private Doctor	20.00	13.90
Hospital Doctor's Private Clinic	45.71	59.64
Others	10.00	1.79
<b>N</b>	<b>210</b>	<b>223</b>

*Source: Primary Survey*

*\*\* Multiple response variables*

The SCs are not provided with any general physician or gynaecologist and therefore in order to obtain expert advice the visit to the private medical facilities are made. It can be seen that around 60 percent of the women in Bamangola and 45 percent in Kaliachak –I visit the private clinic of doctors in the government hospital. Long waiting hours, irregularity and better facility in private has been cited as some of the reasons by the respondents. The percentage of private doctors is also found to be high in Kaliachak – I as the place has a

**Table 5.7 Percentage of Women receiving Specific components of ANC**

<i>Type of medical check-up**</i>	<i>Kaliachak - I</i>	<i>Bamangola</i>
Weight	98.56	99.55
Height	2.87	0.45
Blood pressure	96.65	98.65
Blood (Hb) tested	99.04	99.55
Urine	91.52	97.31
Abdomen	80.74	84.30
Breast	15.79	5.83
Ultrasound	57.89	52.91
Delivery Date	70.81	76.23
Delivery Advice	56.94	56.95
Nutrition	28.23	32.29
<b>N</b>	<b>210</b>	<b>223</b>

*Source: Primary Survey*

*\*\* Multiple response variables*



higher number of private practitioners. It can also be seen that Kaliachak – I report around 10 percent of women visiting other medical facilities which include quacks while the percentage for Bamangola is meagre 1.79.

During each of the ANC visit some specific check-ups of the pregnant women are carried out to ensure better health and a health record is maintained. Table 5.6 shows the percentage of women receiving specific components of ANC in each of the blocks. Almost all the women had been checked for weight, blood pressure and haemoglobin. While the percentage for abdomen check-up is found to be high in Bamangola, the percentage for breast check-up is found to be higher in Kaliachak –I. Delivery advice was provided to only 57 percent of the women in both the blocks. Advice for proper nutrition is also found to be low. Another important finding is that only around 50 percent of the women have opted for an ultrasound in both the blocks. This can be attributed to the absence of the facility in the government health institutions except for the Malda medical college which is situated far away and is visited only in times of emergency. Therefore, women who had simultaneous check-up from the private facilities have only got an ultrasound done.

#### ***5.4.3 Health problems during pregnancy and Medical Care sought***

The period of pregnancy is often plagued by several health problems the women face due to the undergoing changes in her body. While some of these problems are common and harmless, some requires particular attention and immediate medical care. In Bamangola, the highest reported problem was excessive fatigue followed by paleness/giddiness or weakness of the mother and swelling of hands, feet, and face. In Kaliachak – I, the highest reported problem was excessive vomiting, followed by excessive fatigue and weakness. Hypertension was observed to be high among mothers in Bamangola than in Kaliachak –I. Some of the mothers also suffered from jaundice or infection during their pregnancy in both the blocks. While majority of the women suffered from some or the other health problems, a very less number of them sought healthcare service for them. In Bamangola, most of the women visited private facilities when they experienced any problem, followed by a visit to SC. Both the rural hospital and Medical college being situated at a distance, women often resorted to

**Table 5.8 Health problems during pregnancy & medical care sought**

<b>Problems</b>	<b>Kaliachak - I</b>	<b>Bamangola</b>
Swelling of hands, feet and face	12.81	18.05
Paleness/Giddiness/Weakness	16.67	22.33
Visual Disturbances	5.88	8.74
Excessive Fatigue	17.65	23.30
Weak or no movement of foetus	3.34	2.92
Typhoid/Jaundice	3.34	3.40
Excessive Vomiting	18.63	16.02
Hypertension	5.39	8.74
Vaginal Bleeding	3.43	4.37
<b>N</b>	<b>204</b>	<b>206</b>
<b>Medical care Sought</b>		
Hospital	10.00	5.88
CHC/RH	12.50	7.58
SC	20.00	34.85
Private Hospital / Doctor	33.75	54.55
Others	5.00	0.00
<b>N</b>	<b>80</b>	<b>68</b>

Source: Primary Survey

the nearest available private facilities in Bamangola. However, in Kaliachak –I it is noticed that while most of the mothers visited private facility, a substantial percentage simultaneously visited the medical college and rural hospital. In Kaliachak –I, the rural hospital being situated adjacent to the SC, women often visit the hospital in times of emergency too. Further, the proximity to the medical college and easy availability of transportation services allows women to choose according to their need.

#### **5.4.4 Place of delivery**

To encourage the pregnant women to deliver in hygienic conditions under the supervision of trained professional is one of the major goals of the reproductive and child health care programme. It is advisable that the women deliver at a proper medical facility as there are number of researches which show that delivery in equipped facility reduces the risk associated with childbirth and ensures emergencies can be dealt swiftly, increasing the chance of survival for the newborn. Malda is a predominantly rural area, with most of the villages being situated far away from health institutions. Distance is a major factor affecting access to healthcare in the region. However, with increasing awareness and availability of quick referral system,

the district reported an increase in the percentage of institutional deliveries in the recent time. Between the two blocks, while Bamangola reported 84 percent of institutional deliveries, Kaliachak –I reported 78 percent. Government hospitals accounted for the highest percentage of deliveries in Bamangola, while in Kaliachak – I it was the rural hospital. The rural hospital in Kaliachak – I, being located near the SC has resulted in higher

**Table 5.9 Place of last delivery**

<i>Place of Delivery</i>	<i>Kaliachak - I</i>	<i>Bamangola</i>
Government Hospital	8.13	44.84
PHC	3.83	7.62
Rural Hospital	48.80	19.73
Private Clinic / Nursing Home	17.22	8.97
Home	22.01	18.83
<i>N</i>	209	223

*Source: Primary survey*

percentage of delivery in the facility. On the other hand, a large percentage of women of Madnabati SC in Bamangola reported having deliveries in the Uttar Dinajpur government hospital because of the availability of better services as well as proximity to the hospital. Bamangola forms the northwestern border of Malda and villages situated in Madnabati are closer to the Uttar Dinajpur government hospital which explains the reason for high percentage of hospital deliveries in Bamangola. From table 5.9, it can be also inferred that compared to Bamangola, a substantial percentage of women in Kaliachak – I opted for deliveries in private institutions. This could be attributed to the high number of private facilities available in the area. In Bamangola, only women belonging to wealthy households or having pregnancy complications was found to resort to private nursing home. The percentage of home deliveries were also found to be higher in Kaliachak – I. High percentage of people in the low standard of living and higher birth order in the area explains the fact. Most of the home deliveries in Bamangola were among the scheduled tribes who did not think it was necessary to visit the hospital for delivery.

Table 5.10 Place of Delivery By background Characteristics

<i>Background Characteristics</i>	<i>Government Hospital</i>	<i>Rural Hospital / PHC</i>	<i>Nursing Home</i>	<i>Home</i>	<i>Sample Size</i>
<b>Mother's Age</b>					
15-19	29.6	39.4	11.3	19.7	71
20 - 24	31.2	40.0	10.7	18.1	215
25 - 29	22.0	42.0	16.0	20.0	100
Above 30	13.6	34.1	18.2	34.1	44
<b>Birth order</b>					
1	32.8	37.8	15.9	13.4	201
2	28.8	37.7	13.0	20.5	146
3+	11.0	43.9	4.9	37.8	82
<b>Full ANC</b>					
No	27.9	39.6	7.5	25.0	240
Yes	26.6	39.6	19.3	14.6	192
<b>Mother's Education</b>					
Illiterate and Primary	21.0	42.5	4.8	31.7	167
Middle and Secondary	29.5	42.6	10.2	17.6	176
Higher Sec & Above	34.8	28.1	32.6	4.5	89
<b>Husband's Education</b>					
Illiterate and Primary	28.7	41.1	5.4	24.8	202
Middle and Secondary	27.0	42.3	10.4	20.2	163
Higher Sec & Above	23.9	28.4	40.3	7.5	67
<b>Religion</b>					
Hindu	36.2	33.5	14.6	15.7	185
Muslim	20.2	44.2	11.6	24.0	242
<b>Caste</b>					
Scheduled caste	41.4	34.3	14.3	10.0	70
Scheduled tribe	34.5	29.1	0.0	36.4	55
OBC	23.6	47.2	15.3	13.9	72
Others	22.6	41.3	14.5	21.7	235
<b>Exposure to Media</b>					
No Exposure	17.4	34.8	0.0	47.8	23
Exposure	27.9	39.9	13.4	18.8	409
<b>Standard of Living</b>					
Low	23.8	44.8	14.0	17.4	172
Medium	33.0	32.2	7.0	27.8	115
High	27.5	39.4	14.8	18.3	142

Source: Primary Survey

In the study area, around 80 percent of the births took place in medical facilities, of which around 17 percent were in private facilities and the remaining in government facilities. From table 5.10, it can be perceived that with an increase in age of mothers, women are more likely to have home deliveries or deliveries at the private facilities. Complications which arise due to late pregnancy may be cited as one of the reasons for higher deliveries in nursing home with increased age. With increased age, mothers are also more likely to have higher parity and therefore women are more likely to use their past experience and knowledge of childbirth and opt for home delivery. This is further ascertained by the higher percentage of home deliveries for birth order of 3 and above at 37.8 percent. Advice about place of delivery is provided during ANC visits and therefore women availing full ANC are supposed to have more institutional deliveries. It is found women who have availed ANC in the region are less prone to have home deliveries. Education is found to have a positive effect on the place of delivery. Illiterate or mothers having primary education have the highest percentage of home deliveries, while mothers with higher education have institutional deliveries. Same is noticed in case of husband's education. As stated before, higher education leads to better job opportunities thereby enabling people to have deliveries in nursing home. Spouses with higher secondary or more education are found to have 40 percent of their wives deliveries in Nursing home. Social variables like caste and religion also play an important role in determining place of delivery of women. Muslims are found to have more home deliveries compared to Hindus. Customs and culture differ by religion as well as caste and thereby determines the place of delivery. Scheduled tribes reported the highest percentage of home deliveries followed by others. On the other hand, scheduled caste women had the highest percentage of hospital delivery. Exposure to media creates awareness about the benefits of institutional delivery and women with no exposure are found to have the highest percentage of home deliveries. The standard of living presents an ironical situation. Both low and high categories are found to have deliveries in the nursing home. While delivery complications may be the reason for the former, preference for better service and cleanliness is the reason for the latter.

***Cause of Death: Indifference of the Health Personnel***

***Case 5***

*Rekha Devi's (Kaliachak – I) house is located in the farthest village of Silampur sub-centre. Losing her house to the floods of the Ganges four years prior to the survey, she lives in a kutchra house, in an unhygienic environment. Both she and her husband work as labourers. She gave birth to her first child at the age of 18 and got pregnant with her 3<sup>rd</sup> one at the age of 22. The ASHA reported that while she received all the essential ANC services, she suffered from anaemia and was advised rest. However, living in a nuclear family with two children, she was not able to have more rest and also worked as a labourer until seven months of her pregnancy. At nine months, when she started having labour pain, she was admitted to Silampur Rural Hospital where she was kept for two days. The respondent stated that despite repeated complaining to the nurses of abdominal pain, they did not pay heed and said there is still enough time left for the delivery. After two days she was referred to Malda Medical College after she started bleeding and complained of acute pain. A caesarean section was performed and she gave birth to a stillborn. The doctors said that the baby had died inside the womb few hours before and could be saved had she been operated a day earlier.*

***5.4.5 Reasons for not delivering in a health facility***

A high percentage of neonatal deaths occur in the first 24 hours after birth due to infection, birth asphyxia and preterm delivery. WHO reports that up to two-thirds of the neonatal deaths can be avoided if timely care and skilled intervention is provided at birth (WHO, 2011). Therefore, institutional delivery is an intervention in reducing neonatal and infant mortality in the developing countries, wherein births at home continues to be high.

***Table 5.11 Reasons for not delivering in a healthcare system***

<b><i>Reasons</i></b>	<b><i>Kaliachak - I</i></b>	<b><i>Bamangola</i></b>
Not Necessary	50.0	60.0
Not Customary	21.9	37.5
Poor Quality Service	6.3	10.0
Family didn't allow	12.5	15.0
No time to go	56.3	52.5
<b><i>N</i></b>	32	40

Source: Primary Survey

#### 5.4.6 Reasons for not delivering in a Government health facility

Out of the total sample surveyed, 49 women opted for delivery in a private facility. Several researches have documented that irrespective of the increase in government infrastructure and service, the utilization has remained low. Malda medical college which also acts as a district hospital is the only big government hospital available in the district. The huge amount of population pressure on the hospital does not allow proper utilization of resources as well as they are unable to provide better services. The state of the rural hospitals is also in a dismal condition. Dogs and cats are found to loiter around the ward in Kaliachak –I hospital. The surroundings are filthy and unhygienic. Also, irregularity and rude behaviour of doctors and health staff repulse the patients. Table 5.12 reveals the various reasons given by respondents for not using government facilities.

**Table 5.12 Reasons for not going to a government institution for delivery**

<b>Reasons**</b>	<b>Kaliachak - I</b>	<b>Bamangola</b>
Lack of Qualified Doctors	40.9	33.3
Irregular Doctors	14.3	22.2
Preferred Doctors	42.9	73.7
Rude Behaviour	14.3	16.7
No Cleanliness	42.9	38.9
Too Far	23.8	0.0
<b>N</b>	<b>21</b>	<b>18</b>

*Source: Primary Survey, \*\* Multiple response variables*

A majority of women in both the blocks reported preferred doctor as one of the reasons for not delivering in a government facility. As stated before, women along with visiting the SC, also visited a private practitioner for a check-up. Most of these private doctors also have a clinic or nursing home, and therefore women prefer to deliver in their nursing homes under the guidance and supervision of the same doctor. The next important reason given was lack of cleanliness in the government facilities. The hospitals and PHC, especially in Kaliachak – I are in a sorry state of affairs with unhygienic and dirty surroundings. Another important reason given by women was the lack of qualified doctors in the hospitals. Neither of rural hospitals or PHCs reported having a gynaecologist as seen in chapter 4.

***Cause for not Delivering in a Government Facility: Poor Service***

***Case 1***

*Kakuli Devi (Bamangola) had her first birth as a still born. The baby died inside the womb 3-4 hours before the caesarean was performed at Malda medical college. After her first baby, she could not conceive for 4 years and it was after visits to many doctors and quacks she conceived her 2<sup>nd</sup> child. At eight and a half months, she stopped feeling the movement of the baby and got herself admitted at the Doulatpur primary health centre, wherein she was given a bottle of saline drip and discharged. She returned home the next day and at night, her water broke and amniotic fluid started discharging. She again went to the primary health centre from where she was referred to Malda Medical College. The doctors after checking her discharged her and advised her to come back after 2 months as the baby is premature. Thereafter she got herself admitted in a nursing home, where a caesarean section was performed and the premature baby was kept in incubator. Had not the operation been carried out, she would meet the same previous fate. The mother now never visits the government health centre, and always visits a private practitioner in Malda or the quack.*

***Case 2***

*Afreen Bibi (Kaliachak – I) was admitted to Silampur rural hospital after she complained of abdominal pain. She was kept in the labour room for 2 days, for the labour pain to increase to have a delivery. After 2 days, the doctor discharged her saying to come back after 7 days as the due date is still late. The mother delivered her baby at their door step while returning from the hospital. The family reported why they would visit the health facilities if the doctor cannot predict proper delivery date and have an indifferent nature to the problems of the patient.*

**5.4.7 Post Natal Care**

While antenatal care is important to ensure better development of the foetus, good health of the mother and to prevent and detect early signs of danger, post-natal care ensures better health of both mother and child after birth and aids in reducing maternal and child mortality. WHO recommends that a woman should not be discharged before 24 hours after birth. Regardless of the place of birth, it is important



that someone accompanies the woman and new-born for the first 24 hours after birth to respond to any changes in her or her baby's condition as several complications can occur in the first 24 hours. Majority of the neonatal deaths are reported within 24 hours after birth and therefore supervision is required for timely intervention and care.

**Table 5.13 Post Natal Checkup**

	<i>Kaliachak - I</i>	<i>Bamangola</i>
<b><i>Check up within 24 hours</i></b>	65.2	88.89
<b><i>Place of check -up</i></b>		
Government Hospital	14.71	56.02
Rural Hospital	49.02	13.43
PHC	4.9	3.7
Sub Center	9.31	4.17
Private Clinic/ Nursing Home	6.37	5.56
ANM / Nurse/ ASHA at home	15.69	17.13
<i>N</i>	204	216

*Source: primary Survey*

Following childbirth at home, it is important that the mother and baby receive a postnatal examination as early as possible, preferably within 24 hours of birth. The table 5.13 shows that while Bamangola had almost 90 percent of its women availing post-natal check-up within 24 hours of birth, it was only 65 percent for Kaliachak. A probable reason for the trend could be high population pressure on the latter. The check-up is supposed to take place at the institutions where birth takes place and therefore, the percentage varies according to the place of birth in the blocks. When birth takes place at home, ASHA or ANM is supposed to visit the mother and the child at home. While the percentage of home deliveries are quite high in both the blocks, the percentage of women availing post-natal care at home at found to be low, which suggests negligence on the part of the health workers.

The first check-up within 24 hours is essential to detect any health problems of both mother and child. There are several components which forms part of the check-up,

which are listed above (Table 5.14). Examination of the abdomen is important post-delivery for it can reduce complications or risk of infections of the mother, especially for caesarean delivery, where the stitches need to be examined. 57 percent of women reported having their abdomen checked in Bamangola, while it was 38 percent in Kaliachak – I (Table 5.14). Early initiation of is beneficial for the infant as the colostrum, or the first breast milk of the mother is enriched with essential nutrients for developing immunity of the baby.

**Table 5.14 Percentage of women receiving specific components of Post Natal Care**

<i>Components of PNC</i>	<i>Kaliachak - I</i>	<i>Bamangola</i>
Examination of Abdomen	38.27	57.92
Advice on breastfeeding	25.00	32.58
Advice on Childcare	34.36	24.43
Advice on family care	2.05	3.74
Casual Enquiry	27.55	26.94
<i>N</i>	196	221

*Source: Primary survey*

WHO also recommends exclusive breastfeeding up to six months of age which ensure good health of the infant. Therefore, mothers are advised to frequently breastfeed their child after birth as it is an important intervention in reducing infant mortality. Only 25 percent of women were advised on breastfeeding in Kaliachak – I while the figure is slightly higher for Bamangola at 32.5 percent. However, higher percentage of women in Kaliachak – I were provided with advice on baby care than in Bamangola. Around 30 percent of women reported casual inquiry about their health by nurses without any specific check-up or advice in both the blocks.

***Low Utilization of Government Services: Some Findings from the Survey***

*From the indepth interview with the mothers, several causes for low utilization of government health services in the study area were reported. One of the major cause was negligence or indifference on the part of the health professionals. Cases have been reported wherein the women has been kept in the dark labour room for 2-3 days without proper assistance and has been discharged by advising to come back later. The respondents also reported the nurses are rude and don't speak to them properly. This has been confirmed by the ASHAs too. Many people do not want to avail the government facilities due to the rude behavior of the medical staff. Further, under the Janani Shishu Suraksha Karyakram, the mothers who avail government services are provided transportation free of cost to the Government hospitals. For this, contract has been given to private transport company for providing referral services. Many a times these private providers refuse to provide free services citing any reason. They charge the patient anything between 100 to 300 rupees, which further discourages the mothers from accessing these services.*

*The corruption among doctors were also reported by the ASHAs. Mohua Devi (Bamangola) had her first baby at the age of 18. She conceived again within 4 months of giving birth to her first baby. Due to utter poverty and poor health, the mother wanted to get the unwanted child aborted. The doctor at the hospital charged her Rs.4000 for the abortion, the government charges for which is Rs. 700. The ASHA reported that the doctor stated that the facility of abortion was unavailable in the hospital at that time and therefore he would provide private facilities. However, she was unable to pay such a higher user fee and therefore had to bear the child which was 4 months old at the time of survey. The incident however went unreported to the higher authorities. Out of fear of losing their jobs the ASHA keeps their mouth close. The doctors were also reported to practice privately during their duty hours. This in turn increases the long queue of the Government hospital. Further, absence of good public transport system often forces the people to opt for private transport which is costly. Most of the time, the hospitals too do not provide medicine and the patient has to buy it from private medical shop. Respondents are of the opinion that time and money they spent on visiting the Government health facilities is much more than the money spent on visiting the rural health providers or quacks and therefore it is more convenient for them to visit the latter.*

## **5.5 Conclusion**

Both the blocks in the study differs demographically. With a high fertility rate, Kaliachak – I reported more than double the population of Bamangola, with more than 30 percent of higher parity births. The distribution of mothers across age groups was found to be similar in both the blocks, with Kaliachak – I reporting a higher percentage of older mothers. Further, though Bamangola reported higher percentage of adolescent marriages, the percentage of adolescent births was found to be higher in Kaliachak – I. Along with the demographic characteristics, the utilization of maternal healthcare in the region varies widely. Utilization of private health facilities regarding availing ANC was found to be high in both the blocks. However, while the availability of better transportation as well as road network in Kaliachak – I, enabled mothers to choose health facilities according to their need, geographical accessibility pose a constraint to better utilization of healthcare services in Bamangola. Mothers therefore often resort to the nearest available health facility. In general, mothers in both the blocks reported lower utilization of Government health care services.

## Chapter 6

### *Infant Health Status in Malda: Utilization of Healthcare Services & Determinants*

#### **6.1. Introduction**

Good child health is an imperative factor determining the quality of future demographic dividend of the country as most of the cognitive and physical development of the child takes place during these years. Also, this is the most vulnerable period with most of the child deaths taking place within the first year of life – about 4.2 million, almost 75 percent of the under-five deaths in 2016 (WHO, 2016). Taking into the account the high infant and child mortality rates, the Millennium Development Goal of reducing the under-five mortality rates by two-third by 2015 was transitioned to complete end of all preventable neonatal and under-five deaths by 2030 in the Sustainable Development Goals ( Health in 2015).

Maternal and child health has always been a key concern for the policy makers, and this has been time and again reflected in the several programmes and policies of the Government. In 2016, India alone accounted for more than 27 percent of the newborn and 23 percent of the infant deaths worldwide. Despite its remarkable achievement in lowering down the mortality rates in recent years, the decline has not been substantial when compared to the developed countries of the world wherein the IMR is as low as 8.3 per 1000 live births. The country has witnessed an uneven reduction in the mortality rates with pockets of high mortality zones owing to its varied socio-cultural and regional development. Though the reduction in population growth rates marked the population policies in the initial years after Independence, soon the importance of better child survival and maternal health was recognized as the major driving force in bringing down the high fertility rates. It was necessary to implement policies aimed at a better child and maternal health, to bring down the growth rates, and thereby many programmes of the Government has been implemented.

Infant health is influenced by various determinants - various health care practices, traditional knowledge, culture and beliefs, socio-economic status, demographic factors as well the availability and accessibility to the health care services being some of the major factors. In the first year of life, the initial 28 days after birth are the most

vulnerable time with the high risk of dying. Proper feeding and appropriate care need to be provided during this period to reduce the risk of survival and lay the foundation for better health of the child. Thus, neonatal care and practice also is an important factor affecting infant health. This chapter explores the infant health care practices followed and utilization of health services in Malda. An index has also been created to assess the infant health status in the blocks of Kaliachak – I and Bamangola, and to find out its determinants.

## **6.2 Birth Weight and Gestational Period**

The relationship between birth weight, neonatal mortality and child health has been well documented (Kramer, 1987; Carton et al., 1997). The World Health Organization defines low birth weight as babies weighing less than 2500 gm at birth. Epidemiological observations have revealed that it has a close association with neonatal mortality, low cognitive development and other diseases in later life (UNICEF and WHO, 2004). Globally, around 15 to 20 percent of the births are low weight births with more than 95 percent of them being concentrated in the developing countries, which is a matter of grave concern taking into account the already high neonatal mortality rate existing there. Further, not only it increases the risk of neonatal mortality, but it also affects the nutritional development as well as increase in the risk of non-communicable diseases in later life (Risnes et al., 2011).

Low birth weight is determined by two important factors – duration of gestation (period of pregnancy) or slow intra-uterine growth (Kramer, 1987). A normal pregnancy usually lasts for 40 weeks for a human. A preterm birth refers to the births with a gestation period of less than 37 weeks. According to the World Health Organization, pre-term birth complications are one of the leading causes of mortality under the age of five (WHO, 2017) and annually around 15 million births are recorded as pre-term births. Pre-term babies along with low birth weight are most vulnerable and prone to long-term illness as often the organs of the infants are not well-developed resulting in several complications (WHO, 2015). Similarly, post-term babies pose a risk for both the mother and child due to the large size of the baby which may lead to prolonged and delayed labour, injury to the perineum of the mother thereby leading to excessive bleeding and infection.

**Table 6.1 Gestational period and Weight of the baby**

<i>Gestational Period (in weeks) / Birth Weight</i>	<b>Kaliachak - I</b>		<b>Bamangola</b>	
	<i>2500gms and above</i>	<i>&lt; 2500gms</i>	<i>2500gms and above</i>	<i>&lt; 2500gms</i>
Premature (< 37 weeks)	21.4	78.6	38.9	61.1
Full Term (37 to 42 )	89.3	10.7	86.2	13.8
Post term (after 42 weeks)	85.7	14.3	81.3	18.8
<i>N</i>	176	34	183	40

*Source: Primary Survey (Chi-square significant at 1percent level)*

On an average, a full term baby weighs 2500 gms or 2.5 kg at birth. Pre-term or premature babies due to incomplete development often tend to be of low birth weight. A cross-tabulation of the gestation period by birth weight of the infant was carried out to map the distribution of premature and low birth weight babies in the block of Bamangola and Kaliachak –I. A chi-square test was also carried out to ascertain the association between the two which shows a statistically significant relationship at 1 percent level of significance. The highest percentage of low birth weight was found among infants who were born prematurely, followed by infants born post-term. Kaliachak – I record a higher percentage of almost 79 percent of premature and low birth weight infants compared to Bamangola (61 %), who records a higher percentage of post-term infants than the former. Most of the premature infants require extra care and often kept in incubators with regular check-ups being performed to reduce the risk of developing infections and other problems. In the study area, it was observed that most of the premature infants who require specialized care were referred to a higher medical facility like Malda Medical College or private nursing homes due to near-absence of specialized medical care in the PHCs and rural hospitals. This often resulted in a delay of health service being provided to the child, as most of the nursing home and Malda Medical College are situated in Malda town, which is quite far away from both the study areas. Post-term births with more than 3.5 kg of weight were not found in the any of the blocks, and therefore though a comparatively higher percentage of post-term births are witnessed, they did not possess risk for the mother.

### 6.3 Post Natal Care

The period of six weeks following birth, referred to as post-natal period, is the most critical phase for both the mother and the child. Several changes take place during this phase which determines the health of the mother and the child and lack of proper care and intervention may lead to serious health problems and even death. Majority of the maternal and neonatal deaths occur during the first month of birth, and almost half of this takes place in the first 24 hours of birth (WHO and USAID, 2015). Despite substantial progress made in providing quality of antenatal care to the mother, it has been observed that there exists a lack of quality and effective services being provided at this critical juncture, after the birth of the baby. When compared to rates of provision of healthcare services before and during birth, rates were found to be quite low after birth (WHO, 2013). Not only these services aim at better health and prevention of post-partum complications of the mother, but also reduce the risk of complications and infections of the baby (Sharma et al., 2014). The World Health Organization recommends check-up of the child within 24 hours, assessment of danger signs of the newborn, promotion of good hygiene and feeding practices as some of the essential post-natal care to be meted out to the newborn.

#### 6.3.1 Post Natal Check-ups

Recognizing the fact that still, a high percentage of births take place outside the health institutions and even in health institutions the mothers and newborn are discharged a few hours after birth, recommendation on home-based post-natal care was made by the World Health Organization which includes at least three checkup of the baby by health professionals within 10 days of birth (WHO, 2009). In the study area, it has been observed that most of the mothers were released from the health institution after a day of the delivery in case of normal delivery and after three days in case of cesarean delivery. The home deliveries were supposed to be visited by the ASHA or ANM on the day of birth, even if not assisted by any health professional.

Both the blocks in Malda reveals a high percentage of check-up of the child within 24 hours of birth (Table 6.2). A high percentage of institutional births can be cited as the major reason for this. The percentage of children who have received check-up was found to be higher in Bamangola than Kaliachak – I which records almost 9 percent



of the children not receiving a check-up. Place of first check-up depend on the place of delivery and as the percentage of deliveries in private institutions were higher in Kaliachak – I, it reveals a higher percentage of check-up of the child in private health institutions (Table 5.8). Another important revelation is the low percentage of check-up at home in Kaliachak – I. While it records a high percentage of home deliveries,

**Table 6.2 Post-natal Check-up received by the infant**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<b>Check-up of child after 24hours of birth</b>		
Yes	91.3	94.1
No	8.7	5.9
<b>Place of first check-up of the baby after birth</b>		
Government Institutions	70.1	73.7
Private Institutions	14.2	7.4
Home	15.7	18.9
<b>Number of Check-up of child within 10 days</b>		
Less than 3	6.3	27.1
3 and above	93.7	72.9

*Source: Primary Health Survey*

the percentage of check-up was found to be low when compared to Bamangola. However, regarding number of check-ups within ten days, Kaliachak – I record a high percentage of 93 percent wherein Bamangola records only around 73 percent. As stated in chapter 5, a large percentage of women in Bamangola, especially in Madnabati opt for delivery in government hospital in Uttar Dinajpur, which also happens to be maternal home for many women. These women registered in the Sub-Centre of Madnabati do not avail the services of their local SCs or inform them about the delivery, and therefore quite a high percentage of child do not receive the prescribed check-up. Further, accessibility is also a problem for one village in Madnabati and Doulatpur SC each. These villages remain cut off during the monsoon resulting in health personnel not being able to make home visits.

### 6.3.2 Neonatal health and care

The first 24 hours after birth is crucial for the baby as they may develop birth-related complications or infections which, if not assessed or managed in time may result in death. Therefore, it is recommended to identify the danger signs in the baby and act immediately. Some of the danger signs after birth include swollen belly area, jaundice, poor suck of breast, fever, cough, breathing difficulty, vomiting, rapid heart rate, more than 8 stools in a day and cyanosis, also known as blue baby syndrome. In the study area, jaundice, vomiting and fever were noticed as major symptoms among infants after birth. Among the ailments, infants were found to be affected most by fever or cough in both the blocks with Kaliachak –I (22.4%) recording a higher percentage. Regarding children who have jaundice too, Kaliachak – I record a high percentage of 16.2, almost double of Bamangola (9.7). However, a higher percentage of children reported vomiting in Bamangola than Kaliachak –I.

**Table 6.3 Neo-Natal health of the Infant and care received**

	Kaliachak - I	Bamangola
<b>Symptoms after Birth*</b>		
Jaundice	16.2	9.7
Vomiting	8.1	10.2
Cough/Fever	22.4	18.4
<b>Skin to Skin Care Given</b>		
Not at all	33.3	19.7
A little (up to 2 hours total)	58.6	52.5
Moderate Amount (2-5 hours)	7.1	27.4
<b>Baby Required Extra Care</b>		
Yes	35.7	22.5
No	64.3	77.5
<i>N</i>	210	223
<b>Extra Care Received</b>		
More frequent breastfeeding	25.3	22.0
Fed by cup or spoon	2.7	6.0
Incubator	38.7	52.0
Hospitalization	33.3	20.0
<i>N</i>	75	50

Source: Primary Survey; \*Multiple Response Variable

The skin to skin care is an important intervention for the newborn and involves early and continuous skin to skin contact of the mother with her newborn. This leads to prevention of “hypothermia,” i.e., reduction of body temperature below 36.5<sup>0</sup>C of the

infant, especially in cold areas. Further, the process of conventional care for preterm and low birth weight babies requires skilled medical professional as well as sophisticated medical equipment. “*Kangaroo care*” is an initiative of the World Health Organization to provide traditional treatment to pre-term and low birth weight babies which includes continuous and prolonged skin to skin care along with exclusive breastfeeding (WHO, 2003). It has proved to be effective care for preterm babies and is being followed in India too. Skin to skin care is beneficial not only for the premature babies but all other as well as it leads to initiation of early breastfeeding of the child. Table 6.3 reveals that a high percentage of infants in both the blocks were not provided skin to skin care in Malda with Kaliachak – I again recording a higher percentage. While in both Bamangola and Kaliachak – I, more than half of the infants were provided with a little care of up to 2 hours, a higher percentage of around 27 percent of infants received moderate (2 to 4 hours) of care in Bamangola compared to only 7 percent in Kaliachak – I. Skin to skin care proves to be beneficial only when provided for a prolonged period, and though Kaliachak – I records a higher percentage of preterm and low birth weight babies (Table 6.1), the percentage of infants receiving prolonged care was found to be quite low.

Other than the recommended neonatal care, around 35 percent infants in Kaliachak – I and 22 percent in Bamangola required extra care which includes hospitalization, incubation, frequent breastfeeding and feeding by cup or spoon. Incubation of infants recorded the highest percentage in both the blocks, with Bamangola having more than 50 percent of its infant who required extra care availing incubation. Chi-square test was carried out to ascertain the high incubation rate was due to jaundice or low birth weight and a positive association was observed, significant at 1 percent level of significance. This shows that most of the incubation was due to jaundice or low birth weight. However, while the percentage of infants referred incubation was low, the percentage of children hospitalized was found to be quite high in Kaliachak – I which can be explained by the high percentage of children suffering from cough and fever after birth in the block. This is further established by the chi-square test which shows a positive association at 1 percent level of significance. Breastfeeding is always recommended soon after birth as breast milk contains all the essential vitamins required for the baby and aids in immunity development. Around a quarter of the

infants in Kaliachak – I and Bamangola required frequent breastfeeding as extra care after birth.

### ***6.3.3 New Born and Infant feeding practices***

Breastmilk of the mother contains all the essential nutrients necessary for the child's growth and is beneficial as it protects the child from various infections by developing a strong immune system, thereby aiding a healthy growth. Not only it provides half the energy needs of a child aged 6 – 23 months and but also reduces the risk of mortality among malnourished children. Further, breastfeeding also benefits the mother by reducing the risk of breast cancer and improved birth spacing (Victora et al., 2016). The Lancet series on breastfeeding reported that around 8,23,000 children and 20,000 mothers could be saved every year through universal breastfeeding (<http://www.thelancet.com/series/breastfeeding>). It also confirms the relevance of breastfeeding in the newly launched Sustainable Development Goals as it will help to achieve the zero hunger by providing affordable and natural food for the infants. This will further result in “no poverty”, “zero hunger” by exclusive breastfeeding and “good health and wellbeing” as breastfeeding significantly improves the growth and development of the infants and children (<http://www.who.int/mediacentre/events/2016/world-breastfeeding-week/en/>).

The World Health Organization and UNICEF recommend early initiation of breastfeeding within 1 hour of birth and exclusive breast-feeding for 6 months for proper growth and development of the infant ( WHO, 2017). In the survey, question was asked about the timing of initiation of breastfeeding and duration of breastfeeding. It was found that in both Bamangola and Kaliachak – I, initiation of breastfeeding started within after 1 hour to 24 hours after birth for more than half of the infants. However, a high percentage of infants were also found to be breastfed within one hour after birth. In terms of exclusive breastfeeding, both the blocks recorded more than 75 percent of infants being exclusively breastfed compared to the national figure of 57 percent as reported by NFHS – 4 data (WHO, 2016).

The thick yellowish milk – colostrum, secreted after childbirth is considered as the perfect food for the newborn and is supposed to be fed within one hour of birth (WHO, 2007). The colostrum being rich in proteins and antibodies protects the new

**Table 6.4 Breastfeeding Practices**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<b><i>New Born First Feed</i></b>		
Breast Milk	91.9	93.7
Honey / Glucose Water / Cow Milk	8.1	6.3
<b><i>Initiation of Breastfeeding</i></b>		
Immediately / Within one hour of birth	42.9	47.1
Within 24 hours	53.3	49.3
After 2 days	3.8	3.6
<b><i>Exclusive Breastfeeding</i></b>		
Yes	77.1	76.7
No	22.9	23.3
<b><i>Feeding of Colostrum</i></b>		
Yes	96.2	97.7
No	3.8	2.3
<b>N</b>	210	223

*Source: Primary Survey*

born from infections which is essential during the first few days after birth. In India, traditionally the first feed of the newborn honey or butter in the Hindu culture and dates dipped in honey in the Muslim culture and colostrum is often discarded regarding it has harmful for the child (Subbulakshmi et al., 1990). The pre-lacteal food or the first feed of the child is supposed to be sacred and most of the cultures believe that providing foods like honey or date will be beneficial for the child and will grow with right beliefs and attitudes of a sacred man (Haq, 2008). However, all these rituals are harmful to the child and result in delayed breastfeeding and throwing away of colostrum, the powerhouse of nutrients for the child. Though the percentage of exclusive breastfeeding and initiation of breastfeeding was found to be low, more than 90 percent of the infants were fed colostrum and breastmilk as their first feed. Neonatal feeding practices and beliefs often depend on the place of delivery. In intuitional deliveries, the mothers are advised and encouraged to feed colostrum and breastmilk to the baby just after birth, while it may not be a scenario in home delivery by untrained professionals or dais. Though, the chi-square test reveals no significant association between the feeding of colostrum and place of delivery, a high positive association at 1 percent level of significance was noticed between newborn first feed

and place of delivery. A higher percentage of babies born at home was found to be fed with cow milk, honey or sugar as their first feed, especially at Kaliachak – I.

#### **6.4 Infant Health Status**

Health status of the infant is an important indicator of the socio-economic and demographic development of any region. It sheds light on the quality of future demographic window and helps to understand the effectiveness of various programmes and interventions of the Government and formulate policy accordingly. Infant health status in Malda is reported to be poor with high infant and child mortality in the past few years. The district has been news in the past for quite some time because of its high infant and child mortality and morbidity (India Today, Nov 2012; Mail Online, Jan 2012; Outlook, June 2014).

The most common childhood diseases are acute respiratory diseases and diarrhea. Globally, these two account for more than 30 percent of infant deaths and are the leading causes of neonatal mortality (WHO, 2010). To assess the infant health status in Malda, an index has been created taking into account the vaccination status, periods of diarrhea and pneumonia in the last six months and fever and infection in the last one month of the infant. While vaccination status was divided into partial and full vaccination, as none of the infants in the survey area reported no vaccination; pneumonia and diarrhea were categorized into whether none, moderate and severe taking into account occurrence and no of incidences in the last six months preceding the survey. Fever and infection were categorized into whether they had incidences of them in the last one month as the maximum occurrence was found to be only once. After that, the index was formed by merging them into one variable of infant health status. Infants who were affected by none of the diseases and had full vaccination were termed as “good health status”, infants affected by at least one of the diseases and full vaccination or at least one of the diseases and partial vaccination as “moderate health status”, infants affected by severe diarrhea or pneumonia and partial vaccination or affected by all of the diseases and had partial vaccination were termed as “poor health status” accordingly. In the following section, all the indicators of infant health status are discussed in detail and thereafter the determinants of infant health status in Malda are assessed.

### **6.4.1 Immunization**

Immunization refers to the process of administration of vaccine to a person thereby making him resistant and immune to several diseases and infections which can be fatal or make them disabled. The process of immunization starts right after birth and continues till 12 years of age so that the child could be immune to vaccine-preventable diseases like polio, measles, diphtheria, tetanus, tuberculosis which have been causing havoc in the past by claiming a large number of lives (Andre et al., 2007). It is considered as one of the cost-effective treatment, as not only it increases life expectancy but also enables proper growth of the child. Globally, vaccines are targeted to pregnant women, infants and children as they are most vulnerable and at high risk for vaccine-preventable diseases. Though the number of vaccines in the immunization program varies from country to country depending on the burden of disease and disease profile, some of the vaccines against tetanus, diphtheria, polio, measles, pertussis and Hepatitis B are part of the immunization program of the most countries of the world (Lahariya, 2014).

Globally, the proportion of children vaccinated has become stagnant in the last few years and during 2016, only 86 percent of the children received three recommended dosage of diphtheria-tetanus-pertussis (DPT3) vaccine. Accounting for more than 20 percent of global child mortality, India organizes nine million immunization sessions each year targeting these infants and around 30 million pregnant women for routine immunization (UNICEF, 2016). The Government of India introduced the Universal Immunization Programme (UIP) in 1985 for expanding the Routine Immunization (RI) coverage in the country and since then it has been an integral part of every program of Government related to maternal and child health. At present, it is a part of the Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) approach which strives to protect every infant from vaccine-preventable diseases. The UIP provides support to the central and state government for both routine immunization and supplementary immunization including polio, Japanese Encephalitis, and measles. More than 30 years after implementation of UIP, the full immunization coverage (BCG, measles and three doses each of Polio and DPT) remained quite low at only 62 percent (NFHS-4, 2015-16) and had stagnated in the last 5 years increasing at 1 percent average per year. Therefore to strengthen the existing UIP, Mission Indradhanush was launched in December 2014 with the aim of

immunizing 90 percent of the newborn by the year 2020. The project was initially launched in 201 high focused districts of 28 states. The success of the programme in improving the immunization rates encouraged the Government to bring in the Intensified Mission Indradhanush which aimed at fully immunizing children up to two years and all the pregnant women in all the districts within a specific period, December 2018 (<http://www.missionindradhanush.in/about.html>).

**Table 6.5 Immunization Status of the Infants**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<b><i>Vaccination Coverage</i></b>		
Partial Vaccination	5.7	11.2
Full Vaccination	94.3	88.8
<b><i>Place of Vaccination</i></b>		
Sub-Centre	68.6	76.2
Anganwadi / ICDS	15.2	16.1
VHND	14.8	6.7
N	210	223

*Source: Primary Health Survey*

Six districts in West Bengal was listed as the high focused district namely North 24 Parganas, South 24 Parganas, Barddhaman, Birbhum, Uttar Dinajpur and Murshidabad where Mission *Indradhanush* was launched in the first phase. Though Malda was not under the high focused districts, it recorded only 69.5 percent of children being fully vaccinated in NFHS -4, 2015-16 (IIPS and ICF, 2017). In the study area, vaccination status of the children is divided into partial and full vaccination as none of the infants surveyed had no immunization. The immunization status is calculated according to age, i.e., by age the required vaccinations were received or not and thereafter they were divided into partial and full immunization.

In the study area, Kaliachak – I recorded 94.3 percent of the infants being fully immunized, while Bamangola stood at 88.8 percent (Table 6.5). In Bamangola, there exists a small cluster of houses in *Murulipara*, under the Doulatpur Sub-Centre. All the residents were scheduled tribes, speaks a different language than Bengali and are daily laborers. They live in kutchra houses with no access to electricity and improved drinking water source. The ASHA reported it was very hard for them to convince them to get their children immunized as they believe it will cause harm to the children. A similar situation wherein the mothers responded they do not have time to



visit the Sub-Centre was witnessed in *Bokchor*, a Muslim dominated area. These may be cited as some of the reasons for the lower percentage of infants being immunized in Bamangola. Further, infants suffering from cold or any other ailments were vaccinated only when they get well. This may result in the recording of the infant as partially immunized at the time of the survey. As seen in Table 6.5, all the infants received vaccination from the Government health facilities, with the Sub-Centre recording the highest percentage. A large number of infants were also immunized in the VHND, which is conducted once every month in the villages to acquire information and provide primary care for those not able to visit the sub-centre. Since, in Kaliachak – I, many of the villages are situated far away from the Sub-centre, a higher percentage of infants are recorded to receive vaccination at the VHND in the block compared to Bamangola.

#### ***6.4.1.1 Immunization Status by Background Variables***

The immunization status of the infant depends on several factors. NFHS - 4 records a wide array of reasons for not receiving vaccinations like, did not feel the need, unaware of vaccines, unaware of the place to get vaccinated, do not have the money to get vaccinated, etc. (IIPS and ICF, 2017). Therefore, it can be inferred, several socio-economic and demographic factors determine the vaccination status of the children. Table 6.6 lists the various factors by vaccination status of the infants in Malda.

Age of the mother has always played an important role in determining the children's health. Higher age mothers are found to be more aware and also take proper care of their children. In Kaliachak – I, infants of mothers in the age group of 20 -29 was found to be most vaccinated compared to the age group of 15 -19 or above 30. Mothers above the age of 30 have the lowest percentage of their children being fully vaccinated. In Kaliachak – I, most of the households was found to have 2 or more children. A large number of children often leads to division of care with the infants often being neglected as the mother is often busy in tending to other children and also in household chores. This can be cited as one of the reasons for infants belonging to mothers more than the age of 30 having the lowest percentage of full vaccination.

**Table 6.6 Immunization Status of the Infant by Background Characteristics**

<b>Background Characteristics</b>	<b>Kaliachak - I</b>	<b>N</b>	<b>Bamangola</b>	<b>N</b>
<b><i>Mother's Present Age</i></b>				
15-19	92.6	27	88.6	44
20 - 24	97.1	103	90.3	113
25 - 29	96.3	54	82.6	46
Above 30	80.8	26	94.4	18
<b><i>Mother's Education</i></b>				
Illiterate and Primary	95.7	94	91.8	73
Middle and Secondary	93.8	80	86.6	97
Higher Sec & Above	91.7	36	88.7	53
<b><i>Sex of the Child</i></b>				
Boy	97.1	104	91.3	104
Girl	92.4	106	86.6	119
<b><i>Birth Order of the Child</i></b>				
1	94.7	94	88.8	108
2	93.7	63	89.5	86
3+	88.7	53	86.2	29
<b><i>Antenatal Care</i></b>				
Partial	94.7	113	87.5	120
Full	93.8	97	90.3	103
<b><i>Place of Delivery</i></b>				
Government Hospital	94.1	17	89.0	100
Rural Hospital / PHC	96.4	110	90.2	61
Nursing Home	97.2	36	94.7	19
Home	89.1	46	83.3	42
<b><i>Religion</i></b>				
Hindu	100.0	40	91.0	145
Muslim	92.9	170	84.4	78
<b><i>Wealth Index Score</i></b>				
Low	92.6	94	91.0	78.0
Medium	97.8	49	88.4	69.0
High	94.0	67	86.8	76
<b><i>Work Status of the mother</i></b>				
Working	91.4	81	88.6	44
Non - Working	96.1	129	88.8	178

Source: Primary Survey

The effect of women's education on infant health is multifaceted and has been well documented in the literature (Gokhale et al., 2002; Dalal and Dawad, 2009, Bhattacharya et al., 2014). Not only it increases awareness but also enables the mother to take better care of her child. A higher level of education of the mother is therefore linked with better infant health. However, in the study area, a different scenario was witnessed as mothers with no literacy or primary education have the highest percentage of the infants being vaccinated in both Bamangola and Kaliachak – I. While in Bamangola, mothers with secondary education recorded the lowest percentage of fully immunized infants, in Kaliachak – I, it was mothers with highest education level. After the introduction of ASHAs at the village level with the NRHM in 2005, the condition of the health status of mothers and children have witnessed a significant improvement (Singariya, 2013). ASHAs play an important role in delivering health care to the remotest part of the country. They also convince and advice the mothers on the importance of availing maternal and child health services and are often seen to be informing and taking the mother to the Sub-Centre to get their child vaccinated. Therefore, as can be seen, illiterate and primary educated mothers had a higher percentage of their children vaccinated due to the care of the ASHA.

Gender differentials in accessing health care are well rooted in our country. Often, more preference is given to the male regarding treatment of ailments and other important health care services compared to the female child (Wills et al., 2009). Though not on a large scale, the same was noticed in the study area, with male infants being more fully immunized compared to a female child in the both Bamangola and Kaliachak – I. Birth order of the child is also an important determinant of health status. Firstborn was often found to receive more care compared to the later ones as the mother is more protective and naïve of the child's health and tries to provide him with all the care. During the 2<sup>nd</sup> or 3<sup>rd</sup> child, mothers are already aware of all the circumstances and therefore often tend to overlook some of the necessary care. In both Bamangola and Kaliachak – I, 3<sup>rd</sup> or higher order children were found to have the lowest percentage of being fully vaccinated.

Antenatal care includes counseling and advice on child health care. Therefore, mothers receiving full antenatal care were supposed to have better child health. In the study area, mothers receiving full ANC was found to have a higher percentage of the

infants being fully immunized than mothers receiving partial ANC. Though in Kaliachak – I mother with partial ANC was found to have a higher percentage of infants being fully immunized the difference was found to be very less. Further, institutional deliveries are also found to be an important indicator of better infant health status. Infants born in hospitals or nursing home are provided with all the essential health care before being discharged. The same is not the case of home deliveries. Often, children born at home do not receive the post-natal care required and therefore are less likely to have good health status. In both the blocks, infants born at home are found to have the lowest percentage of being fully vaccinated compared to infants born in health institutions.

Despite the laudable success of immunization in preventing a large number of child deaths, there is a large section of people who are not immunizing their children as they believe it causes harm to the children and therefore should not be administered (WHO, 2014). Traditions and culture play an important part in influencing vaccination status. As seen from the table 6.6, Muslim households were found to have a lower percentage of infants being fully immunized compared to Hindus in both the blocks. The conventions followed may be cited as one of the reasons for this. Though vaccinations are provided at free of cost by the Government, and all the infants received vaccination at public health institution in the study area (Table 6.5), in Bamangola, infants belonging to low standard of living had the highest percentage of infants being fully vaccinated while in Kaliachak – I, it was the infants belonging to medium standard of living. Mothers engaged in economic activities are often found to have less time to take care of the child and they are being taken care of by either the older sibling or the other members of the family.

#### **6.4.2 Diarrhea**

The passage of watery stools more than 3 per day with or without blood and acute dehydration is known as diarrhea. Accounting 16 percent of all under-five deaths, it is the second largest cause of death among children under the age of five, globally claiming around 525,000 child lives (WHO, 2017). Around 72 percent of the deaths due to diarrhea occur in the first two years of life with most of the deaths being

concentrated in South Asia and sub-Saharan Africa with India, Afghanistan, Nigeria, Pakistan and Ethiopia alone accounting for more than half the child deaths. Significant progress has been made in the last few years with the reduction in the under-five deaths due to diarrhea by 60 percent from 2000 to 2016 (UNICEF, 2018; Walker et al., 2013). Deaths from diarrhea are preventable as well as treatable and therefore timely and proper interventions can reduce morbidity and save lives as well.

Other than death, diarrhea is also found to have a detrimental effect on the nutritional and cognitive development of the child. Most of the diarrheal deaths, about 88 percent are associated with unhygienic practices, unsafe drinking water and absence of proper sanitation. Acute diarrhea is caused by rotavirus, which accounts for more than 40 percent of hospitalization. Being an infectious disease, diarrhea mostly spread from the excreta of one infected person to other through contaminated water, food or objects (CDC, 2015). In India, diarrhea is the third largest cause of child deaths accounting 13 percent of all under-five child deaths, around 300,000 deaths annually (Lakshminarayan and Jayalakshmy, 2015). UNICEF reports open defecation in India as the major cause for rising number of diarrhea deaths among children in India (<http://unicef.in/whatwedo/11/eliminate-open-defecation>). Open defecation refers to defecation in open fields, bushes, forests by people. This evil practice has been rampant in India since ages and nearly half the population in the country practices open defecation, accounting for about 90 percent of the population in South Asia and 59 percent of the world population practicing open defecation. A study by Bill and Melinda Gates Foundation in Rajasthan, West Bengal, Karnataka, Uttar Pradesh and Madhya Pradesh reported that cases of diarrhea among children in the non-open defecation free area were 46 percent higher than the open defecation free area (Times of India, Oct 2017). Despite the success of Swachh Bharat Mission, which aims at providing improved sanitation and toilets even to the remotest village, the goal of open defecation free India is still a long way.

In the survey, question was asked whether the child suffered from diarrhea in the last six months. While NFHS and DLHS records data for diarrhea and pneumonia or acute respiratory diseases in the last two weeks, the data in the primary survey pertains to the incidence of either two illnesses in the last six months for obtaining the desired sample size. Between the two blocks, Kaliachak – I recorded the highest incidence of diarrhea among infants at 47.1 percent, while Bamangola records only 38 percent.

Question was also asked about the frequency of incidence to determine the severity of the illness. Though Bamangola reported a lower percentage of children affected by diarrhea, the frequency of more than three times in the last six months was found to be higher in the block at 40.7 percent. In diarrhea, the body fluids are depleted fast, and therefore administering of oral rehydration therapy is the main medication. The World Health Organization recommends low-osmolarity oral rehydration solution for treatment of dehydration and intravenous solution for severe dehydration. In addition, zinc supplementation with increased fluid intake and continued breastfeeding is also advised (WHO, 2010). India also adopted the WHO guidelines for management of the diarrhoeal diseases. Salt and sugar solution or ORS is often recommended as the best therapy for diarrhea, and while Bamangola recorded a high percentage of infants suffering from diarrhea being given ORS, the percentage was almost half in Kaliachak – I at 30.3 percent. Along with medication, breastfeeding is also advised, and a high percentage of breastfeeding was found in both the blocks with Kaliachak – I again reporting a much lower percentage. During diarrhea proper hydration is necessary, as plain water does not provide essential nutrient and salts to the body depleted during diarrhea. In Kaliachak – I, the highest percentage of children was however given only plain water. The NRHM, other than adopting WHO guidelines, also advises home remedy for diarrhea which includes rice water, *lassi*, soup, *dal* water, curd, *nimbu pani*, etc. Both the blocks recorded more than 20 percent of the infants being given home remedy in the study area.

Seeking of timely medical care is a pre-requisite for management of any illness thereby reducing its risk and avoiding fatal incidents. During diarrhea, as the body gets dehydrated, identifying danger signs and providing adequate hydration through ORS or intravenous fluid is required for reducing the risk of death. Most of the deaths occur from diarrhea occurs due to late medical intervention. The pediatric head of the Malda Medical College too, reports the same. The children are often brought to the hospital after crucial time has passed and it becomes very difficult to resuscitate them. Around 90 percent of the infants suffering from diarrhea reported seeking some sort of medical care, with Kaliachak – I reporting a slightly low percentage compared to Bamangola. As stated, early initiation of treatment often leads to lowering the risk. In

**Table 6.7 Incidence of Diarrhea, treatment and care followed**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<b><i>Child had diarrhea in last 6 months</i></b>	47.1	38.7
<b>N</b>	210	223
<b><i>Frequency of Occurrence</i></b>		
Less than 3	66	59.3
3 +	39.4	40.7
<b><i>Child given</i></b>		
Plain Water	62.6	50
Salt and Sugar Solution / ORS	30.3	59.3
Breast milk	56.6	84.9
Home Remedy	27.3	22.1
<b>N</b>	99	86
<b><i>Treatment or advice seek</i></b>	87.9	89.5
<b><i>Place of Treatment</i></b>		
Government	4.6	15.6
Private	24.1	26
Homeopathy	4.6	7.8
Quack	66.7	50.6
<b><i>Initiation of treatment</i></b>		
Within 2 days	33.3	57.1
After 2 days	65.5	42.9
<b><i>Child referred to higher medical institution</i></b>	30.6	7.8
<b><i>Provision of Medicine</i></b>		
Free of cost	13.6	6.7
Bought from outside	86.4	93.3
<b>N</b>	87	77
<b><i>Reason for not visiting Government facilities*</i></b>		
No paediatrician	24.1	21.5
Timing Doesn't match	16.9	30.8
Not Needed/Nobody Goes	13.3	13.8
Too Far/ No transport	19.3	30.8
Nobody at home	21.7	15.4
Preferred Doctor	31.3	20
<b>N</b>	83	65

Source: Primary Survey; \*Multiple Response Variable

Kaliachak – I, most of the infants, around 65 percent, reported seeking treatment only after two days. However, in Bamangola, more than half of the infants were given treatment within two days.

In a country like India, where more than 22 percent of the people are below the poverty line, with most of them concentrated in the rural areas, treatment seeking behaviour often depends on the availability of health institutions and economic condition of the household (World Bank, 2016). Most of the out-of-pocket expenditure in India occurs on medical services and is an extra burden on the poorer section of the society. As seen in table 6.7, the percentage of infants seeking treatment from Government health facilities are quite low, with Kaliachak - I reporting a meagre percentage of 4.6. In Bamangola, the percentage was higher at 15.6. In spite of the Sub – Centre and Rural Hospital in Kaliachak – I being situated in close proximity to each other, the use of government facilities was found to be low. The sub-centers are not provided with much medicine, and therefore most of the time people have to rely on the primary health center or rural hospital. Private health practitioners made to the second highest percentage in both the blocks. The irony lies in the fact that most of these private practitioners are doctors employed at the Government hospital. Majority of the households in the survey area complained of doctors in the hospital practicing privately during the duty hours, because of which there is always a long queue at the hospital. To avoid the long queue, people are therefore often forced to visit the private practice of the doctors, which in turn increases their out-of-pocket expenditure,

More than half of the people in both the blocks was found to visit a quack, with Kaliachak - I reporting a higher percentage of 66 percent compared to Bamangola. As defined by the Supreme Court in 1996, anyone practicing modern medicine without proper training and certificate is termed as quacks (DNA, January 2017). Quacks are found to be very low educated – class 10 or 12 pass, practicing medicine for years without any training and are a threat to the people as they do not possess proper training leading to wrong treatment which could be fatal. The World Health Organization reports that only 42.7 percent of the doctors in India have a medical degree and training which is alarming taking into account the huge population of the country being served by untrained doctors. In West Bengal, there has been an acute shortage of doctors and proposal have been made by the state government to validate these untrained practitioners by providing them with some formal training and certifying them as Rural Medical Practitioners (India Today, March 2017). Quacks are very popular and have a huge support from the local people because of the lower charges and easy availability, which make it difficult to take action against them. The



ASHAs in the surveyed area reported that the quacks are quite famous in the local area and in spite of the several warnings and advice to the mothers they visit the quacks. This often results in the delayed proper treatment of the child, thereby increasing the risk of death.

The government health services in India has often witnessed a very low utilization and the same was noticed in the study area too. An inquiry was made for the low utilization of the government health services in the study area and several reasons were cited by the people for the same. While in Kaliachak – I, preferred doctor was the main reason, the inconvenient timing of health center was the main reason in Bamangola. Unavailability of the pediatrician in the health centers was also cited as one of the main reason for accessing private services. Peer effect also plays an important part in the choice of health services as found in the survey areas. Many young mothers reported “*nobody goes*” as one of the main reason for not visiting the government health services. Other reasons included unavailability of better transport, long distance to the health center and nobody to assist the mothers to the hospital.

#### ***6.4.2.1 Incidence of Diarrhea by Background Characteristics***

As discussed in the previous section, the availability of proper sanitation facilities is one of the major factor affecting the occurrence of diarrhea. Other than demographic factors, environmental factors also play an important role in the incidence and transmission of the disease. Proper knowledge about the prevention and necessary interventions reduce the risk of severe damage and often infants belonging to mothers in the higher age group and with high educational qualification are found to suffer less from diarrhea. Infants belonging to mothers in the age group of 15 -19 was found to be most affected with diarrhea in both Kaliachak – I and Bamangola, and the percentage reduced with increase in age of the mother till 30. The percentage of infants affected was again found to be high for mothers in the age group of 30 and above. In terms of literacy, in Kaliachak - I, mothers educated till secondary school was found to have the highest percentage of children being affected while it was

**Table 6.8 Incidence of Diarrhea among infants by background characteristics**

<b>Background Characteristics</b>	<b>Kaliachak - I</b>	<b>N</b>	<b>Bamangola</b>	<b>N</b>
<b><i>Mother's Present Age</i></b>				
15-19	57.7	26	40.9	44
20 - 24	52.9	102	38.1	113
25 - 29	35.2	54	34.8	46
Above 30	42.3	26	52.9	17
<b><i>Mother's Education</i></b>				
Illiterate and Primary	47.9	94	39.7	73
Middle and Secondary	49.4	79	37.1	97
Higher Sec & Above	42.9	35	40.4	52
<b><i>Birth Order of the Child</i></b>				
1	51.6	93	34.6	107
2	42.4	59	40.7	86
3+	49.1	53	50	28
<b><i>Type of House</i></b>				
Pucca	42.5	102	32.8	58
Semi-Pucca	48	87	39.7	141
Kuccha	68.4	19	47.8	23
<b><i>Source of Water</i></b>				
Piped Water	46.4	68	29.3	41
Tube well / Bore well	50	140	40.9	181
<b><i>Access to improved toilet facility</i></b>				
No	47.8	113	42.4	144
Yes	47.9	94	32.1	78
<b><i>Wealth Index Score</i></b>				
Low	46.8	94	33.3	78
Medium	43.5	46	37.7	69
High	50.8	65	45.3	75

Source: Primary Survey

reverse in case of Bamangola, with higher educated mother accounting for a higher percentage of diarrhea cases. In Kaliachak – I, first order child was found to be most affected by diarrhea while in Bamangola, a reverse trend was noticed with higher order children being affected most. This can be explained by the fact that mothers do

not have time to look after a higher number of children and left to tend alone, they are often affected by the disease by playing in the dirt.

After the neonatal period, i.e., one month after birth, exogenetic factors play a greater role in affecting child health. Factors like housing, drinking water and sanitation are found to be some of the important factors affecting diarrhea. Globally, around 60 percent of the diarrhoeal deaths occur due to inadequate sanitation, unsafe water and poor hygiene (UNICEF, 2016). The same is noticed in the study area too. In both Kaliachak - I and Bamangola, infants living in pucca houses reported the lowest incidence of diarrhea, while kuccha houses recorded the highest. Water is the most common source of contamination and access to proper drinking water is a prerequisite to good health and keep contagious and infectious diseases at bay. In Malda, tube well or “*Marshall*” is the most common source of drinking water for the people. These deep tube wells are often located on the roadside with no proper drainage system, and the water is not treated or boiled before drinking. Only a meager percentage of the people use piped or treated water provided by the Government. This can be cited as the major reason for high incidence of diarrhea among households using tube-well as the drinking water source. Further, as stated open defecation is the largest reason for incidence and transmission of diarrhea; and is proved by the data itself (Table 6.8). Households with no access to proper toilet facilities reported a higher percentage of infants affected by diarrhea compared to households that had toilet facilities. Ironically, households with higher standard of living were found to have a higher percentage of children affected with diarrhea in both the blocks.

#### ***Cause of Death: Diarrhea***

##### **Case 6**

*Nafisa Begum (Bamangola) gave birth to her second child at the Primary Health Center. All throughout her pregnancy she suffered from several problems like vomiting, acute abdominal pain, high blood pressure, overweight and headache. Other than the Sub – Centre she visited the quack of the village for these pregnancy problems. At birth, the baby weighed 1.8 kg. The mother suffered from infection post-delivery as her stitches got infected and therefore, the baby was fed with cow’s milk since seven days of birth. The baby frequently suffered from diarrhea for which the mother sought treatment from the quack. Despite several advice of the ASHA, the*

*mother did not take her child to the rural hospital until a period of acute diarrhea for four days. He was referred to Malda Medical College, wherein he was kept in the incubator for 26 days. The baby developed acute jaundice, and due to delayed treatment the doctor could not save him and he died at the age of 2 months.*

#### **Case 7**

*Ajmina Bibi (Kaliachak – I) stays in a joint family comprising of 10 members. While all the male members of the family are engaged as agricultural labourers, the females make “bidi” at home. Pregnant with her 2<sup>nd</sup> child at the age of 22, she registered for ANC at six months and received only two ANC check-ups. The mother was anaemic and had low weight all throughout her pregnancy. She had a home delivery by the traditional dai, who had also delivered other children of the family. The ASHA reported that she did not go for institutional delivery as it was not the custom and the males of the household were against it. The child born weighed less than 1.8 kg and suffered from fever and was therefore taken to Silampur rural hospital, from wherein she was referred to Malda Medical College. The child was kept in an incubator for seven days. Even after recovery, the child frequently suffered from vomiting and diarrhea and was treated with medicines from the quack. The family did not visit other private practitioner or rural hospital as they had believed on the quack or “parar doctor.” Also, long queue, unavailability of medicine was cited as some of the major reasons. At three months the child was again diagnosed with severe jaundice and taken to Malda Medical College, wherein she died after five days.*

#### **6.4.3. Pneumonia**

Acute respiratory infection or pneumonia is the largest cause of the neonatal and infant deaths in the world. It accounted for 16 percent of all the under-five deaths, taking a toll of 880,000 children in 2016, with the majority of them being under the age of two (UNICEF, 2018). The disease caused by bacteria or virus can be controlled and prevented by immunization, proper nutrition and addressing environmental factors like air pollution. Though several initiatives and interventions have been made by the World Health Organization to reduce the mortality burden of children due to ARI, the disease continues to be the largest killer of children. Unlike diarrhea which

compromises the health of the child by leading to malnutrition, hindered growth and poor immune system, pneumonia can result in quick death. Further, the mortality due to pneumonia is found to be concentrated in the low and middle-income countries, where it accounts for more than 90 percent of infant deaths (UNICEF, 2016).

The World Health Organization classifies pneumonia according to the severity of the signs for better management and actions to be taken. Children with running nose, cough with no fast breathing or wheezing were categorized as “*no pneumonia*”; children with fast breathing as “*pneumonia*”; children who had rapid chest in drawing with or without fast breathing as “*severe pneumonia*” and children who had all other danger signs like poor suck of the breast, vomiting, convulsions, unable to take feed etc. as “*very severe pneumonia*” (WHO, 2014). The same classification has been followed for the survey too, with some modifications.

Infants in the survey area were categorized into “not suffering from any ARI or Pneumonia,” “suffering from cold” and “suffering from pneumonia”. Questions were asked about the various signs of pneumonia noticed in the child in the last six months which included difficulty in breathing, not able to take a drink or feed, excessively drowsy and difficult to keep awake, pain in the chest and productive cough, wheezing/whistling, rapid breathing and running nose. The infants suffering from only running nose were classified as “suffering from cold”, infants suffering from running nose and any of the other symptoms were classified as “suffering from pneumonia” and suffering from none of those as not suffering.

Around 9 percent of infants in the blocks of Kaliachak – I and Bamangola reported having no signs of pneumonia in the last six months. The percentage of infants reporting pneumonia was found to be higher in Kaliachak – I, almost 75 percent, while Bamangola had a higher percentage of children being affected by common cold (Table 6.9). The survey was conducted during the winter season, in the months of November to February, which may be the reason for the high incidence of pneumonia in both the blocks compared to diarrhea. Further, the National Highway 34 passes through the town of Kaliachak – I, and at the time of the survey, construction work for expanding the highway was carried out. Environmental factors like air pollution is an important cause of respiratory infections and recent research has shown that it leads to

Table 6.9 Prevalence of Pneumonia and Care Seeking Behaviour

	Kaliachak - I	Bamangola
<b><i>Child Suffered from Pneumonia</i></b>		
No	8.2	8.6
Common Cold	18.4	22.2
ARI	73.4	69.2
<b>N</b>	210	223
<b><i>Frequency of Occurrence</i></b>		
Less than 3	71.6	70.4
3 and above	28.4	29.6
<b><i>Treatment or advice sought</i></b>	72.5	92.6
<b><i>Preference of treatment</i></b>		
Government	5.1	10.5
Private	29.2	36.6
Homeopathy	10.2	9.9
Quack	55.5	41.4
<b><i>Initiation of Treatment</i></b>		
Within 2 days	43.8	62.2
After 2 days	56.2	37.8
<b><i>Child referred to any health institution</i></b>		
No	73.8	90.0
Yes	26.2	10.0
<b><i>Child was taken to a health institution</i></b>		
No	21.2	15.0
Yes	78.8	85.0
<b><i>Child admitted or discharged after treatment</i></b>		
Admitted	65.4	47.1
Discharged after medication	34.6	52.9
<b>N</b>	137	188
<b><i>Reason for not visiting Government Hospital</i></b>		
No pediatrician	24.6	29.2
Timing Doesn't match	16.9	17.9
Not Needed/Nobody Goes	16.2	16.1
Rude Behaviour	8.5	7.7
Too Far/ No transport	10.0	19.0
Nobody at home	17.7	13.7
Preferred Doctor	43.1	24.4
<b>N</b>	130	168

Source: Primary Survey

the frequent occurrence of pneumonia among children under the age of two (Li et al., 2018). The villages being situated near the highway, expose the children to high levels of air pollution leading to higher prevalence. Bamangola on the other hand, being situated in a quaint environment has lower levels of air pollution. However, though Kaliachak – I reported a higher prevalence of pneumonia, the frequency of occurrence was found to be almost same in both the blocks, with Bamangola reporting a slightly higher percentage of children who had a frequency of more than three times.

The percentage of households visiting public health institutions was found to be low in case of pneumonia too. Only 10 percent of the infants in Bamangola reported to receive treatment from government institutions and in Kaliachak - I it was almost half the former at 5.1 percent. The same trend, as in case of diarrhea, was noticed with quacks accounting for the highest percentage of the treatment followed by private doctors. A significant percentage of almost 10 percent was noticed to visit homeopathy practitioners. Mothers reported homeopathy as being a “soft drug,” which does not harm the children and therefore are preferred by many. Timely treatment and management of diseases can prevent many of the deaths. The doctors at the Malda medical college reported that infants were brought in after a long time after the occurrence which delays the needed window of opportunity to save the child.

Also, many times households do not visit a medical professional or provide home remedies to the child because they think it not necessary. While more than 90 percent of the households in Bamangola sought treatment when their child had pneumonia, the percentage was as low as 72.5 in Kaliachak – I which shows that the level of awareness is quite low in the region. Further, initiation of treatment was also found to be late in Kaliachak - I with 56 percent of the households visiting a doctor after more than 2 days compared to Bamangola wherein more than 60 percent of the households visited within 2 days of occurrence.

Question was asked on whether the child was referred to a higher health institution due to complications and whether the child was admitted or discharged. While Bamangola reported 10 percent of its infants being referred to the higher medical institution, the percentage in Kaliachak - I was more than double of the former at 26.2 percent. Of the children referred to health institution, about 79 percent in Kaliachak – I and 85 percent in Bamangola were taken to a health institution. Distance of the

rural hospital, no time to go was reported as some of the main causes by the households for not visiting the health institutions even after referral. Kaliachak – I further reported a higher percentage of children being admitted compared to Bamangola in the health institution. The given table (Table 6.8) implies that not only Kaliachak - I have a higher prevalence of pneumonia, but there exists a lack of better care-seeking behaviour among the mothers which lead to higher percentage of infants being admitted due to the severity of the disease.

In Kaliachak – I preferred doctor was reported as the main cause for not visiting a government health institution, while in Bamangola the reason was the unavailability of a pediatrician. The primary health center in Bamangola did not have a pediatrician and the rural hospital had only one pediatrician who also functions as a gynecologist. The rural hospital being situated far away from the households often resort to the local quacks. The unmatched timing of the government institutions was also listed as many of the other factors. While in Bamangola, distance was the third highest cause, in Kaliachak – I it was unavailability of anybody at home.

#### ***6.4.3.1 Prevalence of Pneumonia by background characteristics***

In Bamangola, mothers in the youngest age group of 15 – 19 reported the highest prevalence of pneumonia at 84 percent. Young mothers are less likely to provide better care to their children due to insufficient knowledge and awareness. Many times they do not recognize the danger signs of the acute respiratory infection thereby resulting in the severity of the disease. Though a high percentage of prevalence in infants of young mothers was found in Kaliachak - I too, higher age mothers, above the age of 30 reported the highest in the block. Education enhances knowledge and thereby increases awareness among mothers about caring for the child. However, in both the blocks education seems to have a little effect on the prevalence of ARI, as infants belonging to mothers in all the categories reported a higher percentage.

Antenatal care received by mother is supposed to enhance her knowledge and awareness about child health care as the ASHA advises the same. ANC has proved to be an effective intervention in reducing child malnutrition and morbidity due to different illness. While in Kaliachak – I, mothers receiving full ANC was found to have a lesser percentage of children being affected, in Bamangola, the percentage of



children affected was found to almost same for the categories with mothers receiving full ANC reporting a slightly higher percentage. Higher birth order children were found to be more affected by ARI in Kaliachak - I while it was the first birth in case of Bamangola.

**Table 6.10 Prevalence of Pneumonia by background characteristics**

	<b>Kaliachak - I</b>	<b>N</b>	<b>Bamangola</b>	<b>N</b>
<b><i>Mother's Age</i></b>				
15-19	76.0	25	84.1	44
20 - 24	67.6	102	62.5	112
25 - 29	77.8	54	69.6	46
Above 30	84.6	26	70.6	17
<b><i>Mother's Education</i></b>				
Illiterate and Primary	77.7	94	75.3	73
Middle and Secondary	67.9	78	61.5	96
Higher Sec & Above	74.3	35	75.0	52
<b><i>ANC received</i></b>				
Partial ANC	75.0	112	68.9	119
Full ANC	71.6	95	69.6	102
<b><i>Birth Order of the Child</i></b>				
1	70.7	92	71.0	107
2	69.5	59	69.4	85
3+	81.1	53	64.3	28
<b><i>Type of Fuel</i></b>				
Clean Fuel	80.0	15	72.7	11
Fossil Fuel	72.9	192	69.0	210
<b><i>Source of Water (Child)</i></b>				
Piped	73.1	67	65.9	41
Tube well / Bore well	73.6	140	70.0	180
<b><i>Access to improved toilet facility</i></b>				
No	71.7	113	66.7	144
Yes	75.3	93	74.0	77
<b><i>Type of House</i></b>				
Pucca	75.2	101	70.2	57
Semi-Pucca	66.7	87	67.4	141
Kuccha	94.7	19	78.3	23
<b><i>Wealth Index Score</i></b>				
Low	66.7	93	64.9	77
Medium	71.7	46	63.8	69
High	83.1	65	78.7	75.0

Source: Primary Survey

Environmental factors play an important role in the prevalence of pneumonia, with indoor air pollution contributing the highest. Unclean fuels, smoking parents and small, poorly ventilated rooms have been cited as some of the major factors leading to high incidence of the disease. It can be observed in table 6.9, that kutcha houses account for the highest percentage of children being affected by pneumonia. The kutcha houses were made of leaves and mud and did not provide enough protection from the harsh winters for the child thereby leading to high prevalence. Source of water did not have much effect on the infant in Kaliachak-I while Bamangola reported a higher percentage of households having tube well or bore well as their source of drinking water. The same was noticed for toilet facility. Pneumonia is an infectious

air borne disease and therefore usage of the type of fuel acts as an important factor. In the study area, however, it was noticed that households using only clean fuel like natural gas for cooking was found to have a higher percentage of children reporting pneumonia compared to households using fossil fuels like coal and wood. Majority of the households in Malda was found to use fossil fuel as their major source of cooking with few of the households having occasional cooking on the oven too. Less than 30 households reported using the oven as their only source of cooking. Households with the highest standard of living were found to have a higher prevalence of pneumonia compared to the other categories. While this is ironic since pneumonia is mostly associated with poor households, it may be due to high reporting of the households in the higher group which has led to a high percentage.

### ***Cause of Death: Pneumonia***

#### **Case 8**

*Amita Devi's (Bamangola) has a family business of pottery making. Their kutcha house is located along the Tangon River. Her daughter-in-law gave birth to twin daughters at the age of 19, one of which died from pneumonia at around two months of age. Between the two babies, the latter had a very low birth weight, less than 1.5 kg. They were born at the Doulatpur Primary Health Centre, and after one month the baby started developing breathing complications. The family visited the Primary Health Centre from where they were transferred to Mudipukur Rural Hospital after four days. The baby was suffering from an acute breathing problem and cold, and the*

*doctors advised them to visit Malda Medical College for better treatment. However, due to financial constraints they did not visit Malda and took the baby to the quack. Post-treatment, the baby remained alive for four days.*

*The ASHA revealed that it was acute negligence on the part of the mother, which led the baby to develop such complications. Despite several warnings and advice, the mother never clothed her child properly and used to bathe her every day. The house being close to the river has cold air blowing into the house all day. Further, the daughter-in-law used to live in Delhi and work with her husband as a daily labourer. She came to village when she was six months pregnant and did not receive all the components of the antenatal care.*

### **Case 9**

*Sahana Bibi (Kaliachak – I) was 32 years old when she gave birth to her 3<sup>rd</sup> child. Her husband works as an agricultural labourer and she makes “bidi” at home. All throughout her pregnancy, Sahana was anaemic and though provided with Iron Folic Acid tablets, she did not have them due to vomiting tendency. The ASHA reported that the mother registered herself late for ANC after five months of pregnancy. Despite several advice the mother opted for home delivery by the traditional dais. However, the mother stated that she did not have time to visit the hospital situated 30 minutes away. The baby suffered from fever after birth, but was not taken to any health facility. At six months, the baby suffered from pneumonia, for which he received treatment from the quack. Long queue and absence of anybody at home was cited as the major reason for not visiting the rural hospital. After seven days, when the child developed an acute breathing problem and did not show any signs of improvement, he was taken to Malda medical college wherein he was admitted and given oxygen for three days. However, the baby developed acute pneumonia and passed away four days after.*

#### **6.4.4 Fever**

Fever is the most common ailment in children and infants and refers to the rise in the body temperature above 37.9°C. Fever itself is not a disease but is a sign of some other ailments or disease the child has contacted. Most commonly it is accompanied by diarrhea or cold in children. But sometimes fever can be a symptom of other

ailments too which are difficult to assess among children like urinary tract infection, meningitis, viral infection etc. (Geurts et al., 2014). India being a tropical country is plagued by mosquito-transmitted diseases like malaria, chikungunya, dengue and Japanese encephalitis. The major symptom of all these diseases is recurrent and high

**Table 6.11 Prevalence of Fever and Treatment seeking behaviour**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<i>Suffered from fever</i>	50.5	57.4
<i>Treatment or advice sought</i>	45.2	77.7
<i>Preference for treatment</i>		
Government	21.6	24.0
Private	37.3	28.1
Homeopathy	5.9	8.3
Quack	35.3	39.6
<i>Possible cause of fever</i>		
Vaccination	15.5	13.8
Cold	68.0	63.1
Infection	9.7	6.2
Reasons Unknown	6.8	16.9
<b>N</b>	106	130

*Source: Primary survey*

fever. Further, the neighbouring northern district of Malda, Uttar Dinajpur has been declared as one of the six Japanese Encephalitis endemic district by NRHM ([www.missionindradhanush.in](http://www.missionindradhanush.in)). Though Malda has not been declared as an endemic districts vaccines against JE has been included in the immunization schedule of the infants. Thus, fever of unknown origin is more dangerous and needs to be assessed and managed properly.

In the survey, question was asked whether the child suffered from fever in the last one month preceding the survey. More than 50 percent of the infants in both the blocks reported having fever in the last month with Bamangola reporting a slightly higher percentage of 57.4 percent. Of the infants suffering from fever, only 45 percent sought treatment in Kaliachak - I while the percentage was as high as 77 percent in Bamangola which shows higher awareness level in the latter. Surprisingly, unlike diarrhea and pneumonia, a considerably higher percentage of households were found to seek treatment from the government health institutions in both the blocks. More than 20 percent of the households reported seeking treatment from government

sources with Bamangola reporting a higher percentage of 24 percent. Private practitioners and quacks also recorded a high percentage and while Kaliachak – I recorded a higher percentage of households visiting private practitioners, Bamangola recorded a higher percentage of quacks. Since fever is often complementary to other ailments, question was asked on what was a possible cause of the fever. A majority of the mother, more than 60 percent reported cold as the largest cause, followed by vaccination in both the blocks. In Kaliachak – I, while infection was the third highest cause, in Bamangola reasons unknown, was reported as the third highest. Around 10 children in Bamangola and 16 in Kaliachak – I reported urinary tract infection as the major reason for fever during the survey.

#### **6.4.5 Infections or Injury**

Along with fever, infections and injuries are also common childhood illnesses. Children are most vulnerable to infections during the neonatal period and utmost care is taken therefore for early assessment and management. Further injuries are also common as the child grows if they let on their own. In the survey area, a lesser percentage of children reported suffering from infections or injury in the last one month preceding the survey. However, Kaliachak – I again reported a higher percentage, almost double (27.6 percent) than Bamangola (14.3 percent).

**Table 6.12 Prevalence of Infection/Injury and treatment seeking behaviour**

	<b>Kaliachak - I</b>	<b>Bamangola</b>
<i>Suffered from Infection/ Injury</i>	27.6	14.3
<i>Treatment or advice sought</i>	79.3	65.6
<i>Preference for treatment</i>		
Government	37.0	25.0
Private	26.1	30.0
Quack	37.0	45.0
<b>N</b>	58	32

*Source: Primary Survey*

Ironically, though in case of diarrhea, pneumonia or fever, Kaliachak - I reported a lesser percentage of mothers seeking treatment, in case of infections a reverse situation was noticed with a higher percentage of mothers in Kaliachak - I seeking treatment compared to Bamangola. As seen in the case of fever, in case of infections

too, a higher percentage of them sought treatment from government sources, followed by quacks. The ASHAs stated measles and rashes as major infection other than UTI in the survey area.

#### ***6.4.5 Determinants of child health status in Malda***

As apparent from the discussion in the previous section, in accordance with the global trend, diarrhea and pneumonia continue to be major ailment prevalent among the infants in Malda too. A high percentage of infants reported having fever one month prior to the survey, the key reason being common cold. Infections were found to be very low in both the study areas, with measles and rashes accounting for the major share. In chapter 3, the various determinants of infant health have been analysed according to the Mosley Chen framework for child survival. In this part, analysis has been carried out whether the same determinants hold true for infant health in Malda too. A multinomial analysis has been carried out to ascertain the determinants of infant health at each level.

The predictor variables are categorical and include the demographic characteristics of the mother and child, socio-economic condition of the household as well as the utilization and accessibility of health services in the study area. Both the blocks in the study area have also been included in the model to compare the infant health status. The model fitting information of the regression model is provided by the chi-square values, degree of freedom and level of significance (Ratherford, 1993; Tarling, 2008). With a chi-square value of 108.490 in the degree of freedom of 48, the model is significant in the study. The odds ratio are used to interpret the model. The results of the multinomial logistic regression reveals that different associations of the same independent variables, at different significance level on moderate and good infant health status when compared with poor infant health status.

The first significant determinant of infant health was found to be educational level of the mother. Education of the mother has always been hailed as the single most important determinant of maternal and child health. Education enhances their knowledge about hygiene, sanitation, feeding practices and nutrition, thereby leading to better infant health (Dreze and Murthy, 2000). A study by Gokhale et al. (2002) found the use of maternal and child health care services were lowest in states with

highest female illiteracy like Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar and Chhattisgarh. Infant mortality rate and all associated variables of maternal health care services reported negative association with literacy. In the study area, almost 40 percent of women in both the blocks were found to be illiterate or had primary schooling and percentage of mothers having high schooling was found to be low. The results of the regression also state the same. The likelihood of moderate infant health decreases with a decrease in the educational level of the mother (OR = 0.478 and 0.390,  $p < 0.05$ ) compared to the reference category of poor infant health at a highly significant level. In case of good health, while mothers with middle and secondary education show higher likelihood than mothers with higher education for good infant health, the result was not significant. However, illiterate mothers showed less likelihood for good child health status (OR=0.786,  $p < 0.1$ ) compared to higher educated mothers, significant at 90% level of confidence.

Caste and religion appear to be next important social determinants of infant health in the study region. Advantage of Muslim child survival over Hindus has been documented in several literature (Bhalotra et al., 2009; Menon and Brainerd, 2015). This advantage is surprising given the socio-economic status of Muslims in India not much better than the low caste Hindus with a long history of deprivation. Ghettoising of Muslims, poor access to schools and deprivation of basic services like clean drinking water and sanitation has led to poor health, especially among Muslim women leading to malnutrition and anaemia, thereby leading to poor child health (GOI, 2006). Menon and Brainerd (2015) state the various religious practices related to mother's nutrition and child birth as some of the reasons for superior health of Muslim infants. Non-vegetarian diet also appears to be an important factor for better nutrition among Muslim child in the first few years (Bhalotra et al., 2009). In the study region, religion was categorised into Hindu and non- Hindu, as though Malda being a Muslim dominated district, Bamangola reported a higher percentage of Hindus along with a considerable percentage of Christians too. Contrary to the literature, Hindu infants were found to be 2.5 times more likely to have moderate health status and 5.4 times more likely to have good health status compared to non-Hindu infants at a 1% level of significance ( $p < 0.001$ ). This can be explained by the poor socio-economic condition of the Muslims in the study area. Bokchor, one of the Muslim dominated villages in Bamangola has the majority of the population dwelling

in kutchra houses, along with the poultry and cattle in the same courtyard. Due to the absence of pucca drainage system, the surrounding environment and sanitation are very poor in the area, with the village remaining inaccessible during the monsoon season.

**Table 6.13 Multinomial Logistic Regression showing determinants of infant health status**

<b>Background variables</b>	<b>Poor vs Moderate</b>	<b>Poor vs Good</b>	<b>N</b>
<b>Age at Marriage (18 and above)<sup>ref</sup></b>			195
Below 18	0.957	0.779	202
<b>Age at First Birth ( 19 and above)<sup>ref</sup></b>			217
Below 19	1.023	1.702	180
<b>Education of the Mother(Higher Sec &amp; Above)<sup>ref</sup></b>			82
Illiterate and Primary	0.39**	0.786*	152
Middle and Secondary	0.478**	1.585	163
<b>Birth Order of the Child (3+)<sup>ref</sup></b>			72
1	0.811	1.484	191
2	0.877	1.674	134
<b>Sex of the child (Female)<sup>ref</sup></b>			208
Male	0.95	0.564	189
<b>Exposure of Mass media (Yes)<sup>ref</sup></b>			316
No	1.009	1.551	81
<b>Religion (Non - Hindu)<sup>ref</sup></b>			225
Hindu	2.533***	5.450***	172
<b>Caste (Others)<sup>ref</sup></b>			183
General	1.603**	3.158**	214
<b>Type of Family (Joint)<sup>ref</sup></b>			260
Nuclear	0.795	1.388	137
<b>ANC received (Full ANC)<sup>ref</sup></b>			177
Partial ANC	0.708	0.994	220
<b>Received PNC (Yes)<sup>ref</sup></b>			235
No	0.657	0.348***	162
<b>Weight of the baby at birth ( less than 2500gm)<sup>ref</sup></b>			68
2500 gm and above	0.734	0.44	329
<b>Exclusive Breastfeeding (Yes)<sup>ref</sup></b>			308
No	0.744	1.194	89
<b>Type of House New (Semi-Pucca/Kutchra)<sup>ref</sup></b>			254
Pucca	1.029	0.772	143
<b>Access to improved toilet facility (Yes)<sup>ref</sup></b>			157
No	1.689	0.434	240
<b>Source of Water (Tube well / Bore well)<sup>ref</sup></b>			296
Piped	0.586*	1.610**	101
<b>Type of Fuel (Fossil Fuel)<sup>ref</sup></b>			375
Clean Fuel	0.276*	0.735	22



<b>Background variables</b>	<b>Poor vs Moderate</b>	<b>Poor vs Good</b>	<b>N</b>
<i>Treatment (Quacks)</i> <sup>ref</sup>			222
Government	4.704***	1.914	27
Private	2.492***	1.907**	148
<i>Accessible throughout the year (Yes)</i> <sup>ref</sup>			358
No	3.737	.375***	39
<i>Public transport available (Yes)</i> <sup>ref</sup>			347
No	0.272	0.453**	50
<i>Sub-Centre (Madnabati)</i> <sup>ref</sup>			117
Silampur	1.742	0.741*	190
Doulatpur	2.013*	0.334**	90

Source: Primary Health Survey;

The condition of Muslims in Kaliachak - I, though found to be better than Bamangola, was still poor when compared to the Hindus in the area. Except for Masterpara, all the other villages revealed poor sanitation and housing facilities. The study by Ghosh et al. (2016) further reinstates the poor condition of Muslims in West Bengal compared to Bangladesh in spite of same topography, demography and long history. Inequalities in income and literacy levels have been cited as the key socio-economic determinant of a higher percentage of malnourished children among Muslims in West Bengal (Bharati et al., 2010).

Caste system in India has been long ingrained in the society and its ill effects are well known. Though a system majorly followed by the Hindus, it exists even among Muslims and Christians. Lower caste has always been associated with menial works and therefore low economic condition, especially in the rural areas. Further, access to health care services is also found to be low among lower caste people due to different health practices and social discrimination by health providers (Luke and Munshi, 2007). Caste also appears to be an important determinant of child nutrition as it forms a vicious loop starting with low education, low knowledge, low paid jobs, thereby leading to the low nutrition of the children (Bharati et al., 2010). In the study region, while Bamangola reports a high percentage of Scheduled tribe population, Kaliachak – I reported a higher percentage of scheduled caste and total absence of scheduled tribes. Therefore, caste in the region has been divided into general and other. The low status of the scheduled population in the region has been reflected in the regression results with general caste shows 1.6 times more likelihood for moderate health and

5.4 times more likelihood for good health compared to poor health at 5% percent level of significance.

The importance of post-natal care in improving child health care has often been overlooked. The few days after birth are crucial for both the mother and the child as it is during this time infections may develop which may cause death or hamper the future cognitive and physical development of the child. According to World Health Organization both the child and the mother should be clinically examined and advised properly during the first 24 hours, and subsequent visits should be made to them till 6 weeks for checkup of both mother and child (WHO, 2015). For the study, PNC refers to the check-up of the mother within 48 hours of delivery, check-up of the child within 24 hours of birth and recommended check-up of 3 or more within 10 days of birth. Women and child not receiving PNC in the study region reported less likelihood for both moderate and good health status compared to women who received PNC. However the relation with moderate health status was not found to be significant. There was 0.7 times less likelihood for good health status for those not receiving PNC at 1 percent level of significance in the region. Low birth weight is always associated with the poor health status of children. Other than increasing risk of neonatal mortality, it also leads to poor development of immunization system and low cognitive development of the child (Risnes et al., 2011). Often, low birth weight babies are found to be acutely malnourished which further increases their risk of developing non-infectious diseases like heart problem and diabetes in later life (Kramer, 1987). However, the regression results reveal a lower likelihood for good and moderate health status for infants having birth weight more than 2500gm, which is statistically insignificant.

Another significant determinant of infant health status in the region appears to be the housing conditions. Housing conditions refer to the type of house (material used in the making), sanitation facilities and provision of clean and safe drinking water. The impact of poor housing on health is manifold. High incidence of diarrhea and pneumonia has been found to be highly associated with children living in houses with no access to safe drinking water, poor sanitation facilities (Tasnim et al., 2017). Much research has been done on the housing condition of the growing urban population living in slums and health effect on them (Agarwal, 2011; Usmani and Ahmed, 2018; PwC and Save the children, 2015) and it has been well established that poor housing

conditions along with overcrowding, pollution and poor sanitation lead to poor health. Not much has been talked about the rural areas which constitute more than 60 percent of the population in India. Except overcrowding, rural areas also face poor housing conditions due to abject poverty. In the study region, more than 52 percent of the houses were semi-pucca, made of asbestos and tin with a mud floor. Kaliachak - I recorded a higher percentage of pucca houses due to a higher level of urbanization compared to Bamangola. Further, only 40 percent of the households have access to proper sanitation facilities and 25.6 to treated piped water. Diarrhea and pneumonia being communicable diseases have a strong linkage with poor sanitation and drinking water which acts as a medium for the spreading of the disease. As expected, households having access to treated pipe water was found to be 1.6 times more likely to have good health status (OR = 1.610,  $p < 0.01$ ) compared to the households using tube well water with reference to poor health status. Indoor pollution has been cited as one of the major determinants of respiratory infections among children and use of clean fuel like LPG, solar is recommended. In the study area, most of the houses used wood, crop residue, coal and dung cakes as the major source of fuel with only 6.2 percent using LPG. While the table (Table 6.12) shows less likelihood of moderate health status for households using clean fuel, the result is not very statistically significant (OR= 0.301,  $p < 0.1$ ).

Utilization of type of health care services emerges as another important determinant of health status in the region. As discussed in chapter 4, government healthcare services in the study region are not adequate for the large population base. Often people, therefore, flock to the private healthcare services which include not only the private registered practitioners but also the Government hospital doctors who run private clinics and the unregistered local doctor known as quacks. In the previous discussion, it has been noticed that people generally prefer quacks over private and government health services due to unavailability of a paediatrician, lack of proper timing as well as the local fame of quacks. The hospital doctors reported seeking treatment from quacks and availing health services only when the child is critically ill has resulted in increased child morbidity and mortality in the area. The regression result also depicts the same. The likelihood of moderate health status increases from private to government when compared to quacks. Children availing private health services were 2.5 times more likely to have moderate health (OR = 2.492,  $p < 0.001$ )

and 4.7 times more likely to have moderate health status when availing Government health services (OR=4.704,  $p < 0.001$ ), compared to those visiting quacks. Though likelihood of good health status also increases with availing private and government health services, the result was found to statistically insignificant for government services, but significant for private services (OR= 1.907,  $p < 0.01$ ).

The utilization of the health services often depends on the accessibility too. Households have reported distance and timing as one of the major factors for resorting to quacks. In both the blocks, one village in each remains inaccessibility during the monsoon season during which the outbreak of diarrhea often takes place. This often coerces them to visit the local quacks who are easily available at the doorstep. Households which are non-accessible throughout the year are found to be 0.7 times less likely to have good infant health status compared to households having accessibility throughout the year in reference to poor infant health status (OR = 0.375,  $p < 0.001$ ). Further, along with accessibility, transportation options are also important for visit to healthcare institutions. Majority of the households in the study area reported having no private vehicle and traveled by public transport to reach the health centers. The public transport in the region comprises of mini buses, vans, and e-rickshaws who have a low frequency. While the buses and vans ply on the main road connecting Malda to Uttar Dinajpur only, the e-rickshaws travel deep into the villages. However, due to the exorbitant fare charged by the latter, it is seldom used by the villagers. Therefore, they often resort to the local doctors rather than visiting the health centers. The regression result shows less likelihood for both moderate and good infant health status for villages having no provision of public transport, though the result for moderate health status is not statistically significant. Villages having no availability of public transport are found to be 0.6 times less likely to have good infant health when compared to villages having public transport (OR=0.453,  $p < 0.01$ ). As discussed in chapter 4, health infrastructures play a key decisive role in the health status of a region. Not only quantity, but the quality of infrastructure is equally important for better delivery of health services. In the study region, the sub-centre in Madnabati was found to be the best in terms of provision of medicines, health care and staff compared to other two sub-centres of Doulatpur and Silampur. This is reflected in the regression results too. Households within the area of Silampur and Doulatpur sub-centre was found to be 0.7 times (OR = 0.0334,  $p < 0.01$ ) and 0.3 times

(OR = 0.741,  $p < 0.1$ ) less likely to have good infant health compared to those in the Madnabati sub-centre and the result is also statistically significant. However, in terms of moderate health status, households in the Doulatpur sub-center were found to 2 times more likely to have moderate health compared to Madnabati. The proximity to the primary health center in the area could be cited as one of the main reasons for the same.

### **6.5 Conclusion**

Infant health status is determined by a number of factors, utilization of health care services being one of them. In Malda, majority of the infants were found to have moderate health status, followed by good health status. Between the two blocks, Bamangola reported a higher percentage of moderately healthy children compared to Kaliachak – I. Utilization of infant health services from the Government healthcare institutions was found to be low in both the blocks with the highest percentage of households visiting the quacks or local doctors. A considerable percentage of infants were also found to be of low birth weight in the region which is a hurdle for the future development of the infant. Literacy of the mother, religion, and caste emerges as an important determinant of infant health in the region. Further, geographical factors like distance along with the quality of the health infrastructure are also found to play a key role in determining the health of the infants in the study. Villages which are accessible throughout the year were found to be more likely to have better health. Also, the well-equipped sub-center of Madnabati recorded the likelihood of good infant health compared to the other two sub-centres. In flood-prone, Gangetic plain like Malda, accessibility often plays a key role in determining the health status of the infants which is proved by the regression results. Therefore, along with improving the quality of the existing health infrastructure in the region, provision of increasing accessibility even to the remotest village should also be taken into consideration for better infant health.

## Chapter 7

### *Conclusion and Recommendations*

Health is one of the vital indicators of development of a country. The economic growth of a country and its development are often interrelated as increased income leads to the better health status of the population, which results in improved work efficiency thereby aiding in the development process (Lange and Vollmer, 2017). This phenomenon is well reflected in the global health landscape with the superior health outcomes of the developed countries compared to the developing nations. Amongst the general population, maternal and child health status are of profound importance as they form the most vulnerable section of the society. Improved maternal health status ensure better health of the child which is imperative for a healthy and productive future workforce. Globally, the under-five mortality was 5.6 million in 2016, translating to nearly 15,000 deaths per day. Of this, 4.2 million were infant deaths accounting for 75 percent of the under-five mortality (WHO, 2017). The glaring picture of global health inequity surfaces as 80 percent of these deaths was found to be concentrated in the developing countries of South – Asia and sub – Saharan Africa. About half of the deaths occurred in only six countries – India, Pakistan, China, Nigeria, the Democratic Republic of Congo and Ethiopia with India and Nigeria alone accounting for around one – third of the deaths (UNICEF, WHO and UN, 2017).

Acknowledging the grave situation of global child health, efforts have been made by international organizations, donors, and Governments to formulate policies and programmes, especially for the developing regions to bring down the mortality rate and improve the child health status. Universal access to healthcare has been identified as the major intervention to bring down the inequalities. With the infant mortality rate reducing to around 30 deaths per 1000 live births from 64 deaths in 1990, substantial progress has been made globally. However, given the concentration of mortality in the developing parts of the world, the efficacy of the programmes remain questionable. It has often been criticized that these programmes have been designed as a fit-for-all, without taking into account the regional inequalities and varying levels of socio-economic development of the countries, thereby not yielding the desired health outcomes (WHO, 2015). The most

ambitious global program was the Millennium Development Goals, 2000 wherein the international organizations and governments called for cooperation and association to achieve the “quantified targets” for an enhanced quality of life for the people by 2015. Despite failing to achieve all the targets globally, countries have made substantial progress in improving their quality of life and reducing infant and child mortality. The latest global program is the Sustainable Development Goal, 2030, built on the achievements of the MDGs, the SDGs are not individual goals but integrated as development and progress in one, leads to development in other. The sustainable development program aims for the development of the present generation, without placing the future in danger. It integrates all three dimensions of a sustainable economy – economic growth, social inclusion and environmental conservation, which makes it unique among all the global programs till date. Other than social and economic development, the goals also take into account the most prominent problem of the present – climate change (<http://www.undp.org/content/undp/en/home/sustainable-development-goals.html> ).

Despite its appreciable economic progress post-liberalisation, India’s infant and child health is in a dismal situation, with the country accounting for one-third of the global under-five deaths along with Nigeria. With increased economic growth, the share of GDP spent on public health is also supposed to increase thereby improving health. However, the same is not witnessed in India. With the health expenditure being 1.4 percent of the GDP in 2014, India’s share in expenditure is not only less than the average of 3 percent in the low and middle-income countries of the world but also than its neighbouring countries of Nepal, Bangladesh and Afghanistan. The history of primary health infrastructure in India dates back to the Bhore committee report of 1946, wherein the need for a primary health care system to provide basic preventive and curative care to all was stressed. A long time has passed since, and the country has witnessed a massive expansion of its primary healthcare facilities. However, the system is plagued by shortage of health professional, absenteeism of those employed, low quality of services and improper maintenance which have rendered them obsolete thereby resulting in underutilization of these services (Jana and Harata, 2016). Further, while the urban areas are well endowed with both public and private health facilities, the rural areas depend

predominantly on the public health care due to paucity of private health care facilities in the latter. Therefore, often due to the poor condition of the public healthcare facilities and the low quality of the services provided, people resort to private facilities and doctors many of whom are not even adequately trained. This also increases the out of pocket expenditure of the poor people, often resulting in delayed or no treatment seeking.

Since independence, the Government has strived hard to improve the health of its population which has been reflected in its various policies and programmes from time to time. Maternal and child health services remained an integral part of India's welfare programmes, and these services provided by the public health infrastructure remain underutilized not only due to the dismal state of the infrastructure but also due to social customs, taboos, and beliefs of the people. For example, delivery at home has been identified as one of the key factor affecting infant mortality, and despite the increase in the number of institutional deliveries or births by trained professionals in the recent years, the number of home deliveries in India continues to be high. The fourth round of the National Family Health Survey records 79 percent of all births being institutional delivery and the main reason for not delivering in a health institution (40 percent) was that the women did not feel it was necessary (IIPS and ICF, 2017). The utilization of health services are not only determined by the accessibility and availability of health services, but also other socio-economic and demographic factors operating in the region. Both the intrastate and interstate inequalities in child health in India are the result of these factors. Hence, along with improving the existing infrastructure, policies and programmes framed should take into account the socio-economic and demographic characteristics of the states for efficient and improved outcomes.

### **7.1 Summary of Findings**

The regional, physical, socio-cultural and economic miscellany of the country has always been reflected in its general as well child mortality rates with rural areas accounting for a larger percentage of the deaths compared to their urban counterparts. With pockets of high mortality regions across the country, there is an evident north-south division in the distribution of infant mortality rate. The northern states were found to register



comparatively high infant mortality rate than the southern states. A look into the data reveals that since 2011, the empowered action group (EAG) states and Assam registered a high infant mortality rate, more than the national average. Despite a steady decline since 2011, the states of Madhya Pradesh (47), Assam (44), Odisha (44), Uttar Pradesh (43) and Rajasthan (41) documented some of the highest IMR in the country in 2016. Perennially plagued by poor socio-economic development, cultural constraints, and taboos, high birth rates ensuing to higher levels of morbidity and mortality, these states have always been in the limelight. On the other hand, the economically developed states of Tamil Nadu (17), Maharashtra (19), Punjab (21), Karnataka (24), Jammu and Kashmir (24), West Bengal (25) and Kerala (10) registered a lower infant mortality rate than the national average throughout the temporal scale. Kerala remains a demographic outlier recording the lowest IMR in the country throughout the period. The state reached a plateau at 12 infant deaths per 1000 live births from 2012 to 2015, which further reduced to 10 in 2016. A long communist regime in the state has ensured a stable situation thereby leading to better implementation of the programmes and policies. Further, study finds people of Kerala being politically aware of their rights, the demand for improved public health services from the Government have made their health infrastructure more enhanced and efficient.

The regional diversity of the country exists not only interstate but also intrastate. Sharp differentials in health outcomes are noticed across districts in India. With the ushering in of decentralized planning, the district became the lowest level for implementation of government policies and programmes and therefore a district level estimate and analysis of infant mortality for the year 2011 was carried out to identify pockets of high mortality region. Concentrated belts of high IMR are noticed across the country, and most of these are in the empowered action group of states. The highest IMR is recorded by the district of East Kameng (110), followed by Kargil (108), Kurung Kumey (107), Anjaw (106) and Kandhamal (101). Pockets of very high IMR (above 73) are found to be concentrated in Madhya Pradesh, Uttar Pradesh, and Odisha. A large number of districts of these states record a very high IMR of above 73. Ironically, the highly urbanized districts of Allahabad, Visakhapatnam and New Delhi also fall under this category which implies that urbanization does not essentially amount to better health, because of the provision of

better healthcare facilities. Other places include southern Assam, southwestern Rajasthan, northern Kashmir, western and eastern Arunachal Pradesh, Malda in West Bengal and eastern Jharkhand. The lowest IMR is found in Kannur, followed by Mainpuri, Palakkad, Ernakulam, Thrissur, and Kasaragod, registering an IMR below 25. The other places include Kerala, parts of Tamil Nadu, eastern coast of Andhra Pradesh, the coastal belt and surrounding districts in Maharashtra, southern West Bengal, south-eastern Punjab, northern Himachal Pradesh and parts of Manipur and Mizoram.

Apart from the southern states, West Bengal is the only state in the eastern part, which registered a continuously low IMR than the national average in the last few decades. High female literacy, low fertility rate along with increased use of maternal and child health care services, especially after the launch of Janani Suraksha Yojana in 2005 under the flagship programme of NRHM have led to the sharp decline of infant mortality rate in the state. However, similar to the country, wide regional variations in IMR is also noticed in the state. The northern hilly districts record a consistent higher IMR than the state average since 1981. The decline of IMR in the state has not been smooth, unlike the country average. From 95 infant deaths per 1000 live births, the IMR declined to 62 in 1991, registering a sharp decline of more than 30 points. A slight increase in IMR was noticed in 2001, with the IMR being at 68 which again plummeted to 46 infant deaths in 2011, the lowest ever in the last decades. Among the districts, the northern districts of Malda, Uttar Dinajpur, Jalpaiguri, Dakshin Dinajpur and Murshidabad recorded a constant high IMR in the state since 1981. The southern districts of Haora, Hooghly, Bardhamann and Bankura, on the other hand, registered a constant low IMR during the same time frame. Rapid urbanization, industrialization coupled with high female literacy, proximity to the capital, Kolkata can be cited as some of the reasons for this distinct division in the state.

The regional disparity in infant mortality is the outcome of the interrelationship of the various socio-economic factors in a region. Therefore, to understand the spatial variability of the factors affecting infant health, geographically weighted regression was carried out. The results of the global regression reveals improved sanitation facilities, schooling of the mother, full ANC, delivery by skilled health personnel and anaemia of

the mother as the important predictors of infant mortality in the country. However, the results predict these factors to have a constant relationship with infant mortality over space which is not true. By dint of their regional diversity, the relationship too varies. The results of the GWR reveals improved sanitation facilities, clean fuel, schooling of the mother, delivery by skilled health personnel and immunisation of the child as the spatial predictors of infant mortality in India. Barring the north-western and southern part of the country, where the variance explained is little less than 50 percent, the GWR model fits well in most parts of the country, especially in the newly formed state of Telangana, coastal Andhra Pradesh, western Maharashtra, Odisha, Madhya Pradesh, Chattisgarh, West Bengal, Assam, all the north-eastern states, eastern and western Bihar, northern Uttar Pradesh, Haryana, Uttarakhand and Himachal Pradesh.

Delivery of health services requires health infrastructure. The term health infrastructure does not merely refer to physical availability but a whole network of trained medical personnel, adequate supply of drugs and medicines, medical equipment along with proper infrastructure. Taking into account the high IMR in the EAG states an outcome of poor health infrastructure in the region, widespread expansion and renovation of the health infrastructure was carried out under the National Rural Health Mission in 2005. While considerable progress has been made under the mission in increasing use of maternal and child health services, thereby reducing the mortality rates, the system is plagued by a shortage of health professionals, lack of interest and irregularity of those who work. All these contribute to the underutilization of public health services, and often people resort to private healthcare services, paying higher user fees and thereby escalating out of pocket expenditure. The proliferation of the private health sector, along with no proper monitoring or evaluation system of the Government have resulted in high prices for health services in the private sector, thereby increase in the out of pocket expenditure of the people.

The primary healthcare system in India is a three-tier structure, based on the population norms, with the Sub Centres at the lowest level, followed by the Primary Health Center and Community Health Centre. Post – NRHM, a considerable increase in the health infrastructure was noticed across states in the country. Some of the states reported a

reduction in their health infrastructure due to the bifurcation of the states, as well as upgradation of PHCs to CHCs. Data reveals that both the lowest and highest tier of the health system witnessed a massive increase in post-NRHM, compared to the intermediate tier of PHCs. With the launch of the program, PHCs were revamped and upgraded to CHCs thus strengthening the referral system and emergency services. However, though an increase in the number of health infrastructure was observed, the requirement of the ever-growing population could not be met and acute shortfall was noticed in some states. The highest shortfall of SCs and PHCs was recorded by Delhi, Jharkhand, Uttar Pradesh, Madhya Pradesh, Haryana, Maharashtra and West Bengal. The situation was worst for the CHCs with the majority of the states reporting high shortfall.

An ironical situation witnessed is the high shortage of health infrastructure in West Bengal. The state with a consistent low IMR and low TFR is one of the demographically advanced states in the country. However, the public health system in the state seems to be in a dismal state, with an increase in the out of pocket expenditure on health as more and more people shift to private health services. Among the districts, the southern districts of South 24 Parganas, North 24 Parganas and Paschim Medinipur are found to have a higher number of health infrastructures compared to the northern districts of Malda, Jalpaiguri, and Koch Bihar. Though health infrastructure are built by population norms, developed regions are found to be abundantly blessed with better healthcare. The similar situation is noticed in case of West Bengal, the southern districts being more developed than the northern, are endowed with more health infrastructure, both public and private. Due to lower number of health infrastructure in these districts, the shortage was also found to be high in the northern districts compared to the southern districts.

In the study area, it was found all the SCs cater to a population much higher than the prescribed norm, with Silampur Sub-centre in Kaliachak – I serving almost double. High population pressure in Kaliachak – I depict the gloomy situation of the health infrastructure in the region. The average distance to the farthest village was around 1 km for both Silampur and Doulatpur, while for Madnabati it was more than 2 km. One village in each of the Sub-centre did not have all year round accessibility. An analysis of the efficiency indices reveals Madnabati as the most and Doulatpur as the least efficient

Sub-centre in the region. While in terms of connectivity, all the Sub-centres performed moderate, infrastructure, medical resources and human resource was found to be best in Madnabati.

The highest tier of the primary healthcare system, the community health centres, known as Block hospitals or rural hospitals in West Bengal was also surveyed. Silampur rural hospital caters to a population almost three times the prescribed norm, while in Bamangola it was just a little above the norm. All the villages reported all year round accessibility to the hospitals. Distance to the highest tier, Malda Medical College was found to be only 23 km for Silampur, while for Bamangola it is 65kms. The efficiency index shows Bamangola Rural Hospital more efficient than Silampur in all aspects except investigative facilities. Though both hospitals reported having labour rooms, caesarean delivery is always referred to Malda Medical College. The labor room of Bamangola Rural Hospital, treated as the model labor room in West Bengal after being transformed by the collaboration of WHO and UNICEF, still don't have facilities for caesarean deliveries. The high efficiency of Bamangola Rural Hospital is attributed to the low population pressure in the region.

The highest functioning healthcare facility in the district, the Malda Medical College is situated in Malda town. It forms the lifeline of not only Malda district, but also of many adjacent villages of the district. Being the only district hospital, it receives a huge number of patients. Well equipped with physical infrastructure, medical supplies, high inpatient capacity, the hospital still fails to provide quality service to a large number of patients. Acute shortage of paramedical staff has been reported by the superintendent. Also, the hospital premises are found to be dirty, overcrowded, with patients and their relatives lying in corridors waiting for their turn. High population pressure along with a dearth of medical professionals have been cited as the major reason for the low quality of service provided.

Majority of the respondents in Malda belonged to the age group of 20-24, married before the age of 18 and primary educated. While Kaliachak- I recorded the highest percentage of a Muslim households, in Bamangola it was Hindus. Agriculture occurs to be the primary occupation in the region with most of the fathers working either as farmers or as

agricultural labourers. Majority of the households reported Sub-centre as their nearest health facility almost half of the sample population have to travel a distance of 1 to 2 km to reach the health institution. Physical accessibility to the health institutions is constrained due to the absence of pucca roads to the village interiors which have given rise to the problem of better transportation, as public transport like bus or auto plies only on the main road. Around 70 percent of women reported foot march as the mode of transportation to reach the facility. Often in times of emergency, due to unavailability of public transportation and high charges of the private vehicles, the respondents resort to the local doctor or “quack” for treatment. Utilization of maternal health care services was found to be considerably high in the region, though the place of availing these services varied. While the majority of the women received antenatal care from both the Sub-centre, a high percentage of them also visited the private practitioners in case of any health problems during pregnancy. The study area recorded around 80 percent of institutional deliveries, mainly in the Government facilities and a high percentage of women receiving post-natal care. Thus, while utilization of government health services is found to be high for maternal health services, during emergency people often resort to private health facility due to the belief that they function in a more efficiently.

Infant health and health care utilization in the study area presents a varied picture. Majority of the infants in the study area was found to have moderate health status, followed by good health status. Between the two blocks, Bamangola reported a higher percentage of moderately healthy children compared to Kaliachak – I. Around 20 percent infants in the study area was found to be low birth weight and premature, often kept in incubators with regular check-ups being performed to reduce the risk of developing infections and other problems. Due to the absence of facility for specialized care in SCs and PHCs, the infants were taken either to Malda Medical College or private nursing homes. A very high percentage of infants, around 90 percent, received postnatal check-ups, though the number of check-ups was higher in Kaliachak – I. The neo-natal health of the infants reveal that a substantial number of children suffered from Jaundice and cold, just after birth, Kaliachak-I registering a higher percentage. The WHO recommends exclusive breastfeeding till 6months of age as breastmilk of the mother contains all the essential nutrients necessary for the child’s growth and is beneficial as it protects the

child from various infections by developing a strong immune system, thereby aiding a healthy growth. While more than 95 percent of the infants were fed colostrum or the first milk of the mother, exclusive breastfeeding was provided only to 75 percent of the infants. Neonatal feeding practices and beliefs often depend on the place of delivery. In intuitional deliveries, the mothers are advised and encouraged to feed colostrum and breast milk to the baby just after birth, while it may not be a scenario in home delivery by untrained professionals or dais. However, no significant association between feeding of colostrum and the place of delivery was noticed.

While the infant health status in the study area was found to predominantly moderate, the general health of the infants in the district is found to be poor with high infant and child mortality. Health status of infants in an area sheds light on the quality of future demographic window and helps to understand the effectiveness of various programmes and interventions of the Government and formulate policy accordingly. One of the most important interventions for enhanced infant health status is immunization. This cost-effective preventive care, not only increases life expectancy but also protects and aids in proper development of the child. In India, full immunization refers to BCG, measles and three doses each of Polio and DPT within the first year of life. More than 90 percent of the infants were found to be fully vaccinated in the area and the main place of receiving vaccination was the Sub-centre. None of the infants in the Malda reported no vaccination and those who were partially vaccinated was due to the infant suffering from cold or any illness at the time of the vaccination schedule. In the remote and farthest of the villages, vaccination was provided in the Village Health Nutrition Day, held once every month.

The two largest cause of death among children worldwide is diarrhea and pneumonia. These two diseases account for around 29 percent of the total under-five deaths worldwide, leading to a loss of 2 million lives each year (WHO and UNICEF, 2013). Deaths by both the diseases are preventable and substantial progress has been made in reducing the number of deaths by providing timely intervention and curative care. Diarrhea is a water borne contagious disease which spread through contaminated water sources. One of the main reason for high incidence of diarrhea is open defecation, which is practiced widely in India. Around 44 percent of the infants in the study region reported

having diarrhea in the last six months prior to the survey, of which almost 90 percent sought treatment. A high percentage of the affected children were also given home remedies. Acute respiratory infection or pneumonia is the largest killer of under-five children. An airborne contagious disease, it affected around 70 percent of the infants in both the blocks of Bamangola and Kaliachak – I in Malda. While 92 percent of the infants were reported suffering from some of the signs of ARI, 70 percent reported suffering from pneumonia in the last six months. Of the affected children, only 72 percent in Kaliachak – I and 93 percent in Bamangola sought treatment. Among other childhood ailments, fever and infection are the most common. Around 55 percent and 21 percent of infants were found to suffer from fever and infection respectively in Malda. While the treatment sought for infections was substantially high at around 80 percent, only 55 percent of infants were taken to a health facility when they had fever.

A vital point noticed in Malda is the low utilization of public health care services in terms of infant health care utilization. While vaccination was received entirely from the Government health facilities, the same is noticed in the case of infants suffering from any ailment. A meagre percentage, less than 10 percent of the respondents, sought treatment from the government sources. Among the private sources, the local doctor or “quacks” form the majority share. These local doctors or quacks, practice medicine without any formal medical training and are very well-known among the villagers due to low fees and easy accessibility. The next highest percentage is of the private practitioners, often who are the Government doctors having a private practice. The general notion of the people of the region is that the Government doctors when visited in their private clinics, provide better treatment. Also, the long queue of the Government facilities can be avoided. Another major reason cited for not visiting the Government health sources is the absence of the pediatrician. Further, easy accessibility and availability of the quacks have led people to often resort to them. The government health facilities, especially the rural hospital or Malda Medical College is only visited in times of emergency. The hospital doctors reported seeking treatment from quacks and availing health services only when the child is critically ill has resulted in increased child morbidity and mortality in the area. However, the treatment-seeking behavior differed in both the blocks, with Bamangola reporting a higher percentage of infants receiving treatment when suffering



from any ailment, than Kaliachak – I, which explains the higher percentage of low infant health status in the latter.

Among the socio-economic determinants, education of the mother, religion and caste emerges as the major factors affecting infant health in the region. Religion and caste are the dominant of all the factors, with Hindus and higher caste infants showing more likelihood for good health status. The economic status of the Muslims and Scheduled population in the region is found to be quite low when compared to the Hindus. Further, poor sanitation and housing facilities of the Muslim areas in the study area may be cited as the major reason. Source of drinking water was also found to have a profound influence on infant health, especially in terms of good health. Infants having piped water as drinking source showed more likelihood of good infant health status. Utilization of type of health care services emerges as another important determinant of health status in the region. The regression results reveal that the infants receiving treatment from private or Government sources were more likely to have good or moderate health status, compared to infants visiting the quacks. Geographical accessibility to the health facilities emerges as another important factor affecting infant health. Villages having accessibility throughout the year were found to have a high likelihood for good infant health status. Health infrastructures too play a key decisive role in the health status of a region. Not only quantity, but the quality of infrastructure is equally important for better delivery of health services. In the study region, the Sub-centre in Madnabati was found to be the best in terms of provision of medicines, health care, and staff compared to other two Sub-centres of Doulatpur and Silampur. The regression results too show the same with infants within the area of Madnabati sub-center showing a high likelihood of good infant health status, compared to Doulatpur and Silampur.

## **7.2 Recommendations**

Malda has a long history of poor infant health, with the district recording some of the highest IMR in the state since 1981. Despite the rich legacy of the independent sultanates and Mughal dynasty, the present socio-economic development of the district is quite low. With high population pressure and fewer number of health infrastructure, the health

scenario in the district is in a dismal state. The survey reveals both supply and demand side factors play a decisive role in the poor health status of the infants in the region.

The huge population pressure in Malda has encumbered health facilities thereby constricting efficient and quality service delivery. The referral system in the district is also found to be poorly developed and non-functional which further intensifies the pressure on the Medical College. Construction of more health infrastructure at the lower tiers, operationalizing and strengthening the existing referral system would reduce pressure on both the medical college as well as the rural hospitals. Further, shortfall of paramedical staffs in the medical college and doctors in the villages was noticed which further reduced the efficiency of the service. Unavailability of paediatrician, long queue and preferred doctor was stated as the predominant reason for the low utilization of government health services and heavy reliance on the village quacks. To meet the acute shortage of doctors, especially in the rural areas an initiative has been taken by the Government of West Bengal to provide some basic medical training and certification to these ‘doctors’ or quacks for better health care provisioning and drug dispensing ( The Telegraph, Dec 2017). However, at the time of survey this was still at a nascent stage, and therefore recruitment to fill the vacant posts and training of the rural health providers should be done at the earliest.

Geographical accessibility emerges as another important reason for low utilization and infant health in the region. Low connectivity and absence of metalled roads have led to less number of public transportation in the region. The region being interspersed by rivers, the absence of pucca bridges forces the people to travel by boat during monsoon and by foot during other time of the year, which makes access to health institutions very difficult. Expansion and construction of road network and bridges on the rivers is required for optimal utilization of the existing health care services in the region.

The socio-economic and demographic characteristics of the region too play an important role in influencing infant health. Age at marriage was found to be quite low in the district with most of the girls being married at adolescent. Taking into account the evils of adolescent marriage which soon results in adolescent pregnancy, the Government needs to implement stricter measures to check the under-age marriages and encourage

postponement of the marriage age. The head of the paediatric department, Malda medical college reported a lack of awareness and indifference on part of the households, often leads to delayed initiation of treatment of the infant increasing the risk. Acceptance of new interventions is also low in the region. Therefore, more awareness camps need to be organized in the villages to make people aware of the benefits of the different programmes and policies of the Government. Lastly, there exists a general notion among the people that private health providers are more efficient and provide better health services. However, treatment seeking from private health institution increases the out of pocket expenditure of the poor households due to arbitrary charges levied by them. Monitoring and regulating the private health sector by the Government is therefore required to check their unprecedented growth and medical charges imposed on them. Not only this will lower the out-of-pocket expenditure of the people, but also ease the burden on the Government health system.

The enhancement of infant health in Malda, therefore, requires a series of efforts both on the part of the people as well as on the part of the Government. Along with the expansion of the healthcare facilities, monitoring and supervision of the existing ones are required for proper functioning. On the part of the people, more awareness, acceptance and utilization of public health programme is needed. Though the ASHAs have done a commendable job in improving the health status of the infants in the region and increasing delivery assisted by skilled person, more effort is required to bring about the desired change.

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*Appendix 1. Basic characteristics and human resources availability at Sub-centers*

<b>Name of the Sub-centre</b>	<b>Silampur</b>	<b>Doulatpur</b>	<b>Madnabati</b>
Population covered	9,388	7,687	6,412
No. of villages catered	7	7	13
Average distance from villages (in km)	1.14	1.07	2.04
Distance of the farthest village (in km)	2	2.5	4.5
No. of villages connected with pucca road	7	6	13
No. of villages connected with bus/private vehicle	6	5	12
No. of villages accessible throughout year	6	6	12
<b><i>Availability of Human resources/personnel</i></b>			
ANM/Female health worker	Yes	Yes	Yes
Male health worker	No	No	No
Additional ANM (contractual)	No	Yes	Yes
ASHA	6	6	6
<b><i>Training received during last five years</i></b>			
Integrated skill development training for 12 days	Yes	No	Yes
Vector Borne Disease Control Programme (VBDCP) training	Yes	Yes	No
Directly Observed Treatment Short course (DOTS) training	Yes	No	Yes
Immunization training	Yes	Yes	Yes
Intra Uterine Device (IUD) Insertion training	Yes	Yes	Yes
Integrated Management of Neonatal and Childhood Illnesses (IMNCI) training	Yes	Yes	Yes
Skilled Birth Attendant training	Yes	No	Yes

*Source: Primary Survey*

*Appendix 2. Facilities and equipment availability at Sub-centers*

<b>Name of the Sub-centre</b>	<b>Silampur</b>	<b>Doulatpur</b>	<b>Madnabati</b>
<b><i>Labour room facilities</i></b>			
Availability of labour room	Yes	No	No
Availability of 24 hours water supply	Yes	No	No
SC situated in a Government designated building	Yes	No	Yes
<b><i>Availability of selected furniture</i></b>			
Examination Table	Yes	No	Yes
Labour Table	No	No	No
Foot Step	No	No	Yes
Cupboard with lock and key	Yes	Yes	Yes
Bedside Screen	Yes	No	No
<b><i>Availability of equipment</i></b>			
Instrument Sterilizer	Yes	No	Yes
Auto Disposable (AD) Syringes	Yes	Yes	Yes
Hub Cutter	No	Yes	No
B.P. Instrument	Yes	Yes	Yes
Stethoscope	Yes	Yes	Yes
Weighing machine (adult)	Yes	Yes	Yes
Weighing machine (infant)	Yes	Yes	Yes
Haemoglobinometer (Sahlis)	Yes	Yes	Yes
Foetoscope	Yes	No	Yes
IUD Insertion Kit	Yes	No	Yes
Vaccine Carrier	Yes	Yes	Yes

*Source: Primary Survey*



**Appendix 4. Availability of medicines and other consumables at Sub-centers**

<b>Name of the Sub-centre</b>	<b>Silampur</b>	<b>Doulatpur</b>	<b>Madnabati</b>
<b><i>Availability of essential drugs/items</i></b>			
Drug Kit -A	Yes	No	No
Drug Kit -B	Yes	No	No
IFA Tablets	No	Yes	Yes
Vitamin A Solution	Yes	Yes	Yes
ORS Packets	Yes	Yes	Yes
<b><i>Additional drugs for intra natal care</i></b>			
Inj. Gentamycin	No	Yes	Yes
Inj. Magnesium Sulphate	No	No	No
Cap. Ampicillin	No	No	No
Tab. Metronidazole	No	Yes	Yes
Tab. Misoprostol	No	No	No
<b><i>Availability of medicines and other consumables</i></b>			
Tab. or syrup Chloroquine Blister pack for treatment of Plasmodium Falciparum (P.F). cases	Yes	Yes	No
Tab. Primaquine			
Tab. or syrup Paracetamol	Yes	Yes	Yes
Tab. DEC (Di Ethyle Carbamazine )	No	No	Yes
Anti Leprosy medicines (MDT)	No	No	No
Anti-Tubercular drugs	No	Yes	Yes
Diagnostic Kit for Malaria	No	Yes	No
Testing strips for Glucose in Urine	Yes	Yes	Yes
Testing strips for proteins in Urine	Yes	Yes	Yes

*Source: Primary Survey*

**Appendix 4. Basic characteristics and availability of human resources in the Rural Hospital**

	Name of the Rural Hospital	
	Silampur	Bamangola
No of PHCs catered by this CHC	3	2
Population covered	4,14,287	1,50,481
Distance between DH and CHC (in KM)	23	65
Distance of the farthest village (in KM)	25	19
Is there all weather communication for all the villages?	Yes	Yes
<b>Availability of Clinical Human resources</b>		
Physician	4	5
Obstetrician /Gynaecologist	0	1
<b>Availability of Support Human resources</b>		
Public Health Nurse (PHN)	NA	27
Auxiliary Nurse Midwife (ANM)	42	27
Staff Nurse	11	NA
Nurse/ Midwife	NA	9
Dresser	6	NA
Pharmacist/ Compounder	1	1
Lab. Technician	1	1
Radiographer	0	1
Ophthalmic Assistant	0	1
OPD Attendant	1	1
Statistical Assistant/Data Entry Operator	2	1
OT Attendant	0	0
Registration Clerk	1	0
Class IV Employee	1	3
At least one staff nurse/LHV/ANM at CHC available round the clock	Yes	Yes
Gynaecologist available on call in case of emergency	Yes	Yes

*Source: Primary Survey*

*Appendix 5 Training provided to staff in the hospitals*

	Name of the Rural Hospital	
	Silampur	Bamangola
<b>Training For Medical Officer (MO) During Last Five Years</b>		
Non Scalpel Vasectomy(NSV) training	No	Yes
Minilaprotomy training	Yes	Yes
HIV/AIDS Prevention, Care and Support training	No	Yes
Emergency Obstetric Care(including C-Section) training	No	Yes
Newborn Care training	Yes	Yes
Basic Emergency Obstetric Care training	No	Yes
Integrated Management of Neonatal &Childhood Illnesses training	No	Yes
Medical Termination of Pregnancy (MTP) training	No	No
<b>Training For Para Medical Staff During Last Five Years/Ever Received The Training</b>		
Reproductive Tract Infection /Sexually Transmitted Infection (RTI/STI) training	No	No
Blood grouping and cross matching training	No	No
Integrated Management of Neonatal and Childhood Illnesses (IMNCI) training	Yes	Yes
Skilled Birth Attendant training	Yes	Yes
Electro Cardiogram (ECG) training	No	No

*Source: Primary Survey*

*Appendix 6 Facilities provided by the Rural Hospitals*

	Name of the Rural Hospital	
	Silampur	Bamangola
<b>Investigative Facility</b>		
ECG facility	No	Yes
X- Ray facility	No	Yes
Ultrasound facility	No	No
<b>Physical Facility</b>		
Pharmacy for drug dispensing and drug storage	Yes	Yes
Availability of OPD rooms	2	1
Availability of OPD cubicles	2	2
Availability of Minor Operation theatre	No	Yes
Availability of Injection Room and Dressing Room	Yes	Yes
Availability of Emergency Room / Casualty room	Yes	Yes
Total Number of beds in CHC	60	30
Separate wards for males and females	Yes	Yes
Number of beds for Male	20	15
Number of beds for Female	40	15

*Source: Primary Survey*

*Appendix 7 Availability of Essential services in the Rural Hospital*

	Name of the Rural Hospital	
	Silampur	Bamangola
<b>Operation Theatre</b>		
Availability of Operation Theatre (OT)	No	Yes
Surgeries carried out in the operation theatre		Yes
OT used for obstetrical / gynaecological purpose		Yes
OT fitted with air conditioner		Yes
Back up facility for electricity cut-off available in OT		Yes
<b>Labour Room</b>		
Availability of Labour room available	Yes	Yes
New born care area in the labour room	Yes	Yes
Emergency drug tray in the labour room	Yes	Yes
<b>Laboratory</b>		
Operational laboratory	Yes	No
Blood Storage Facility	No	No
<b>Laboratory Equipment</b>		
Refrigerator	Yes	Yes
Blood culture bottles with broth	No	No
Cold Box	Yes	Yes
Kits for ABO blood grouping	No	No
HIV test kits	Yes	No
<b>Cold Chain Equipment</b>		
Walk in cooler	No	No
Walk in freezer	No	No
ILR Large	Yes	No
ILR Small	Yes	Yes
Deep freezer Large	Yes	Yes
Deep freezer Small	Yes	Yes

*Source: Primary Survey*