TRENDS IN SOCIAL GROUP DISPARITY IN INFANT MORTALITY IN INDIA AND ORISSA, NFHS-1 TO NFHS-3

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MASTER OF PHILOSOPHY

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DECLARATION

This is to certify that the dissertation entitled **"TRENDS IN SOCIAL GROUP DISPARITY IN INFANT MORTALITY IN INDIA AND ORISSA, NFHS-1 TO NFHS-3"** is my bonafide work for the degree of **MASTER OF PHILOSOPHY** and may be placed before the examiners for evaluation.

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DEDICATED TO
MY
FAMILY AND TEACHERS

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Abbreviations

IMR= Infant Mortality Rate

NNMR= Neonatal Mortality Rate

PNNMR= Post-Neonatal Mortality Rate

IIPS= International Institute for Population Sciences

MoHFW= Ministry of Health and Family Welfare

UNDP= United Nations Development Programme

SC= Scheduled Caste

ST= Scheduled Tribe

OBC= Other Backward Class

RCH= Reproductive and Child Health

CSSM= Child Survival and Safe Motherhood

TBA= Traditional Birth Attendance

NHRM= National Rural Health Mission

ORS= Oral Rehydration Salt

NFHS= National Family Health Survey

UIP= Universal Immunization Programme

RGI= Registrar General of India

Chapter **1**

Introduction

CHAPTER-1

INTRODUCTION

Fertility and mortality are the two important fundamental determinants of population growth. Out of these two determinants mortality is very important because first mortality declines and fertility follows after a lag. Decline in child mortality, most of it is under-five years of age is one of the major causes for declining fertility world wide. Under-five mortality is divided into infant mortality (0-1 year of age) and child mortality (1-4 year of ages) for better study purposes. The infant mortality rate is commonly used more than any other measure as a general indicator of socioeconomic wellbeing and of general medical and public health conditions in a country (UNICEF:2006). Despite achieving a remarkable decline in the mortality level in world, as a result of improvement in socio-economic, demographic and family health care particularly mother and child health care factors as well as scientific and technological advancement in the medical field, the level of infant mortality still remains very high in many developing countries like India. India is a major concern because it constitutes16 per cent of world population. So the total number of infant deaths in India constitutes a large proportion of total infant deaths in the world.

Infant mortality refers to deaths of children under the age of one year. It is measured by the infant mortality rate (IMR), which is the total number of deaths to children under the age of one year for every 1,000 live births. The infant mortality rate is often broken down into two components relating to timing of death: neonatal and post-neonatal. The neonatal mortality rate refers to the number of deaths to babies within 28 days after birth (per 1,000 live births). Sometimes a special type of neonatal mortality is assessed. The perinatal mortality rate measures the number of late fetal deaths (at or after 28 weeks gestation) and deaths within the first 7 days after birth per 1,000 live and still births. The post-neonatal mortality rate is deaths to babies from 28 days to the end of the first year per 1,000 live births. The distinction between neonatal and post-neonatal mortality is important because the factors which affect neonatal mortality are mostly endogenous and post-neonatal mortality mostly exogenous in nature. The endogenous factors are related

to the formation of foetus in the mother's womb and are biological in nature. These include age of mother, birth order, period of spacing between births, pre-maturity, weight of the child at the time of birth and other biological factors. Socio-economic, cultural and environmental factors are considered as exogenous factors, which are more responsible for mortality during post-neonatal period. These include faulty feeding, poor hygiene, crowding and congestion, lack of sunshine and fresh air, polluted water, etc. It has been found that in countries where infant mortality is low, a large proportion of deaths occur during the neonatal period, because being developed they have successfully eliminated environmental factors responsible for post-neonatal deaths (Raj: 2003).

1.1: Infant Mortality in International Perspective

Table 1.1 provides IMR (infant mortality rates) for the world, for developed and developing countries, and by continent, with some selected countries that highlight the range of levels. World's infant mortality rate of 52 indicates it needs time to lower infant mortality. Differences in infant mortality level across the world are substantial. Africa's rate of 86 is fourteen times higher than the average rate 6 for the developed countries. The highest levels of infant mortality in the world are experienced within Africa. Both Europe and North America (the United States and Canada) have low levels of infant mortality, with average rates under 6. In Latin America the infant mortality rate is four times higher than North America. On average the rate for Asia (48 pre 1000 live births) is somewhat lower than for Africa, but some Asian countries such as Afghanistan have rates 166 as high as anywhere in the world. On the other hand, Hong Kong's rate 2 is very low, illustrating that the large variation in infant mortality level occurs in Asia. The average infant mortality rate for East Asia, West Asia, South East Asia and South Central Asia are 25, 41, 32 and 64 respectively. In South Central Asia the rate is the highest in Asia. If the infant mortality rate in India comes down it will have a great impact in reducing the average rate for South Central Asia as well as the average rate for Asia. The decline of infant mortality rate in India will not only lower the average rate for the Asian continent but also lower the average rate for world because in India a large proportion of births occur annually in the world. Per cent of infant mortality decline from 1997 to 2007 very less in India compared to Sri Lanka, China and Indonesia. Infant mortality declines in Sri

Lanka, China and Indonesia are 39 per cent, 34 per cent, and 29 per cent respectively in this decade, where in India it is only 21 per cent.

Table 1.1: Infant mortality rate (per 1000 live births) by region and selected countries

AREA	Infant Mortality Rate
World	52
More developed countries	6
Less developed countries	57
Africa	86
Sierra Leone	158
Asia	48
East Asia	25
China	27
Hong Kong	2
West Asia	41
Iraq	94
Israel	4
South East Asia	32
Indonesia	34
South Central Asia	64
Afghanistan	166
India	57
Sri Lanka	11
Europe	6
Latin America	24
North America	6

SOURCE: *2007 World Population Data Sheet,* Population Reference Bureau (2007).

1.2: Infant Mortality in National Perspective

The infant mortality rate in India was close to 200 per 1000 live births in 1911. At the time of independence the infant mortality rate was at 134 (India, Registrar General, 1981). It came down to 129 in 1971 and further to 110 in 1981. In the year 2000 infant mortality rate in India was 68 and finally in 2006 it was at 57 per 1000 live births. Table 1.2 indicates infant mortality rate varies from state to state to a great extent because disparities exist between states with respect to socio-economic, cultural, demographic and physical structure. Starting from infant mortality rate of 15 per 1000 live births in Kerala, which is the lowest among states to the highest in Madhya Pradesh (74). Infant mortality rate is high in the states of Orissa, Uttar Pradesh, Madhya Pradesh, Assam and Rajasthan compared to national average. It is important to give more focus to these states for achieving the national population policy goals of IMR below 30 by 2010. The monitorable targets for the Tenth Five Year Plan include reduction of IMR to 45 by 2007 and 28 by 2012. SRS (sample registration system) data shows that Punjab, West Bengal, Delhi, Tamil Nadu, Maharastra and Kerala have already achieved the target for 2007. Now the time has come to give special attention to the poorer states for achieving the national targets.

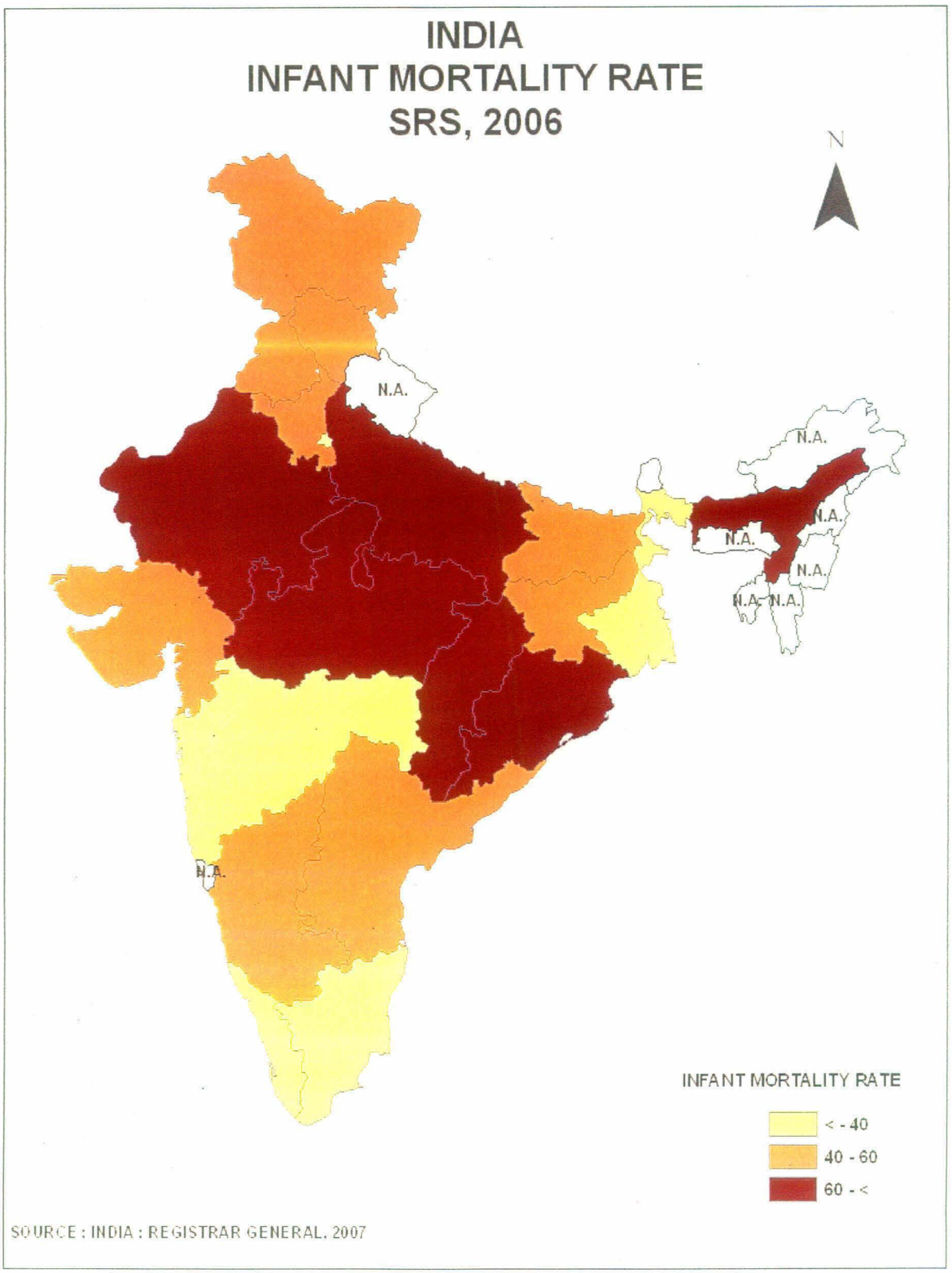
In India great disparity also exists among different segments of population. From the very early stage of society some castes were having higher socio-economic status than others (scheduled caste and scheduled tribe), with the result that the latter are facing very high under-five mortality rate compared to the former. The first round of National Family Health Survey (1992-93) showed that the infant mortality rate is the highest among children belonging to scheduled castes (107 per 1000 live births) followed by scheduled tribes (91) and others (82) respectively. The third round of National Family Health Survey (2005-06) showed infant mortality rates are 66 and 62 per 1000 live births for children belonging to scheduled castes and scheduled tribes respectively, whereas the rates are 56 and 49 among children belonging to other backward castes and other community respectively.

Table 1.2: Infant mortality rate (per 1000 live births) in India and its bigger states, 2006 (in descending order of IMR)

Regions	Infant Mortality Rate
India	**57**
Madhya Pradesh	74
Orissa	73
Uttar Pradesh	71
Assam	67
Rajasthan	67
Chhattisgarh	61
Bihar	60
Haryana	57
Andhra Pradesh	56
Gujarat	53
Jammu & Kashmir	52
Jharkhand	49
Karnataka	48
Punjab	44
West Bengal	38
Delhi	37
Tamil Nadu	37
Maharastra	35
Kerala	15

Source: Sample Registration System: Registrar General of India, (2007).

Map 1.1


INDIA
INFANT MORTALITY RATE
SRS, 2006
N
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
INFANT MORTALITY RATE
< - 40
40 - 60
60 - <
SOURCE : INDIA : REGISTRAR GENERAL, 2007

1.3: Infant mortality in Orissa

Orissa has the second highest infant mortality rate in the country at 73 per 1000 live births according to the sample registration system (SRS) in 2006 (India, Registrar General, 2007). Within Orissa disparity exists in different parts and among different segments of population as Orissa is a state of great diversity. Some parts are more developed while others parts under developed. Various socio-economic, demographic and environmental indicators greatly differ from one part to another. Infant mortality rate was the highest in the southern parts of Orissa, where more proportion of Scheduled caste and scheduled tribe population live. In coastal region of Orissa, infant mortality rate was the lowest, where less proportion of scheduled caste and scheduled tribe population live. The first round of National Family Health Survey (1992-93) shows that infant mortality rate was the highest among children belonging to scheduled castes (161 per 1000 live births) followed by others (115) and scheduled tribes (113) respectively. The second NFHS (1998-99) shows that infant mortality rate is the highest among children belonging to scheduled tribes (99) followed by other backward class (96), scheduled caste (84) and others (79) respectively. So it is essential to know details about these social groups. The description about different social groups is given below.

Social Groups

From the ancient times, people in India are divided into some groups according to their socio, economic, cultural and physical settings. There are huge disparities among groups. A caste system is a social system where people are ranked into groups based on heredity within rigid systems of social stratification. Social status is determined by the caste of one's birth and may only rarely be transcended. The caste is a closed endogamous group whose members are severely restricted in their choice of occupation and degree of social participation. The Government of India has taken initiatives by giving special benefits to the weaker or oppressed groups. There are a large number of castes, and on the basis of social condition, these are grouped into four categories. These are given below.

Scheduled Caste (SC)

In past Scheduled Caste people were considered as untouchables by the others. The British described them as 'depressed classes'. In 1931 census, they were classified as 'exterior castes'. The scheduled castes are economically very poor and socially backward (Ahuja: 2007). The present population is 16 per cent of total population of India, whereas it is 17 per cent in Orissa.

Scheduled Tribe (ST)

Tribe means an endogamous group which is a collection of clans (smaller exogamous groups), individualized by a distinct name with a separate dialect, sharing a common way of life and a political system. However in the Indian context, the tribe refers the indigenous people usually designated as 'Vanyajaty', 'Adivasi', 'Adimjati' or 'Janjati'. Those tribes which are listed under the 5^{th} and 6^{th} schedule of the constitution are designated as Anusuchit Janjati. Scheduled tribe people are isolated groups from ancient India. Primitive agriculture practices and collection of forest product are the main sources of livelihood (Das: 1997). Their education, income and health status are very poor compared to others. Currently their population constitutes 8 percent of total population of India, whereas it is 22 percent in Orissa.

Other Backward Classes (OBC)

Other Backward classes are traditionally socially and educationally backward but of a higher status than the Scheduled Castes and Scheduled Tribes. There is substantial debate over the exact number of OBCs in India. The Mandal commission covered more than 3000 castes under OBC category and stated that OBCs form around 52 percent of the Indian population. However, the National Sample Survey puts the figure at 32%.

Other Castes

Except SC, ST and OBC, the rest of the castes are considered as general caste population. Generally upper caste people such as Brahmans and Kshatriyas from ancient India come under 'other' (general) caste population. The socio-economic status of 'other' caste population is high compared to any other castes.

1.4: Percentage of SC and ST population and infant mortality rate in Orissa compared with other Poor states

In the following Table 1.3 it is shown that infant mortality in those states having high Scheduled Caste and Scheduled Tribe population is higher compared to other poor states in India. In Orissa and Madhya Pradesh where more than 35 percent of population belongs to Scheduled Castes or Scheduled Tribes, the infant mortality rates were 73 and 74 per 1000 live births respectively. Other poor states such as Uttar Pradesh, Assam and Bihar have comparatively low level of infant mortality rate and their Scheduled Caste and Scheduled Tribe population is low compared to Orissa and Madhya Pradesh. Thus it is found that there is some association between percentage of Scheduled Caste and Scheduled Tribe population and infant mortality rate in India.

Table 1.3: Percentage of SC and ST population and infant mortality rate in poorer states

state	% of SC and ST population*	Infant Mortality Rate(per 1000 live births)**
Orissa	**39**	**73**
Madhya Pradesh	**36**	**74**
Uttar Pradesh	**21**	**71**
Assam	**19**	**67**
Bihar	**17**	**60**

Sources: *Primary Census Abstract: Registrar General of India, (2005a).
** Sample Registration System: Registrar General of India, (2007).

1.5: Reproductive and Child Health Programme in India

The reproductive and child health programme (RCH) in India has given more focus to under-served population groups for reducing infant mortality with the objective to reduce socio-economic group disparity as well as regional disparity, which will help to achieve the national target. India has long had a family planning programme. In 1977 the Family Planning Programme was renamed into Family Welfare Programme, with maternal and child health becoming an integral part of the programme, with the vision that reduction in

birth rate has a direct relationship with reduction in infant and child mortality and vice-versa. Under this programme a number of new programmes started to reduce infant and child deaths, which are mentioned here. The diarrhoeal disease control programme was started in the country in 1978.The Main objective of the programme was to prevent death due to de-hydration caused by diarrhoeal disease among children under five years of age (MoHFW, 1997). Under the RCH pogramme ORS (Oral Rehydration Salt) is supplied in the kits to all sub-centers in the country every year.

Universal immunization programme (UIP) against six preventable diseases namely diptheria, pertusis, childhood tuberculoses, poliomyelitis, measles and neonatal tetanus was introduced in the country in a phased manner in 1985, which covered whole of India by 1990. Universal immunization programme become a part of the child survival and safe motherhood (CSSM) programme in 1992 and reproductive and child health (RCH) programme in 1997. In 1992 the ARI (acute respiratory infection) control programme was implemented as part of CSSM and later with RCH. The child survival and safe motherhood programme jointly funded by World Bank and UNICEF was started in 1992 -93 for implementation up to 1997-98. The objectives of the programme were to improve the health status of infants, child and mother (IIPS and Macro International, 2000a). The programme has given more focus to strengthen the immunization service of poor performing areas. Under the safe motherhood component, training to traditional birth attendance (TBA), provision of ascetic delivery kits and strengthening of fast referral units to deal with high risk and obstetric emergencies were taken up.

In order to effectively improve the health status of women and children and fulfill the unmet need for family welfare services in the country, especially the poor and under served by reducing infant, child and maternal morbidity and mortality, Government of India in October 1997 launched the Reproductive and Child Health (RCH) programme for implementation during the Ninth plan period by integrating child survival and safe motherhood (CSSM) programme with other reproductive and child health (RCH) services (MoHFW, 1999). The RCH programme is the umbrella programme of the department within whose framework and approach all the services being provided/arranged by

Department of Family Welfare are to be planned and delivered. It aims at providing need based, client centered, demand driven, high quality services to the beneficiaries with a view to enhancing the quality of reproductive life of the population and enabling the country to achieve population stabilization. The programme paid substantially more attention on the eight states lagging behind in population stabilization efforts viz. Orissa, Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttaranchal and especially to under-served groups. Dai's Training, RCH Camps and RCH out reach services were started to address felt gaps (MoHFW, 2001). The initiatives that are implemented by the Department of Family Welfare to reduce infant and child mortality are listed below.

1. Control of deaths due to acute respiratory infection.
2. Control of deaths due to diarrheal diseases.
3. Provision of essential new born care.
4. Vitamin-A supplementation to children between the ages of six months to three years.
5. Iron Folic Acid supplementation to children under-five years of age.
6. Implementation of Exclusive breast feeding up-to the age of six months and appropriate practices related to complementary feeding.
7. Integrated Management of Neonatal and Childhood Illnesses (IMNCI) started under RCH Programme. It offers a comprehensive package for the management of the most common causes of childhood illness i.e. sepsis, measles, malaria, diarrhea, pneumonia and malnutrition. It is supported by appropriate strengthening of the health care system and promotion of positive health care practices of the community.

Broadly, the programme aims to universalize the immunization, ante-natal care, skilled attendance during delivery as well as for common childhood elements. Greater stress on improving neonatal care at all levels, hospital, home and community will be paid so as to substantially reduce the infant mortality. The National Rural Health Mission (NRHM) started in the year 2005 to meet the unmet need of rural poor and abridge the health gaps between rural and urban people. National Rural Health Mission seeks to improve access

of rural people, especially poor women and children to equitable, affordable and effective primary health care throughout the country with special focus on eighteen states which have weak public health indicators and weak infrastructure (IIPS and Macro International, 2007).

1.6: Statement of the Problem

The first and the second rounds of National Family Health Survey showed that infant mortality in Orissa is the highest among all Indian states. The recently published report of the third round of National Family Health Survey shows infant mortality rate in Orissa is the second highest followed by Madhya Pradesh. Though Orissa holds a good position in various demographic and social indicators like crude birth rate, sex ratio at birth and literacy level, etc it stands very poorly in case of infant mortality rate as compared to other poorer states like Bihar, Uttar Pradesh and Assam. Due to high infant mortality rate, the crude death rate of Orissa is also the highest in India. In Orissa, the coverage of antenatal services is high compared with other poor states, yet the level of infant mortality rate has not fallen below than in the other poorer states.

To know the micro factors which are very important to reduce the infant mortality, we need more research in this regard. In Orissa 39 per cent of population belongs to either scheduled caste (SC) or scheduled tribe (ST). All reports show that the socio-economic and demographic indicators are very poor among SC and ST population than 'other' castes. This situation leads to high infant mortality rate among SC and ST children than 'other' caste children. Is it a major reason for the high infant mortality rate in Orissa? Whether the caste disparity of infant mortality in Orissa as well as India has declined or not through reproductive and child health intervention programme? This study tries to find out the actual picture in this regard. The analysis of the micro data will surely be helpful to the planners and programme managers to have an effective plan, while planning, formulating, implementing and monitoring the programmes.

1.7: Hypothesis

From the above discussion about child health programmes, it is found that the poor or vulnerable groups in the population are getting much priority for improving infant and

child health and reducing mortality. The following hypotheses have been made on this basis.

1. Infant mortality level is higher among SCs and STs than others both due to poor socio-economic conditions and social deprivation.
2. The disparity in Neonatal and Post-Neonatal mortality among socio-economic groups has declined over time.

1.8: Objectives

The objectives of this study are as follows:-

1. To make comparative study of the trend of infant mortality rate in Orissa with India.
2. To assess trends in the caste/tribe disparity in Neonatal and Post-Neonatal mortality in Orissa.
3. To compare caste/tribe disparity in Neonatal and Post-Neonatal mortality in Orissa and India.
4. To assess net differences by social background controlling for the effects of other socio-economic factors.

1.9: Chapterization of Study

The dissertation is divided into six chapters which are follows:-

Introduction, statement of the problem, hypothesis, and Objectives are included in the first chapter. The second chapter presents review of literature and research gaps. The conceptual framework, data sources and methodology have been presents in third chapter. Chapter 4 consists of trend analysis and district level infant mortality rate in Orissa. Chapter 5 analyzes the socio-economic group disparity of Neonatal and Post-Neonatal mortality in India and Orissa and its trend. Conclusions and policy recommendations are discussed in Chapter 6.

Chapter 2

Review of Literature

CHAPTER-2

REVIEW OF LITERATURE

A large number of studies have focused on different factors like socio-economic, cultural, demographic, medical facility and sanitation at individual as well as household level which have an effect on infant mortality. Since the number of studies is large, it is not possible to list these here. However some eminent scientists have summarized many and the important points noted by them are discussed below.

Social scientists mainly focused research on socio-economic aspects of child survival, while medical scientists focused research on biological aspects of child survival. The Mosley and Chen (1984) analytical framework for child survival brings an integration between socio-economic and biological factors, which determined child survival. The framework is based on the premise that all social and economic determinants of child mortality necessarily operate through a common set of biological mechanisms or proximate determinants, to exert an impact on child mortality. The proximate determinants are grouped into five categories such as maternal factors (age, parity, birth interval), environmental contamination (air, water, food, inanimate objects, insect vectors), nutritional deficiency (calories, protein, micronutrients), injury (accidental and intentional), and personal illness control (personal preventive measures and medical treatment).

Preston (1996) investigated the relationship between under-five mortality and socio-economic and demographic characteristic from world fertility survey data. He found that five socio-economic characteristics such as mother's education, father's education, mother's labour force status, father's occupation and place of residence (rural/urban) influence child survival. Mother's labour force status and place of residence were not as important as the other three socio-economic characteristics. The impact of mother's education on child mortality in Latin America and South East Asia was particularly important. The demographic factors such as sex of child, birth spacing and age of the

mother have a substantial effect on child survival. Out of these factors birth spacing was most important for child survival.

Potter (1988), while analyzing World Fertility Survey (WFS) data found that birth spacing and child survival are positively and strongly correlated. Birth spacing affects child survival through two ways. On the one hand mother's good biological and health condition and on the other hand increasing the length of breast feeding by decreasing sibling competition increases the chances of infant and child survival.

2.1: Studies in Developing Countries

The influences of socio-economic and demographic factors on infant mortality have been investigated in a number of populations. Some important studies from developing countries are reviewed first, followed by studies in India.

Bairagi *et al*, (1999) using hazard model technique for Bangladesh Demographic and Health Survey 1993/94 data found that mother's education, mother's age, birth order, sex of child and religion were important determinants of both infant and child mortality. However, the nature of the effects of some of these determinants was different in infancy than in childhood. Infant mortality had a U-shaped relationship with education level of mother and birth order but child mortality increased linearly with birth order. In Bangladesh infant mortality was higher for males and Hindus, but child mortality was higher for females and for Muslims.

Chen *et al*, (2002) using Viet Nam Demographic and Health Survey (1997) data analyzed disparities of perinatal mortality among different socio-economic and geographical groups of population. The study shows that perinatal mortality is high among mid-land/mountainous population (30 per 1000 live births) and low among plain land population (19 pre 1000 live births). The child of a low income family has twice the risk of perinatal mortality than the child of a high income family. The child of an illiterate mother faces three times higher risk of dying in perinatal period compared to the child of a higher secondary educated mother. Perinatal mortality rate was the highest among the

Ba Na ethnic group (73 per 1000 live births) and lowest among the Kinh ethnic group (20 per 1000 live births). In Viet Nam perinatal mortality was the highest in July, the hottest month, and also in February, the end of winter.

Stoeckel *et al,* (1972) studied 'neonatal and post-neonatal mortality in rural area of Bangladesh' and found that the stage of development or modernization process influences the post-neonatal death rate substantially but not the neonatal mortality to that extent. The result also found that mothers in the oldest age group did not exhibit a neonatal mortality rate very different from that of mothers aged 25-39 and that post-neonatal mortality in the oldest age group decreased sharply after age 39. The births to women aged 40-49 years of high parity produced low levels of neonatal and post-neonatal mortality.

Mostsfa (1995) applying odds ratios on demographic surveillance system data for Matlab Thana of Bangladesh found that biological factors have more influence on the perinatal mortality than socio-economic factors. Children born at an early age (less than 20) and old age (more than 34) of mother face higher risk of child death. Children of those women, who had foetal losses, are more at risk of child death. The results also show that birth interval between 2 to 5 years are very less risk for child death.

Gubhaju *et al* (1991) while analyzing the Nepal fertility and family planning survey data found that demographic factors such as maternal age and birth orders are significant determinants of infant mortality, after controlling all other factors. Mothers less than 20 years of age were experiencing 51 per cent higher risk of infant mortality than mothers 20-29 years. First born children have the lowest risk of dying during infancy and risk increases with birth order. Drinking water and toilet facility are also significant factors affecting child survival.

Howlader and Bhuiyan (1999) studied the Bangladesh demographic and health survey data and found that toilet facility was one of the important determinants of post neonatal and child mortality whereas the preceding birth interval was an important determinant of

neonatal mortality. For mothers whose children were born after a birth interval of 18 months or longer, the risk of their children dying at the neonatal stage was about 40 percent lower compared with those children born after an interval of less than 18 months. Mother's age less than 20 and higher birth order posed higher risks of neonatal mortality for their children. The analysis also shows a surprising result that the mother who delivered child at health centers/hospitals was facing higher risk of neonatal mortality than the non-institutional deliveries.

Alicia *et al,* (2008) studied the ethnic disparities in infant mortality in Southern Brazil and found that infant mortality among births to White women decreased by 54% from 1982 to 2004. But in the same period the infant mortality to births to Black and Mixed-race women fell by 43%. In each time period, infant mortality was consistently higher among infants born to Black and Mixed-race women. The proportion of deaths among infants born to Black and Mixed-race women, which represents 28% of all infant deaths of the city in 1982, increased to 36% in 1993 and to 43% in 2004, representing a relative increase of 54% in the study period (1982 to 2004).

Widayatun (1991) while analyzing the relationship between women's status and child survival in West Java found that women's status and child mortality are strongly negatively correlated. The infant and child mortality rates tended to be high in the 10 regencies (regions) in the north and west coast of West Java, where the status of women was relatively low. By contrast, in the municipalities where the status of women was relatively high, infant and child mortality rates tended to be lower. Women's status both in the household and in society may affect infant and child mortality through birth spacing and health care. Women who have higher status either in the household or in society are more likely to have a higher level of contraceptive use leading to higher levels of birth spacing, which is an important determinant of health of infants. They are also more likely to seek more appropriate treatment when their children are ill, leading to less child death.

2.2: Studies in India

In India considerable variation exists in terms of utilization of institutional health facilities by pregnant women. Scheduled caste and scheduled tribe women have higher probability of delivery at home. So the infant and child mortality among these groups is higher than others. In rural India, the scheduled caste and scheduled tribe people are often forced to reside in isolated localities away from main village settlement reserved for the higher categories. Since health facilities are closer to the main settlement, it acts as an additional constraint for the women belonging to schedules castes and scheduled tribes (Chakrabarti, 2005).

Choe and Chen (2006) studied the effectiveness of reproductive and child health programme on child and maternal mortality in India and found that India can not achieve the goal 4 of United Nations of a reduction of under-five mortality by two thirds (67 per cent). If the current trend in under-five mortality in India continues one can expect a 54 percent reduction by 2015, about 13 per cent short of the goal. The analysis shows that this gap can be closed by effective family planning programmes resulting in reduction of early child bearing; short birth intervals and high order births combined with increased utilization of reproductive and child health programmes including antenatal tetanus vaccination and child immunization. Eliminating discrimination against girl children can reduce early childhood mortality even further.

With increasing mother's education the survival chances of children also increases. Mother's education has a greater effect on the survival of her daughters than it does on that of her sons. The effect of education was so much greater than that of place of residence. (Bourne *et al*, 1991). Parental education particularly maternal education improves the survival chances of children in India. The improvement in the economic condition of the households measured through SLI and father's occupation is found to have enough potential to reduce child mortality (Singh *et al*, 1998).

One study conducted by Arnold *et al* (1998) on child mortality shows that, 45 per cent excess female child mortality over male child mortality was experienced in Orissa, while

135 per cent excess female child mortality over male child occur in Haryana. Kerala and Tamil Nadu show excess male child mortality over female. The scheduled caste and scheduled tribe children faced lower risk of dying in neonatal period but higher risk of dying in post-neonatal period compared to other caste children.

In the northern and north-central regions of India, excess female child mortality compared with boys of respective rank is about one-third higher for the first girl child and even greater for girls of higher rank. Gender bias is more severe and selective in the north compared with the north-central regions of India. In the eastern, western and southern regions of India, excess female child mortality is marginal and does not rise systematically as the number of female children in the family increases. The improved education, economic status and exposure to mass media tend to reduce gender bias in these regions (Arokiasamy, 2004).

Two individual level factors relating medical care at birth and care during the post-neonatal period explained about 64 per cent of the regional variations in infant mortality as compared with 60 per cent explained by the two house-hold level factors i.e. poverty and adult women's literacy in India. The medical factors have shown a slightly high effect on infant mortality than the non-medical factors (Jain, 1985).

Banerjee and Roy (2002) using National Family Health Survey data found that consanguineous marriage has a crucial genetic effect on offspring mortality. There is still some preference for marriage among biological relatives in India, particularly in the southern and western parts of the country. It is clear from the bivariate as well as multivariate analysis that, the genetic effect of consanguinity on offspring mortality is detrimental only among close consanguineous couples and exclusively during the period of development of the foetus (still-births) and the early phase of infancy.

Infant mortality correlated with household basic amenities. The availability of safe drinking water, toilet facility and modern cooking facility seems to play a very important role in explaining the differential in infant mortality rate (IMR) and child mortality rate

(CMR) in Maharastra. With overall economic development, household amenities were important determinants of infant and child mortality (Ram and Annama, 1998).

Rajna *et al*, (1998) using NFHS-2 data for Uttar Pradesh analyzed the impact of maternal education and health services on child mortality. The study shows that maternal education is an important determinant of mortality in the post neonatal and childhood ages. The education advantage in child survival operates through greater access to child health services and environmental factors for the better educated. The gross effect of maternal education on post neonatal period shows children of illiterate mothers experienced 1.9 times higher risk of dying as those born to mothers who had at least middle school and above education. After controlling the effect of other socio-economic variables, maternal education continued to be important revealing that illiterate women faced a 1.6 times higher risk of later childhood deaths of their children compared with women educated to at least the middle school level. Along with maternal education antenatal care of the mother showed a highly significant negative effect on mortality. Children born to mothers who received antenatal care experienced a 30 per cent lower risk of dying than those of mothers who did not receive antenatal care. The study also shows that children of Muslims/others faced a lower risk of dying compared with those of SC and ST Hindus.

Das Gupta (1997), while analyzing socio-economic status and clustering of child deaths in rural Punjab found that significant clustering of child deaths occurred only in the lower socio-economic and education groups of population. Mother's education is a powerful factor that affects the clustering of child deaths. Significant heterogeneity in child mortality is found among uneducated women, but not among educated women. The study also showed that biological factors predominate amongst the causes of death of neonates, while Post-neonatal mortality is more affected by child care practices than any other factors. There is significant clustering of deaths in both the neonatal and post-neonatal period but clustering is more prevalent during the post-neonatal period and it accounts for a large proportion of all child deaths. This shows that child care practices are more responsible for death clustering than biological factors. High-risk families are more

exposed to short birth intervals and are likely to reach higher parities in their attempts to achieve their desired family size.

Reddy (2005) studied fertility and mortality among the Madigas (scheduled caste population) in Andhra Pradesh and found that a small proportion of prenatal deaths and high proportion of post-neonatal deaths were observed. The reason is the negligible progress in the control of diseases, particularly those of infectious origin that occur in the post-neonatal period and lack of proper medical care and malnutrition of the infants besides social and biological factors. The economically poor and illiterate Madigas do not adopt birth control methods and perform early marriages mostly with their relatives leading to high fertility, which in turn reflects in high mortality. Poverty makes it impossible for many parents to provide adequate resources to ensure the health of their children. The general causes of death of the children are fever, vomiting, dysentery, diarrhea, inflammation and feeding complications among the Madigas groups.

In Orissa maternal factors are important for child survival. NFHS-2 data shows mothers having higher education and aged 19-30 years facing very low infant mortality. Mother's nutritional status is closely associated with children's birth weight and is an important determinant of the child's survival chances. Institutional and safe delivery coverage is also a major factor that reduces the extent of neonatal, infant and early childhood mortality. The risk of child mortality is higher in rural compared with urban area. Women from scheduled caste/tribes and other backward castes experienced higher risk of infant and child mortality compared to other caste children (Pradhan and Arokiasamy, 2006).

The pace of decline in IMR has been slow in Orissa; in the 16 year period between 1981-83 and 1995-97 it declined by 25 percent, i.e., at the rate of about 1.6 percent per annum. This has been less than the extent of decline in IMR in the case of other low –income states over the same period (Utter Pradesh: 44 percent, Bihar: 35 percent, Madhya Pradesh: 28 per cent) as well as all India (33 per cent) (Padhi, 2001).

2.3: Research Gap

From the above literature, it is found that social, economic, demographic and environmental factors are important determinants of infant survival. Some studies focused on level and trend and determinants infant mortality, while other focused on disparity of infant mortality among socio-economic groups and its causes. Though some studies dealt with socio economic disparity in infant mortality but whether this disparity has declined over time has not been properly addressed in any of the studies. In this context, this study aims to study the trend of disparity in infant mortality in Orissa compared with India.

Chapter 3

Conceptual Framework, Data Base and Methodology

CHAPTER-3

CONCEPTUAL FRAMEWORK, DATA-BASE AND METHODOLOGY

From the literature survey, it is derived that disparity in infant mortality exists among socio-economic groups. Inequality in health is a major issue for a nation because health is an important aspect of human development. Extreme inequalities in opportunity and life chances have a direct bearing on what people can be and what they can do. That determines human capabilities. Children are facing higher risk of death because they are born in a low income family or in an indigenous group or they are female. Deep disparities based on wealth, gender and ethnicity are bad for growth, and bad for social cohesion, which will prevent achievement of the millennium development goal of reducing under-five mortality (UNDP, 2005). Children have the right to basic health care, nutritious food and protective environment. When these rights are not available to all, there is a corresponding rise in mortality among deprived children and a decrease in the country's economic potential. Implementing efforts to decrease infant and child mortality by reducing inequality is the only way to ensure a healthy population and prosperous future.

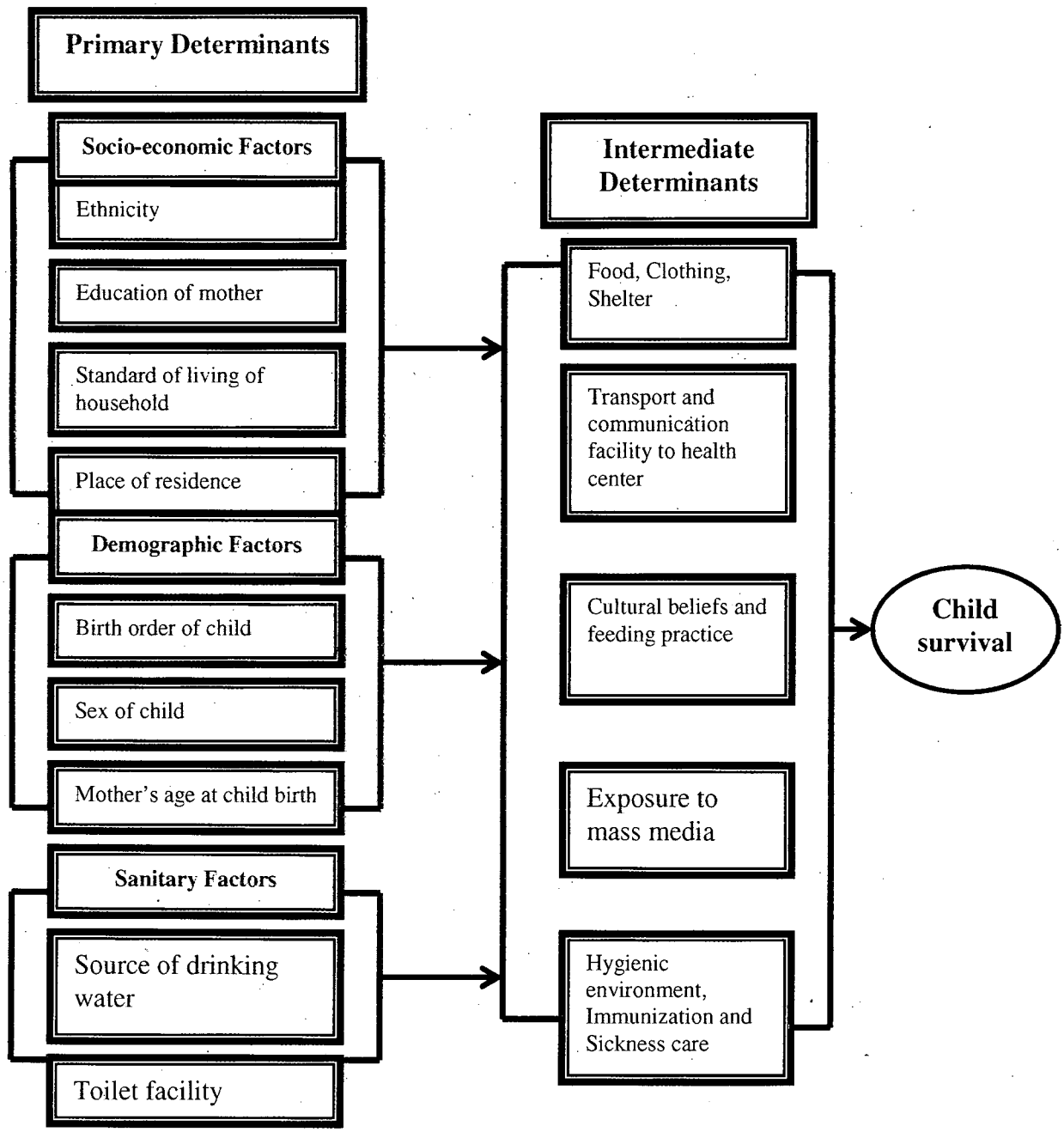
3.1: Framework for the analysis of child survival

A conceptual framework is useful to outline the relationship between the concepts. In a conceptual framework a set of concepts are linked in a planned manner to establish function and relationship. Conceptual framework may be considered as a relational model. Some frameworks given by prominent researchers are useful for the study of child survival. Among them Mosley and Chen's 'Analytical Framework for the Study of Child Survival in Developing Countries' is one of important framework (Mosley and Chen, 1984). This framework depicts a set of socio-economic and medical factors affecting child survival. Social and economic determinants of child mortality operate through a common set of biological mechanisms or proximate determinants to bring an impact on mortality. The proximate determinants are (i) maternal factors (age, parity, birth interval); (ii) environmental contamination (air, water/food, inanimate objects); (iii) nutritional deficiency (calories, protein, micronutrients); (iv) injury, and (v) personal illness control.

All the maternal factors have influence on pregnancy outcome and infant survival. Survival of children is influenced by nutrients available not only to the child but also to the mother. Maternal diet and nutrition during pregnancy affect birth weight and during lactation influence the quantity and nutrient quality of breast milk, which affect child survival. Injury of the child includes physical injury, burns and poisoning. Injury may also be intentionally inflicted, the most extreme example being infanticide. Environmental contamination transmits infectious agents to children. The principal routes of spread for diarrhea and other intestinal diseases are contaminated water and food. The personal illness control is important for child survival. First it influences the practices and the quality of care during pregnancy and child birth and, secondly measures taken to cure after child became ill. Along with this, physical infrastructure also influences child survival. The roads, electricity, water; sewage and telephone systems can influence health, particularly through their impact on the relative price of staples as well as of health related goods, services, and information. For example, the poor pay more money, time and effort for poor quality water than the rich, who have access to an equivalent supply of pure piped water.

Based on the literature survey and Mosley and Chen's framework, a conceptual framework has been formulated for the present study (Figure 3.1). This framework depicts the linkages between various socioeconomic, demographic, and environmental factors and infant survival. The socio-economic factors are affecting child survival mainly through intermediate factors. The economic status determines the type of food and cleanliness at the time of feeding the child which ultimately determines the nutritional status of a child. The demographic and biological factors determine the body mass index, nutritional status and immune system of a child, which influence child survival. People belonging to different castes are having different cultural values. The housing condition and sanitation factors also affect child survival. In Kuchha houses the bacteria and germ are more prevalent than Pucca houses which affect childhood diseases. In the same manner where sanitation condition is not good, the children are more likely to be affected by Parasites, fungi, etc. which leads to child morbidity and finally determines child survival.

Figure 3.1: Framework for child survival



Those households living in rural area face a lot of problems at the time of child sickness compared to urban area. Variables used in the analysis and how these influence child survival are discussed below.

Socio-economic factors

The socio-economic factors both indirectly affect child survival. How these factors affect child survival are discussed below.

Ethnicity

Ethnicity is a set of characteristics i.e. cultural, social and linguistic, which forms a distinctive identity shared by people. When a child faces discrimination because of his/her ethnicity, the risk of exclusion from essential services and protection rises sharply. In India different castes/tribes represents different life conditions, values and social choices. The effect of caste/tribe on infant mortality is mediated by the interplay of such factors such as health status and access to health services (Chakrabarti: 2005). Scheduled castes and scheduled tribes are oppressed sections of the society and live in relative isolation. Scheduled castes were treated as untouchables in the past and denied of access to health care facilities. Scheduled tribe people are generally living in the hilly or forest area or in isolated places, where health facility is not adequate. Along with this their mass illiteracy and poor economic condition affect their health care practices for children, which in turn adversely affects survival chances of children.

Place of Residence

The place of residence is likely to affect at the time of illness of the child. Most of the homes in rural areas are quite far from hospital/clinic. And also adequate facility for child care is not available in rural area compared to urban area. Sub-centers and PHC (primary health center) are set up in the rural areas to address the needs of the rural people. But lack of basic requirements such as drugs, blood banks, refrigeration units and health personnel etc. are creating obstacle for proper health care for the children.

Education of Mother

Education is the most important variable in this study because the effect of mother's education for child survival is high. Education is associated with the release of the individuals from the bonds of tradition, with the progressive differentiation of society, with emergence of civil society, with social equality, and with innovation and change. It helps people to have exposure to mass media, which helps them to escape from superstition and religious dogmas. Education of mother is more important than father's education for child survival as proved from previous studies (Caldwell, 1979). More educated women inclined to seek antenatal care and will be more willing to choose trained medical personal to assist them during delivery and post-natal care. Educated women are more conscious about the proper feeding practices for their children and also might be better informed about the symptoms of child illness, and therefore more likely to give proper treatment for babies. With increasing education of women the age at marriage also increases, which indirectly effects child survival.

Household Standard of Living

In developing countries on an average, children of families in the bottom wealth quintile of the population are more than twice likely to be dying before reaching the age of five than children living in families in the top quintile (UNICEF, 2005). The spending on health by the poor people takes a major share from their income. So poor people do not prefer to go medical institution in case of minor illness of child, which decrease their survival chances. Household with better income can purchase better food which leads to better nourished mother and child (Flegg, 1982). Better nourished mothers, in turn give birth to healthy child, which leads to more child survival chances. The economic status of the household influences the utilization of services. Utilization of services might lead to healthy and hygienic habits, where children have lower risk of viral diseases and ultimately are more likely to survive.

Exposure to Mass-Media

Mass media with the help of technologies have enabled the distant world to come closure. But still many sections of the population in developing countries have no access to any

type of mass media. Health information is one of the important parts in every type of mass media. Those who fail to access mass media will not be able to know the health information provided by Government (Frenzen, 1982). Particularly in tribal areas, not even a single mass media is accessed by most of the people. So health information by the government like, date of immunization service and health camps in local area, etc can not be known to the people, which affect the child health and ultimately survival chances. Media is likely to have effect on practices of child care particularly child feeding and rearing. It enables women to learn the proper way to utilizing existing resources for the optimal use for children.

Demographic Factors

Some demographic factors directly affect child survival; these are discussed below.

Birth Order of Child

Repetitive child bearing affects the biological capacity of women, which ultimately affects succeeding births. It is assumed that women who gave less number of births their child will be healthier than the mother who gave more births, and this means that children at higher orders are disadvantaged.

Sex of Child

Unequal treatment between boys and girls is visible in every society. The reasons may be social or economical. Societies prefer boys than girls, so the position of girl child in the society has deteriorated considerably. There is significant evidence that sex bias against female children in the allocation of food and other resources decreases the survival chances among female children. An estimation made by United Nations shows that if India closed the gender gap in mortality between girls and boys ages 1-5, that would reduce its overall child mortality rate by 5 per cent (UNDP: 2005).

Mother's age at child birth

Young age at birth for the mother is the main factor leading to heightened risk of infant and child mortality (Pandey, 1997). Young mothers (less than 20 years of age) are not

fully biologically capable for child birth. If they conceive the child faces many biological problems, which decrease the survival chance of child.

Sanitation Factors

Toilet Facility

Infant and child mortality is most affected by the health and sanitary conditions of the area in which a child is born. Toilet facility in the household is directly linked with childhood diseases. The acute respiratory infections (ARI) and infectious diseases caused due to bad sanitation condition are the main cause of infant mortality.

Source of Drinking Water

Drinking water facility in the household is one of the sources of disease in the post-neonatal period. Dehydration, chronic diarrhea and infectious diseases are mainly caused due to unsafe water. The diseases that occur due to unsafe water are major cause for high infant and child mortality in India.

3.2: Data Sources

The data sets used for this analysis are: National Family Health Survey (NFHS), Sample Registration System (SRS), Census and World population data sheet (Population Reference Bureau). The National Family Health Survey is the main source for this study. The individual data from NFHSs has been used. So the sample size, period of survey and variables collected are essential to know for different NFHSs. In the following the details about three NFHSs are given.

NFHS-1

The country's first National Family Health Survey was conducted in 1992-93.Interviews were conducted with a nationally representative sample of 89,777 ever married women in the age group 13-49 from 88,562 households, from 24 states and the national capital territory of Delhi. Data collection was carried out in three phases from April 1992 to September 1993. In Orissa interviews were conducted with a state representative sample of 4,257 ever married women in the age group 13-49 from 4,602 households within the

period of 4 months starting from March 1993 to June 1993. The main objective of the survey was to collect reliable and up-to-date information on fertility, family planning, mortality and maternal and child health. Here three types of questionnaire were used i.e. household, woman's, and village questionnaire.

NFHS-2

The second national family health survey conducted in 1998-99, was an important step in strengthening the database for implementation of the Reproductive and child Health approach adopted by India after the International Conference on Population and Development in 1994 in Cairo. Data collection was carried out in two phases from November 1998 to December 1999. Interviews were conducted with a nationally representative sample of 89,199 ever married women in the age group 13-49 from 91,198 households, from 25 states. In Orissa interviews were conducted with a state representative sample of 4,425 ever married women in the age group 15-49 from 4,689 households within the period of 4 months starting from March 1999 to June 1999. Here three types of questionnaire were used, i.e., household questionnaire, woman's questionnaire and village questionnaire. Second national family health survey collected same information as collected in first national family health survey. In addition, the survey provides indicators of the quality of health and family welfare services, women's reproductive health problems and domestic violence, and includes information on the status of women, education and the standard of living. The survey was also intended to provide estimates at the regional level for four states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) and estimates for three metro cities (Calcutta, Chennai, and Mumbai), as well as slum areas in Mumbai.

NFHS-3

The third National Family Health Survey was conducted in 2005-06.Unlike the earlier surveys, NFHS-3 interviewed men age 15-54 and never married women age 15-49, as well as ever-married women. NFHS-3 also included new questions on several emerging issues such as perinatal mortality, male involvement in maternal health care, adolescent reproductive health, high risk sexual behaviour, family life education, safe injections, and

knowledge about tuberculosis. NFHS-3 collected information from a nationally representative sample of 124,385 women in the age group 15-49 and 74,369 men in the age group 15-54 from 109,041 sample households. NFHS-3 also collected information on population and health indicators for slum and non-slum populations in eight cities, namely Chennai, Delhi, Hyderabad, Indore, Kolkata, Meerut, Mumbai, and Nagpur. The three core questionnaires used in the NFHS-3 are- Household Questionnaire, Women's Questionnaire and the Man's Questionnaire. In Orissa the information was collected from 4540 women in the age group of 15-49 and men in the age group of 15-54 from 3,910 sample households selected in NFHS-3. The survey was conducted from November 2005 to April 2006.

3.3: Explanation of the Variables Used in the Analysis

All respondents in the National Family Health Survey were asked to give a complete birth history, including sex, date of birth, survival status and age of the time of the survey or age at death for each live birth. For children who had died, age at death was recorded in months for children dying before their second birth day, and in years for children dying at later ages. This information was used to calculate the following direct estimates of neonatal and post-neonatal mortality. Along with birth history the socio-economic, demographic and sanitation condition of the household also have been collected, which are used as independent variable for this analysis.

Measurement of Variables

The dependant variables are neonatal mortality and post neonatal mortality, each dependant variable is dichotomous. The independent variables are caste, place of residence, exposure to mass media, education of mother, economic condition of household considered as social-economic variable, mother's age at child birth, birth order of child and sex of child as demographic variable; and source of drinking water and type of toilet facility taken as environmental factor and their recoding for the analysis is given below.

Dependent Variables

The births that have occurred within 5 year before one year of survey have been taken as cases for this study. For example, the starting date of survey in NFHS-3 was November 2005, then before November 2004 the births that have occurred within 5 year have been taken as cases for analysis. In all three NFHSs this method has been applied. The infant death within one month is considered as neonatal mortality. The infant death after one month but before one year is considered as post-neonatal mortality. If mortality occurred after births either in neonatal or post-neonatal period, then it is coded as 1 (one), and remaining coded as 0 (zero).

Independent Variables

Ethnicity

Ethnicity has been categorized into four categories such as, scheduled caste, scheduled tribe and other backward class (OBC) and 'other' community in NFHS-2 and NFHS-3. But in NFHS-1, OBC is included in 'other' community. So in the analysis for comparison purposes three categories have been taken i.e. 'other' (Non SC/ST) community=1 scheduled caste (SC) =2 and scheduled tribe (ST) =3.

Place of Residence

Place of residence has been divided into two categories i.e. urban=1 and rural=2.

Education of Mother

Mother's education is recoded as illiterate=1 and literate=2. Education of mother is recoded into two categories because in the higher education category sample size is very less in Orissa.

Exposure to Mass-Media

Data on exposure to media like reading news paper, listening to radio and watching television have been collected in NFHSs. If the mother was either watching television or listing to radio or reading news paper once a week, then she is considered as exposed to

mass media. There are two categories i.e. not exposed to mass media=1 and exposed to mass media=2.

Standard of Living Index

The standard of living is calculated by taking a number of household usable factors. The procedure of calculating standard of living index is given in the appendix. The standard of living index of household is recoded in to two categories i.e. low standard of living=1 and 'medium or high' standard of living=2. High standard of living is included in medium standard of living due to less sample size in Orissa.

Birth Order of Child

Birth order of child is recoded into three categories based on their major differentiation in characteristics. The categories are, first order birth=1, 'second and third' order birth=2, and 'fourth or above' order birth=3. The second and third order births are in one category because they face somewhat similar advantage and disadvantage.

Sex of Child

Sex of child is a direct question asked to mothers. The sex of child is categorized as male=1 and female=2.

Mother's Age at Child Birth

Two questions were asked in the surveys, i.e., year of birth of child and respondent's (mother) year of birth. Mother's age at the time of child birth is calculated by subtracting calendar year of child birth from mother's calendar year of birth. There are two categories, i.e., mother's age below than 20 years=1 and mother's age '20 or above' years at child birth=2.

Source of Drinking Water

A direct question about source of drinking water in household was asked in the surveys. The variable is recoded into two categorized as; safe drinking water=1 and unsafe drinking water=2.

Toilet Facility

A question about type of toilet facility for the household member was asked in the surveys. This variable is recoded as; with toilet=1 and without toilet facility=2.

3.4: Methodology

The following quantitative research methods have used for this study.

Relative Risk

Exclusion can only be measured by comparing the circumstances of some individuals, groups and communities relative to others at a given place and time. Relative risk of mortality among children belonging to scheduled caste compared with children belonging to 'other' community has been measured through this method. And also relative risk of mortality among children belonging to scheduled tribe compared with children belonging to 'other' community has been measured through this method.

Bivariate Analysis

Association between dependent and independent variables is examined with the help of Cross-Tabulation. Cross tabulation shows comparisons between groups. In this study the neonatal and post-neonatal mortality by different socio, economic, demographic and sanitation factors have been analyzed by bivariate method.

Binary Logistic Regression

In a logistic regression model we assume that the P (probability of occurrence of events) is related to the independent variables in the form of logistic function instead of a linear function. Binary Logistic Regression is used to access the net effect of socio-economic, demographic and environmental factors on neonatal and post-neonatal mortality. The equation used in this analysis is given as follows:

$$\text{Log } \{P/ (1-P)\} = b0 + b1X1 + b2X2 + b3X3 + \ldots bkXk$$

Where b0 is constant,

X1, X2,..... are the independent variables

.b1, b2,.....are the coefficients of X1, X2,.....

P is the estimated probability of child death

The quantity P/(1-P) is called the odds, hence the quantifying log {P/ (1-P)}is called the log odds or the logit of P . The logit regression coefficient for a category of variable is interpreted in relation to the reference category; exp. (coefficient of a category) gives the 'odds ratio', ratio of the odds for the specified category to the odds of the reference category. This technique will be used to determine the predictors for neonatal and post-neonatal mortality which are dichotomous dependent variables.

3.5: Limitations

The study is mainly based on three National Family Health Survey data. Two major limitations are in this study related to NFHS data. (i) The neonatal mortality is taken as the probability of dying within first month of life but it should be taken as probability of dying within 28 days of life. (ii) The explanatory variable caste/tribe is taken as three categories such as; Scheduled Caste, Scheduled Tribe and 'Other' (Non SC/ST) because data on OBC not taken as a separate category in NFHS-1. But is should be four categories like, Scheduled Caste, Scheduled Tribe, Other Backward Caste (OBC) and 'Other'(Non SC/ST/OBC) because each category is having some similar socio-economic characteristics.

Chapter 4

Infant Mortality Trends in Orissa and India

CHAPTER- 4

INFANT MORTALITY TRENDS IN ORISSA AND INDIA

Infant mortality rate of Orissa was 134 in the early seventy's. The same level of infant mortality also prevails in India as a whole at that time. In the following Table 4.1 it is shown that, from 1971 to 1981 the infant mortality rate in Orissa declined very slowly with fluctuation from year to year, whereas in India gradual decline occurred. From 1981 to 1991 infant mortality rate declined gradually in Orissa, whereas India experienced a rapid decline. From 1991 to 2005 infant mortality rate decline was rapid in Orissa compared to India as a whole, shown in Figure 4.1.

Table 4.1
Infant mortality rate (Three year moving average) in Orissa and India, 1971-2005

PERIOD	ORISSA			INDIA		
	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL
1971-73	139	78	134	144	85	134
1973-75	153	84	148	143	82	133
1975-77	145	88	141	143	82	133
1977-79	147	84	143	136	76	126
1979-81	148	72	142	124	66	115
1981-83	137	68	131	116	64	107
1983-85	134	80	130	111	64	102
1985-87	132	78	127	105	61	96
1987-89	127	74	123	101	60	93
1989-91	127	72	122	90	54	84
1991-93	121	73	116	85	50	78
1993-95	110	66	105	81	48	74
1995-97	102	65	98	76	55	72
1997-99	100	65	97	76	45	71
1999-01	98	64	94	74	43	68
2001-03	90	57	87	69	40	63
2003-05	80	57	77	64	40	58

Source: Sample Registration System, Registrar General of India, New Delhi

Infant mortality trend in rural area of Orissa and India is shown in Figure 4.2. Infant mortality rate in rural area of India declined sharply from 1971 to 2005. But the speed of decline from 1991 to 2005 was higher than the period from 1971 to 1991. Infant mortality

rate declined slowly with fluctuations from year to year in Orissa from 1971 to 1981. After 1981 it declined gradually up to 1995. After 1995 the decline rate was rapid up to 2005 compared to India as a whole.

Infant mortality trend in urban area of Orissa and India is shown in Figure 4.3. Infant mortality rate in urban area of Orissa declined very slowly from 1971 to 1995 with large fluctuations in this period, whereas India experienced a gradual decline in the same period. The decline was very rapid in India from 1971 to 1981. From 1981 to 1995 the infant mortality declined slowly in India. After 1995 the infant mortality rate was almost stagnant up to 2001 in Orissa, whereas gradual decline occurred in India.

Figure 4.1: Trends of Infant mortality Rate (IMR) in Orissa and India, 1971-2005

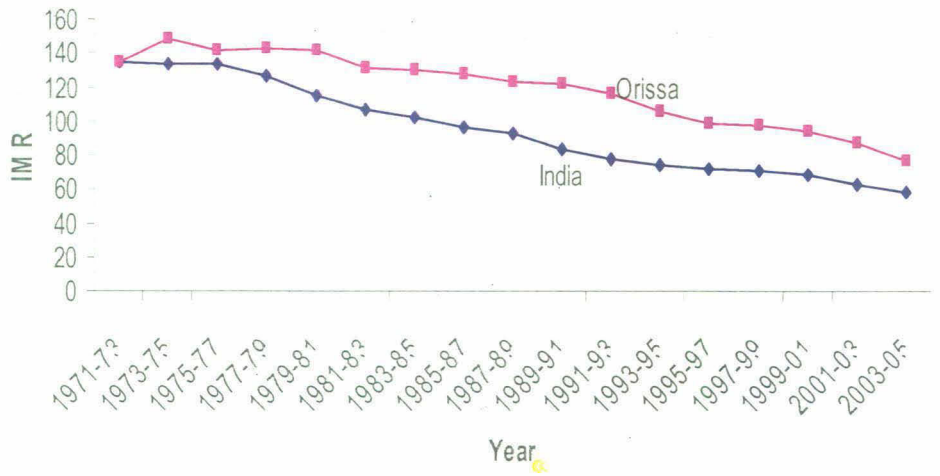


Figure 4.2: Trends of Infant mortality Rate (IMR) in Orissa and India (Rural), 1971-2005

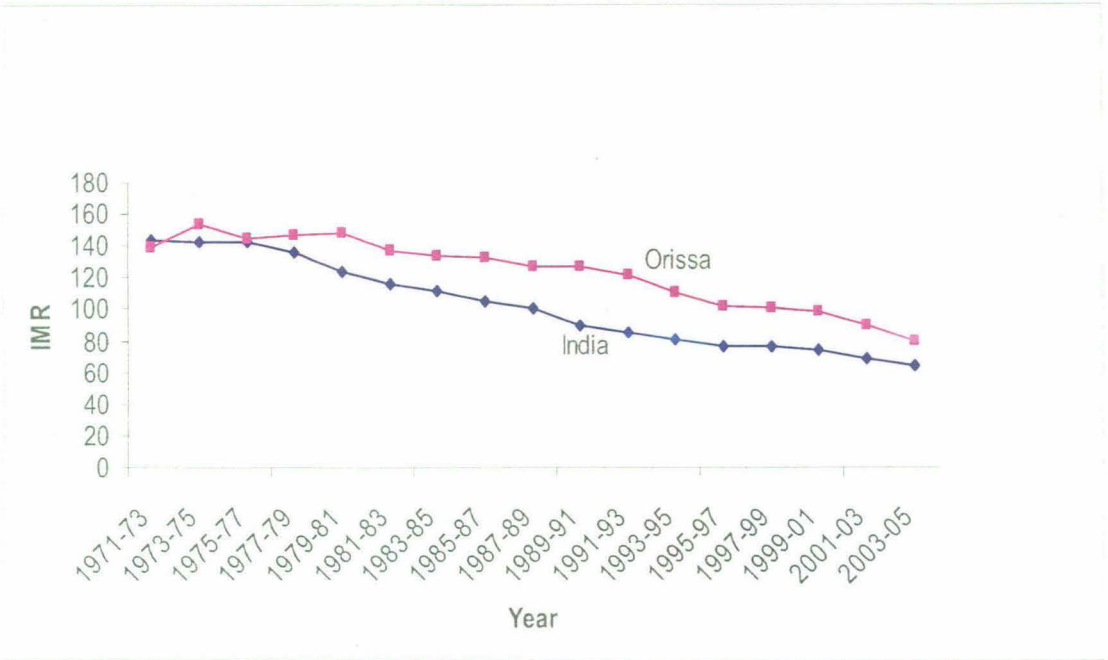


Figure 4.3: Trends of Infant mortality Rate (IMR) in Orissa and India (Urban), 1971-2005

4.1: Caste disparity of infant mortality rate in Orissa compared with other states

Sample registration system is not publishing data on caste basis regularly. In 1998 special fertility and mortality survey was conducted by the Registrar General of India, which has given data on caste basis. From this data the caste variation of infant mortality rate in Orissa compared to other states is analyzed. Table 4.2 shows that, Compared to other caste (Non SC/ST) children, scheduled caste (SC) children in Orissa face 1.3 times higher risk of dying in infancy period. The children from SC families in Madhya Pradesh and Kerala face 1.2 and 1.1 times higher risk of dying compared to other caste children. In comparison to Orissa, SC children of all other states face higher risk of dying than the other caste children except Maharastra, where the risk for SC children is lower compared to other caste children.

Scheduled tribe (ST) population is not distributed equally through out the states of India. Concentration of ST population exists in some states. For states with high concentration of ST population infant mortality rate is calculated by sample registration system for scheduled tribe. Infant mortality rate among ST is significant in the states of Andhra Pradesh, Madhya Pradesh, Orissa, West Bengal and North Eastern Region (including Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and Tripura). ST children in Orissa were facing 1.7 higher risk of dying compared to other caste children. ST children in Madhya Pradesh and West Bengal were facing 1.3 and 1.1 times higher risk of dying compared to other caste children. But the ST children of Andhra Pradesh were facing lower (10% less) risk of dying compared to other caste children. In the North-East region ST children were facing 1.9 times higher risk of dying compared to other caste children in infancy period. One of the reason may be due to higher infant deaths among ST children, infant mortality rate in Orissa is highest compared to other states as it constitute 21 percent of ST population.

Table 4.2
Infant Mortality among SC and ST compared to other castes, 1998

STATES	Scheduled Caste IMR	Scheduled Tribe IMR	Other Caste IMR	Risk of SC infant relative to other castes	Risk of ST infant relative to other castes
INDIA	85	84	66	1.3	1.3
Andhra Pradesh	86*	51	58	1.5*	0.9
Assam	103	66*	75	1.4	0.9*
Bihar	97	62*	71	1.4	0.9*
Gujarat	85	54*	62	1.4	0.9*
Haryana	87	NA	63	1.4	NA
Himachal Pradesh	85	55*	62	1.4	0.9*
Karnataka	71	46*	52	1.4	0.9*
Kerala	13*	21*	12	1.1*	1.8*
Madhya Pradesh	102	112	87	1.2	1.3
Maharastra	39	61*	46	0.8	1.3*
Orissa	99	134	78	1.3	1.7
Punjab	64	NA	43	1.5	NA
Rajasthan	83	101*	83	1.0	1.2*
Tamil Nadu	84	90*	44	1.9	2.0*
Uttar Pradesh	104	63*	80	1.3	0.8*
West Bengal	66	56	51	1.3	1.1
Delhi	61*	NA	24	2.5*	NA
North East	45*	64	34	1.3*	1.9

Sources: Special Fertility and Mortality Survey (1998), Registrar General of India (2005b)
Note: * Indicates possible fluctuations due to small sample

4.2: Neonatal and Post-Neonatal Mortality decline in Orissa compared to other states: *Evidence from NFHS data*

Neonatal Mortality

Table 4.3 shows the neonatal mortality trend in different states of India. From NFHS-1 to NFHS-2 the highest decline in neonatal mortality rate occurred in the states of West Bengal (38 per cent) followed by Orissa (25 per cent) and Tamil Nadu (25 per cent) whereas the lowest decline occurred in the states of Andhra Pradesh (3 per cent) followed by Gujarat (6 per cent) and Haryana (9 per cent).

From NFHS-2 to NFHS-3 the states of Tamil Nadu (45 per cent), Haryana (32 per cent) and Karnataka (22 per cent) experienced high decline and Delhi (1 per cent), Maharashtra (1 per cent), Orissa (7 per cent), Andhra Pradesh (8 per cent) low decline. West Bengal showed some rise in neonatal mortality from NFHS-2 to NFHS-3.

From NFHS-1 to NFHS-3 Orissa achieved 30 per cent decline in the neonatal mortality rate, whereas the average decline in India was 20 per cent. The decline was very low in the states of Punjab (10 per cent), Andhra Pradesh (11 per cent), Maharastra (13 per cent), Delhi and Madhya Pradesh (16 per cent).

Table 4.3
Trends in Neonatal Mortality Rate in different states of India, NFHS-1 to 3

STATES	NFHS1 NNMR	NFHS2 NNMR	NFHS3 NNMR	% decline fromNFHS1 to NFHS2	% decline fromNFHS2 to NFHS3	% decline from NFHS1 to NFHS3
India	48.6	43.4	39.0	11	10	20
Delhi	34.9	29.5	29.3	15	1	16
Haryana	38.4	34.9	23.6	9	32	39
Punjab	31.2	34.3	28.0	- 10	18	10
Rajasthan	37.2	49.5	43.9	- 33	11	-18
MP	53.2	54.9	44.9	- 3	18	16
UP	59.9	53.6	47.6	11	11	21
Bihar	54.8	46.5	39.8	15	14	27
Orissa	64.7	48.6	45.4	25	7	30
WB	51.8	31.9	37.6	38	-18	27
Gujarat	42.3	39.6	33.5	6	15	21
Maharashtra.	36.4	32.0	31.8	12	1	13
AP	45.3	43.8	40.3	3	8	11
Karnataka	45.3	37.1	28.9	18	22	36
Kerala	15.5	13.8	11.5	11	17	26
Tamil Nadu	46.2	34.8	19.1	25	45	59

Sources: NFHS-1, International Institute for Population Sciences, Mumbai, 1995
NFHS-2, International Institute for Population Sciences and ORC Macro, Mumbai, 2000
NFHS-3, International Institute for Population Sciences and Macro International, Mumbai, 2007
Note: NNMR= Neo-Natal Mortality Rate
NFHS= National Family Health Survey

Post-Neonatal Mortality

Table 4.4 shows the post-neonatal mortality trend in different states of India. From NFHS-1 to NFHS-2 Orissa achieved 32 per cent decline in post-neonatal mortality rate. Kerala (70 per cent), Delhi (43 per cent), Tamilnadu (38 per cent) and Haryana (37 per cent) achieved high decline rate than the state of Orissa. The lowest decline rate was experienced by Madhya Pradesh which is only 3 per cent and Punjab experienced just 1 per cent increase in post-natal mortality, but this could be sampling fluctuations and not necessarily arise.

From NFHS-2 to NFHS-3 the post-neonatal mortality rate declined by 40 per cent in Orissa, whereas the average decline rate in India was 26 per cent. The highest decline in post-neonatal mortality rate was achieved by the state of Maharashtra (51 per cent) followed by Orissa, Delhi, Punjab and Andhra Pradesh. Kerala experienced 52 per cent rise in post-neonatal mortality in the same period, but again the level is very low and the absolute change is small and hence could be due to sampling errors.

From NFHS-1 to NFHS-3 the post neonatal mortality rate declined by 59 percent in Orissa, whereas the average decline in India was 40 per cent. The highest decline in post-neonatal mortality was achieved by Delhi (66 per cent) followed by Orissa and Maharastra. The decline was very low in the states of Madhya Pradesh, which was only 23 per cent.

Compared to other poor states, such as MP, UP and Bihar, Orissa achieved great success in lowering post-neonatal mortality rate from NFHS-1 to NFHS-3. The decline rate of neonatal mortality was also more in Orissa compared to other three poor states. But the decline rate was higher in post-neonatal mortality compared to neonatal mortality.

Table 4.4
Trends in Post-Neonatal Mortality Rate in different states of India, NFHS-1 to 3

STATES	NFHS1 PNMR	NFHS2 PNMR	NFHS3 PNMR	% decline fromNFHS1 to NFHS2	% decline fromNFHS2 to NFHS3	% decline from NFHS1 to NFHS3
India	29.9	24.2	18.0	19	26	40
Delhi	30.5	17.4	10.5	43	40	66
Haryana	34.9	21.9	18.1	37	17	48
Punjab	22.5	22.8	13.7	- 1	40	39
Rajasthan	35.4	30.9	21.4	13	31	40
MP	32.0	31.2	24.7	3	21	23
UP	40.0	33.1	25.0	17	24	38
Bihar	34.4	26.4	21.9	23	17	36
Orissa	47.4	32.3	19.3	32	40	59
WB	23.5	16.8	10.4	29	38	56
Gujarat	26.4	23.0	16.2	13	30	39
Maharashtra	14.0	11.7	5.7	16	51	59
AP	25.0	22.1	13.2	12	40	47
Karnataka	20.2	14.4	14.3	29	1	29
Kerala	8.2	2.5	3.8	70	-52	54
Tamil Nadu	21.5	13.3	11.2	38	16	48

Sources: NFHS-1, International Institute for Population Sciences, Mumbai, 1995
NFHS-2, International Institute for Population Sciences and ORC Macro, Mumbai, 2000
NFHS-3, International Institute for Population Sciences and Macro International, Mumbai, 2007
Note: PNMR=Post-Neonatal Mortality Rate
NFHS= National Family Health Survey

4.3: District level infant mortality Rate in Orissa

Orissa has the second highest infant mortality rate in the country at 73 per 1000 live births (Registrar General, India, 2007). Within Orissa a great disparity also exists among districts in socio-economic condition and hence the level of mortality is expected to vary across districts.

Table 4.5 shows the infant mortality rate and percentage of SC and ST population in all districts of Orissa. The infant mortality rate was calculated directly from the information in the birth history by International Institute for Population Sciences (IIPS). The infant

mortality varies from 121in Gajapati district to 38 in Puri district per 1000 live births. Infant mortality rate is very high (more than 100 infant deaths per 1000 live births) in the districts of Gajapati, Malkangiri, Balangir, Rayagada where more than 50 per cent of SC and ST population live (except Balangir) and low (less than 50 infant deaths per 1000 live births) in the districts of Sambalpur, Debagarh, Jharsuguda, Dhenkanal, Cuttack and Puri where less than 50 per cent of SC and ST population live (except Sambalpur). However, the ranking of all districts according to infant mortality rate does not follow the pattern of ranking of districts according to the percentage of SC and ST population, and thus there is no one-to-one correspondence (the correlation coefficient is 0.433). Caste/tribe is not only the determinant of infant mortality but it is one of the determinants of infant mortality. Other socio-economic, demographic and environmental factors affect infant morality too.

Table 4.5: Infant mortality rate and percentage of SC and ST population in all districts of Orissa, 2001

Regions	Infant Mortality Rate	% of SC and ST population
Gajapati	121	58
Malkangiri	117	79
Balangir	103	38
Rayagada	102	70
Kendrapada	97	21
Kendujhar	90	56
Kandhamal	85	69
Jagatsinghpur	83	22
Sundergarh	81	59
Ganjam	80	26
Kalahandi	76	46
Baudha	74	34
Koraput	72	63
Jajpur	71	31
Nuapada	71	48
Anugul	69	29
Khordha	64	19
Nabrangpur	63	69
Sonapur	62	33
Mayurbhanj	62	64
Bargarh	61	39
Balasore	61	30
Nayagarh	55	20
Bhadrak	54	23
Sambalpur	48	52
Debagarh	48	49
Jharsuguda	48	48
Dhenkanal	46	31
Cuttack	39	23
Puri	38	19
Orissa	**76**	**39**

Source: Ram *et al* (2005), 'Human Development: Strengthening District Level Vital Statistics in India', IIPS

Chapter 5

Disparity in Neonatal and Post-Neonatal Mortality by Background Characteristics In India and Orissa

CHAPTER-5

DISPARITY IN NEONATAL AND POST-NEONATAL MORTALITY BY BACKGROUND CHARACTERISTICS IN INDIA AND ORISSA

In the last few decades both Government and Non-Governmental Organizations (NGOs) in India and international organizations have been striving to help vulnerable population groups in health sector with the aim to reduce infant and child mortality. In this context it is required to assess, whether any changes have occurred in the disparity of child survival among socio-economic groups. In the first part, the change in gross disparity in the infant mortality rate among socio-economic groups in India and Orissa is discussed. The estimates for various socio-economic and demographic categories are presented and differentials noted. No statistical tests of significance are carried out at his stage. In the second part, the change in net disparity in the risk of infant mortality among socio-economic groups in India and Orissa is discussed. Here the logistic regression coefficients allow statistical testing of differences in the risks.

5.1: Neonatal mortality rate among socio-economic groups in India and trends in disparity

Children belonging to scheduled castes were facing higher neonatal mortality rate compared to children belonging to 'other' (Non SC/ST) community at the time of the first National Family Health Survey (NFHS-1). The disparity declined marginally in NFHS-2 and NFHS-3, shown in Table 5.1. Contrary to expectations, children belonging to scheduled tribes were facing lower neonatal mortality rate compared to children belonging to 'other' community in NFHS1, but the difference was not substantial. But by NFHS-2, children belonging to scheduled tribes were facing higher neonatal mortality rate compared to children belonging to 'other' communities. Further in NFHS-3, the same situation prevailed as in NFHS-1. The level of neonatal mortality among rural children was higher than urban children and there was a substantial difference. The neonatal mortality disparity among children belonging to rural and urban area was narrowing in NFHS-2 and NFHS-3 but it was not a substantial change.

There is a negative relationship between education of mother and infant mortality. The rate of neonatal mortality was higher among children whose mother was literate than illiterate mother and the difference was substantial in all the three rounds (NFHS-1, NFHS-2 and NFHS-3). The analysis also shows that children of mothers exposed to mass media were facing low level of neonatal mortality rate compared to the children of mothers not exposed to mass media. The differences have been consistently seen throughout the study period (NFHS-1, NFHS-2 and NFHS-3). Children from high standard of living households were facing low level of neonatal mortality rate than children from low standard of living households. The effect of economic disparity on neonatal mortality rate has not changed over the study period (NFHS-1, NFHS-2 and NFHS-3).

The children of the first order experienced high neonatal mortality risk compared to succeeding birth order over the study period. Birth order of child and neonatal mortality has a 'U-shape' relationship. Gender disparity in neonatal mortality shows that, female children were facing lower risk of dying than male children throughout the study period. No change has occurred in gender disparity in neonatal mortality throughout the study period. The children born to mothers below than 20 years of age were facing higher neonatal mortality than children born to mother above 20 years and there was substantial difference exist in NFHS-1. Though the disparity was narrowing in NFHS-2 and NFHS-3, there was not substantial change.

From the above discussion it is clear that almost the same neonatal mortality disparity persisted between different socio-economic groups in NFHS-1 and NFHS-2 and some narrowing of disparity has occurred in NFHS-3 but it was not a substantial change.

Table 5.1
NEONATAL MORTALITY RATE BY SOCIO-ECONOMIC AND DEMOGRAPHIC CHARECTERISTICS, INDIA, NFHS-1 to 3

Explanatory Variables	NFHS-1	N	NFHS-2	N	NFHS-3	N
Ethnicity						
Others (Non SC/ST)	45	44452	40	37391	34	31595
Scheduled Caste	55	7681	49	10128	37	9104
Scheduled Tribe	42	8102	44	8525	33	8259
Place of Residence						
Urban	33	16553	30	14632	28	19597
Rural	51	43682	47	41957	39	31577
Education of Mother						
Illiterate	53	36962	51	30720	43	21849
Literate	34	23069	32	25851	29	29323
Exposure to mass media						
Not Exposed	53	30578	50	26236	42	20204
Exposed	39	29614	36	30348	30	30958
Standard of living						
Low	54	11699	53	18737	44	12348
Medium and High	41	12765	37	37118	31	35073
Birth Order of Child						
1st order	56	15959	45	15734	40	16054
2nd and 3rd order	39	25316	36	24390	29	22510
4th and above order	47	18960	49	16465	39	12610
Sex of Child						
Male	48	31117	45	29275	37	26621
Female	44	29118	40	27314	32	24553
Age of Mother						
=<19 years	69	11490	61	10843	56	8046
>= 20 years	40	48745	38	45746	31	43128

Sources: Estimates from individual data file of NFHS-1, NFHS-2 and NFHS-3.
Note: 'N' indicates number of births

5.2: Post-neonatal mortality rate among socio-economic groups in India and trends in disparity

The level of post-neonatal mortality depends more on socio-economic status rather than biological factors. Children belonging to scheduled castes were facing higher post-neonatal mortality than children belonging to 'other' community, with a difference of 7 post-neonatal deaths per thousand live births in NFHS-1, shown in Table 5.2. In the NFHS-2 this disparity was 6 and in NFHS-3 it remained the same. Surprisingly the post-neonatal mortality rate was lower among children belonging to scheduled tribes compared to children belonging to 'other' community in NFHS-1. There may be hidden reason that due to mass illiteracy among mothers belonging to scheduled tribes, they reported post-neonatal mortality as child deaths which show a reverse result. The scheduled tribe children were facing higher post neonatal mortality as compared to 'other' children in NFHS-2 and NFHS-3.Gradual increase in post-neonatal mortality disparity between ST and 'other' children prevailed, whereas almost constant disparity between SC and 'other' children is noted throughout the study period. The children belonging to urban area were facing lower post-neonatal mortality than rural area throughout the study period. The post-neonatal mortality disparity between rural and urban children declined from NFHS-2 to NFHS-3, but it was not a substantial change. The disparity in post-neonatal mortality according to the place of residence is lower than in neonatal mortality.

As expected the children of literate mothers were facing lower post-neonatal mortality than children of illiterate mothers. Though the effect of education on post neonatal mortality disparity declined gradually in study period but there was no substantial change. Children of mothers exposed to mass media, have less risk of dying in post-neonatal period compared to the children of mothers not exposed to mass media. The disparity declined slowly over the study period. The children of high standard of living households were facing lower post-neonatal mortality than children of low standard of living households. The disparity declined gradually throughout the study period.

With increasing birth order the risk of post-neonatal mortality increases. The gender disparity in post-neonatal mortality shows that, female children were facing higher risk of dying than male children, whereas mortality rate was lower among female children in the neonatal period. The gender disparity in post-neonatal mortality was almost the same throughout the study period. The children born to young mothers (age less than 20 years) were facing higher risk of post-neonatal mortality compared to children born to older mothers. The disparity remained almost the same throughout the study period.

Sanitation facility has a substantial effect on post-neonatal mortality. The children belonging to households using unsafe drinking water were facing higher risk of post-neonatal mortality compared to other children. The difference in post-neonatal mortality between two groups gradually declined. The children of households with toilet facility were facing very low post-neonatal mortality compared to the children of households without toilet facility; the disparity has not declined over the study period.

From the above discussion it is found that, in post neonatal mortality social group disparity remained almost the same between scheduled castes and 'other' children, and it was increasing between scheduled tribes and 'other' children through the study period. Other socio-economic disparities in post-neonatal mortality declined but not substantially.

Table 5.2
POST-NEONATAL MORTALITY RATE BY SOCIO-ECONOMIC AND DEMOGRAPHIC CHARECTERISTICS, INDIA, NFHS-1 to 3

Explanatory Variables	NFHS-1	N	NFHS-2	N	NFHS-3	N
Ethnicity						
Others (Non SC/ST)	29	45226	22	38103	14	32268
Scheduled Caste	36	7835	28	10355	20	9265
Scheduled Tribe	27	8230	27	8672	20	8367
Place of Residence						
Urban	22	16742	16	14849	13	19892
Rural	32	44549	27	42824	17	32283
Education of Mother						
Illiterate	36	37632	31	31363	22	22308
Literate	18	23454	15	26293	11	29865
Exposure to mass media						
Not Exposed	35	31163	31	26747	20	20668
Exposed	23	30110	18	30921	13	31494
Standard of living						
Low	40	11884	32	19162	22	12630
Medium and High	25	12976	20	37778	13	35716
Birth Order of Child						
1st order	25	16469	21	16132	13	16506
2nd and 3rd order	26	25669	21	24776	14	22854
4th and above order	37	19153	31	16765	23	12815
Sex of Child						
Male	28	31793	22	29963	15	27227
Female	31	29498	26	27710	17	24948
Age of Mother						
=<19 years	35	11912	31	11181	22	8338
>= 20 years	28	49379	22	46492	15	43837
Source of Drinking Water						
Safe Drinking Water	27	44903	23	43299	15	39949
Unsafe Drinking Water	35	16321	28	14365	18	9548
Toilet Facility						
With Toilet	18	19714	15	21708	12	26099
Without Toilet	34	41532	29	35959	19	23345

Source: Estimates from individual data file of NFHS-1, NFHS-2 and NFHS-3.
Note: 'N' indicates number of births

5.3: Neonatal mortality rate among socio-economic groups in Orissa and trends in disparity

Children belonging to scheduled castes were facing higher neonatal mortality compared to children belonging to 'other' community in NFHS-1, shown in Table 5.3. The disparity narrowed substantially in NFHS-2. In NFHS-3, there was no disparity in neonatal mortality rate between children belonging to scheduled castes and 'other' community. Children belonging to scheduled tribes were facing higher neonatal mortality compared to children of 'other' community in NFHS-1, whereas the converse was experienced in India. From NFHS-1 to NFHS-2 the disparity in neonatal mortality rate between children belonging to scheduled tribe and 'other' community nearly disappeared. As expected urban children were facing lower neonatal mortality rate than rural children in NFHS-1 and the difference was substantial. The disparity has declined in NFHS-2 substantially. But further the disparity was increased in NFHS-3.

Children of literate mothers were facing lower neonatal mortality than children of illiterate mothers; the disparity has declined substantially over the study period. Children of mothers exposed to mass media were facing lower neonatal mortality rate than the children of mothers not exposed to mass media. The disparity substantially declined over the study period. The children of high standard of living households were facing lower neonatal mortality rate compared to the children of low standard of living households, but the disparity declined over the study period.

First order births faced the highest risk of dying in neonatal period compared to succeeding birth order. Female children were facing lowest neonatal mortality rate compared to male children in NFHS-1. The gap declined from NFHS-1 to NFHS-2, but widened by NFHS-3. Gender disparity in neonatal mortality in Orissa was higher compared to disparity in India. As expected the children born to mothers below 20 years of age were facing higher neonatal mortality compared to children born to mothers over 20 years of age, and the disparity has increased over the study period.

From the above discussion it is clear that, disparity in neonatal mortality between children belonging to scheduled castes and 'other' community has declined substantially

over the study period. Disparity according to mother's education and mother's exposure to mass media has also declined substantially over the study period.

5.4: Post-neonatal mortality rate disparity among socio-economic groups in Orissa and its trends

The children belonging to scheduled castes and scheduled tribes were facing higher post neonatal mortality rate than children belonging to 'other' community. The post-neonatal mortality rate was 70 per thousand live births among children belonging to scheduled castes whereas the rate was 43 per thousand live births for children of 'other' communities in NFHS-1, shown in Table 5.4. The difference in post-neonatal mortality rate was 27 points. The disparity declined in NFHS-2 and NFHS-3 and there was substantial change. The disparity between children belonging to scheduled tribes and 'other' community also declined substantially over the study period. As expected urban children were facing lower post-neonatal mortality than rural children in NFHS-1. The disparity between children belonging to rural and urban area has declined from NFHS-1 to NFHS-2 but further increase in disparity was observed in NFHS-3.

As expected the children of literate mothers were facing lower post-neonatal mortality than children of illiterate mothers. The post-neonatal mortality disparity between children of literate and illiterate mothers increased from NFHS-1 to NFHS-2, and it was almost constant from NFHS-2 to NFHS-3. The children of mothers exposed to mass media were facing lower post-neonatal mortality rate compared to children of mothers not exposed to mass media; the disparity was increasing gradually over the study period. The reason may be that the increasing health awareness through mass media helps mothers to take proper child care in the post neonatal period. The children of low standard of living households were facing higher post-neonatal mortality compared to children of high standard of living households; the disparity increased from NFHS-1 to NFHS-2, but from NFHS-2 to NFHS-3 the disparity declined substantially.

Table 5.3
NEONATAL MORTALITY RATE BY SOCIO-ECONOMIC AND DEMOGRAPHIC CHARECTERISTICS, ORISSA, NFHS-1 to 3

Explanatory Variables	NFHS-1	N	NFHS-2	N	NFHS-3	N
Ethnicity						
Others (Non SC/ST)	55	1985	51	1500	41	926
Scheduled Caste	70	280	53	571	41	330
Scheduled Tribe	63	535	53	536	44	451
Place of Residence						
Urban	41	756	51	491	29	435
Rural	64	2044	56	2116	47	1291
Education of Mother						
Illiterate	63	1722	57	1454	42	801
Literate	50	1068	45	1153	42	925
Exposure to mass media						
Not Exposed	65	1608	56	1507	42	798
Exposed	49	1190	46	1100	41	927
Standard of living						
Low	60	902	55	1469	43	733
Medium and High	52	602	47	1125	39	787
Birth Order of Child						
1st order	78	746	51	759	55	589
2nd and 3rd order	47	1247	54	1213	36	744
4th and above order	56	807	48	635	34	393
Sex of Child						
Male	66	1436	55	1319	52	911
Female	49	1364	48	1288	31	815
Age of Mother						
=<19 years	80	555	83	485	76	279
>= 20 years	52	2245	44	2122	35	1447

Source: Estimates from individual data file of NFHS-1, NFHS-2 and NFHS-3.
Note: 'N' indicates number of births

As expected with increase in the birth order of the child the risk of post-neonatal mortality was increasing over the study period. Gender disparity in post-neonatal mortality rate shows that, the female children were facing lower post-neonatal mortality rate than male children in NFHS-1. But in NFHS-2 the female children were facing higher post-neonatal mortality than male children. The same disparity prevailed in NFHS-3 also. Gender disparity in post-neonatal mortality was higher in Orissa as compared to India's average disparity. Children born to young mothers (below the 20 years of age) were facing slightly higher post-neonatal mortality than children born to mothers above 20 years of age in NFHS-1. The disparity was increasing over the study period.

The children belonging to households using unsafe drinking water were facing higher risk of post-neonatal mortality compared to children belonging to households who were using safe drinking water in NFHS-1.The disparity decreased from NFHS-1 to NFHS-2 but from NFHS-2 to NFHS-3 the disparity increased. The children of households having toilet facility were facing lower post neonatal mortality compared to children of households having no toilet facility in NFHS-1. But the disparity decreased substantially over the study period.

From the above discussion it is clear that gap in post-neonatal mortality between children belonging to scheduled castes and 'other' communities has declined substantially over the study period. So has the gap between the scheduled tribes and 'other' communities. Post-neonatal mortality disparity according to the place of residence, education of mother and mother exposed to mass media has increased somewhat.

Table 5.4
POST-NEONATAL MORTALITY RATE BY SOCIO-ECONOMIC AND DEMOGRAPHIC CHARECTERISTICS, ORISSA, NFHS-1 to 3

Explanatory Variables	NFHS-1	N	NFHS-2	N	NFHS-3	N
Ethnicity						
Others (Non SC/ST)	43	2010	26	1539	16	951
Scheduled Caste	70	280	35	582	23	336
Scheduled Tribe	53	541	37	545	19	463
Place of Residence						
Urban	39	757	27	506	9	444
Rural	50	2074	31	2160	21	1326
Education of Mother						
Illiterate	51	1744	39	1482	28	818
Literate	41	1078	19	1184	9	957
Exposure to mass media						
Not Exposed	51	1632	34	1541	24	813
Exposed	43	1197	24	1125	12	955
Standard of living						
Low	51	911	41	1492	21	750
Medium and High	36	612	17	1161	16	806
Birth Order of Child						
1st order	46	772	25	780	14	614
2nd and 3rd order	44	1251	30	1244	13	762
4th and above order	55	808	37	642	32	394
Sex of Child						
Male	52	1457	24	1362	12	949
Female	43	1374	36	1304	24	821
Age of Mother						
=<19 years	48	574	32	512	13	298
>= 20 years	47	2257	30	2154	19	1472
Source of Drinking Water						
Safe Drinking Water	49	1789	30	1800	17	1284
Unsafe Drinking Water	44	1042	31	866	21	373
Toilet Facility						
With Toilet	26	409	13	374	14	361
Without Toilet	51	2422	33	2292	19	1293

Sources: Estimates from individual data file of NFHS-1, NFHS-2 and NFHS-3.
Note: 'n' indicates number of births

5.5: Disparity in infant mortality according to socio-economic and demographic characteristics and its trends

Several socio-economic and demographic factors that affect probability of child survival are interrelated. For example, high risk of infant mortality among children belonging to scheduled caste may be due to low level of education among scheduled caste mothers. In order to disentangle the linkages and to get net effects of each predictor variable controlling other predictor variables on neonatal and post-neonatal mortality, the method of binary logistic regression is used.

The net effects of socio-economic factors on neonatal mortality in India and the trends

The variables such as caste/tribe, place of residence, education of mother, mother's exposure to mass media, standard of living index, birth order of child, sex of child and mother's age at child birth possibly affect neonatal mortality.

Controlling all other effects, children belonging to scheduled tribe were less likely (odds ratio 0.597) to die during the neonatal period compared to children belonging to other (Non SC/ST) community in first National Family Health Survey (NFHS-1), shown in Table 5.5. The advantage narrowed (odds ratio 0.837) by NFHS-3. The reason may be scheduled tribe children are more biologically stronger than 'other' caste children, as neonatal mortality is more influenced by biological factors rather than socio-economic status. This needs to be investigated. The neonatal mortality disparity between children belonging to scheduled castes and other community was not significant in all the three National Family Health Surveys (NFHS-1, NFHS-1 and NFHS-3). Children in rural areas were more at risk of neonatal mortality compared to those in urban areas, even after controlling all other factors. The net influence of place of residence remained fairly steady through the period.

Mother's literacy also showed a consistent effect through the study period from NFHS-1 to NFHS-3. The net effect of mother's exposure to mass media on neonatal mortality was not significant in NFHS-1 and NFHS-2, but it was significant but small (odds ratio 0.871)

in NFHS-3. Children belonging to high standard of living households were less (odds ratio 0.820) at risk of neonatal mortality compared to children of low standard of living households in NFHS-1. There was no substantial change in the relative levels of economic groups observed through the study period from NFHS-1 to NFHS-3.

The children of second and third order births were at lower risk of neonatal mortality compared to children of first and 'fourth and above' order births. Female children were at lower risk of neonatal mortality compared to male children in NFHS-1. No change in gender disparity of neonatal mortality was observed. As expected children born to very young mothers (age less than 20 years) had higher risk of neonatal mortality compared to children born to other mothers.

From the above discussion it is found that, no noticeable change has occurred in the effects of socio-economic factors on neonatal mortality over the period from NFHS-1 to NFHS-3.

Table 5.5

Results of Logistic Regression Analysis of Neonatal mortality on socio-economic and demographic variables, India, NFHS-1 to 3

Explanatory variables	Odds Ratio		
	NFHS-1	NFHS-2	NFHS-3
Ethnicity			
Ref: Others (Non SC/ST)			
Scheduled Caste	1.105	1.063	0.954
Scheduled Tribe	0.597***	0.958	0.837**
Place of Residence			
Ref: Urban			
Rural	1.249*	1.303***	1.187***
Maternal education			
Ref: Illiterate			
Literate	0.783***	0.737***	0.772***
Exposure to mass media			
Ref: Not exp MM			
Exposed to MM	0.944	0.973	0.871**
Standard of living index			
Ref: Low SLI			
Medium & high SLI	0.820***	0.846***	0.894*
Birth order of Child			
Ref: First child			
2nd & 3rd Child	0.868*	0.910*	0.782***
4th & above Child	1.002	1.202***	1.084
Sex of child			
Ref: Male			
Female	0.892*	0.883***	0.859***
Maternal age at birth			
Ref: =< 19 years			
> 19 years	0.613***	0.597***	0.552***
Constant	-2.473	-2.653	-2.505
-2 Log likelihood	9636.67	20035.56	13787.50
Nagelkerke R2	0.018	0.019	0.020
N	25606	57754	47071

Note: ***P < 0.01; **P < 0.05; *P < 0.1

Ref: indicates reference category

5.6: The net effects of socio-economic factors on post-neonatal mortality in India and the trends

Children belonging to scheduled tribes were at significantly lower (odds ratio 0.701) risk of post-neonatal mortality compared to the children belonging to 'other' community in NFHS-1, shown in Table 5.6. But in NFHS-3 the children belonging to scheduled tribes were at significantly higher (odds ratio 1.277) risk of post-neonatal mortality compared to the children belonging to 'other' community. The reason may be the children belonging to other community are getting more benefit from the reproductive and child health programme started in 1997 than children belonging to scheduled tribe, but the evidence has to be examined before drawing any conclusion. The children belonging to scheduled castes were at higher (odds ratio 1.314) risk of post-neonatal mortality compared to children belonging to 'other' community in NFHS-3. The post-neonatal mortality disparity according to place of residence was not significant through study period from NFHS-1 to NFHS-3.

Children of literate mothers had lower (odds ratio 0.708) risk of post-neonatal mortality compared to children of illiterate mothers in NFHS-1. The disparity increased in NFHS-2 and NFHS-3. Children of mothers exposed to mass media had lower (odds ratio 0.836) risk of post-neonatal mortality compared to children whose mothers were not exposed to mass media in NFHS-2. The children of medium and high standard of living households had lower risk of post-neonatal mortality compared to children of low standard of living households in NFHS-1, but the influences of standard of living declined in NFHS-2.

With increasing birth order of child, the risk of post-neonatal mortality increases sharply especially at the fourth order. In NFHS-1, the children of fourth and above birth order had 1.5 times risk of post-neonatal mortality compared to children of first birth order. In NFHS-3, the children of fourth and above birth order had 2.1 times risk of post-neonatal mortality compared to children of first birth order. Female children had significantly higher risk of post-neonatal mortality compared to male children in NFHS-2 and NFHS-3. There was no absolute change in gender disparity of neonatal mortality observed. The neonatal mortality is lower, but post-neonatal mortality is higher for female children

compared to male children. The reason may be male children get better care than female children in post-neonatal period. As expected, children born to mothers of age 20 or more had lower (odds ratio 0.745) post-neonatal mortality risk compared to children born to mothers of age less than 20 years in NFHS-1. The disparity increased in NFHS-2 and NFHS-3.

From the above discussion it is clear that, children belonging to scheduled tribes had lower risk of post-neonatal mortality compared to children of other community in NFHS-1. But the situation reversed in NFHS-3. Overall post-neonatal mortality disparity among socio-economic groups has not changed much over the study period (NFHS-1, NFHS-2 and NFHS-3).

5.7: The net effects of socio-economic factors on neonatal mortality in Orissa and the trends

The logistic regression result shows that, Children of mothers exposed to mass media had significantly lower (odds ratio 0.585) risk of neonatal mortality compared to children whose mothers were not exposed to mass media in NFHS-1, shown in Table 5.7. The children of second and third birth orders had lower (odds ratio 0.631) risk of neonatal mortality compared to children of first birth orders in NFHS-1. As expected, children born to mothers of age more than 19 years had significantly lower neonatal mortality risk compared to children born to mothers of age less than 20 years in NFHS-2 and NFHS-3. The net effect of many socio-economic factors on neonatal mortality was not significant. The reason may be sample size is not large enough to detect small differences.

Table 5.6
Results of Logistic Regression Analysis of Post-Neonatal mortality on socio-economic and demographic variables, India, NFHS-1 to 3

Explanatory variables	Odds Ratio		
	NFHS-1	NFHS-2	NFHS-3
Ethnicity			
Ref: Others (Non SC/ST)			
SC	1.161	1.043	1.314***
ST	0.701***	1.048	1.277**
Place of Residence			
Ref: Urban			
Rural	1.122	1.102	0.929
Maternal education			
Ref: Illiterate			
Literate	0.708***	0.680***	0.644***
Exposure to mass media			
Ref: Not exp MM			
Exposed to MM	0.895	0.836***	0.924
Standard of living			
Ref: Low			
Medium and High	0.780***	0.896*	0.885
Birth order of Child			
Ref: First child			
2nd & 3rd Child	1.163	1.143*	1.196*
4th & above Child	1.535***	1.621***	2.064***
Sex of child			
Ref: Male			
Female	1.117	1.140**	1.164**
Maternal age at birth			
Ref: =< 19 years			
> 19 years	0.745***	0.600***	0.515***
Drinking water Source			
Ref: Safe water			
Unsafe water	1.095	1.056	1.058
Toilet facility			
Ref: with toilet			
Without toilet	1.111	1.259***	1.027
Constant	-3.395	-3.578	-3.722
-2 Log likelihood	7145.22	12698.51	7455.26
Nagelkerke R2	0.019	0.025	0.027
n	25606	57754	47071

Note: ***P < 0.01; **P < 0.05; *P < 0.1

Ref: indicates reference category

5.8: The net effects of socio-economic factors on post-neonatal mortality in Orissa and the trends

Children of literate mothers had lower (odds ratio 0.392) risk of post-neonatal mortality compared to children of illiterate mothers in NFHS-3, shown in Table 5.8.The children of medium and high standard of living households had substantially lower (odds ratio 0.486) risk of post-neonatal mortality compared to children of low standard of living households in NFHS-2. Female children had significantly higher risk of post-neonatal mortality compared to male children in NFHS-2 and NFHS-3. There was substantial increase in gender disparity of post-neonatal mortality observed from NFHS-2 to NFHS-3. The net effect of many socio-economic, demographic and sanitation factors on post-neonatal mortality were not significant. The reason may be sample size is not sufficient to detect small differences.

Table 5.7

Results of Logistic Regression Analysis of Neonatal mortality on socio-economic and demographic variables, Orissa, NFHS-1 to 3

Explanatory variables	Odds Ratio		
	NFHS-1	NFHS-2	NFHS-3
Ethnicity			
Ref: Others (Non SC/ST)			
SC	0.508	0.901	0.877
ST	0.748	0.816	0.930
Place of Residence			
Ref: Urban			
Rural	1.387	0.822	1.612
Maternal education			
Ref: Illiterate			
Literate	1.203	0.816	1.173
Exposure to mass media			
Ref: Not exp MM			
Exposed to MM	0.585*	0.903	0.935
Standard of living			
Ref: Low			
Medium and High	1.046	0.982	0.968
Birth order of Child			
Ref: First child			
2nd & 3rd Child	0.631*	1.335	0.749
4th & above Child	0.658	1.312	0.905
Sex of child			
Ref: Male			
Female	0.737	0.835	0.667
Maternal age at birth			
Ref: =< 19 years			
> 19 years	0.776	0.446***	0.455**
Constant	-2.258	-2.054	-2.626
-2 Log likelihood	676.58	1098.95	513.93
Nagelkerke R2	0.027	0.019	0.032
n	1592	2736	1565

Note: ***P < 0.01; **P < 0.05; *P < 0.1

Ref: indicates reference category

Table 5.8
Results of Logistic Regression Analysis of Post-Neonatal mortality on socio-economic and demographic variables, Orissa, NFHS-1 to 3

Explanatory variables	Odds Ratio		
	NFHS-1	NFHS-2	NFHS-3
Ethnicity			
Ref: Others (Non SC/ST)			
SC	1.429	0.985	1.495
ST	1.122	1.021	0.642
Place of Residence			
Ref: Urban			
Rural	1.395	0.866	1.914
Maternal education			
Ref: Illiterate			
Literate	1.154	0.650	0.392*
Exposure to mass media			
Ref: Not exp MM			
Exposed to MM	1.457	1.322	0.653
Standard of living			
Ref: Low			
Medium and High	0.614	0.486**	1.393
Birth order of Child			
Ref: First child			
2nd & 3rd Child	0.787	1.145	0.751
4th & above Child	1.177	1.282	1.563
Sex of child			
Ref: Male			
Female	0.975	1.493*	2.158*
Maternal age at birth			
Ref: =< 19 years			
> 19 years	1.142	0.920	1.112
Drinking water Source			
Ref: Safe water			
Unsafe water	0.641	0.965	1.190
Toilet facility			
Ref: with toilet			
Without toilet	1.811	1.482	0.604
Constant	-3.908	-3.682	-4.240
-2 Log likelihood	574.39	722.75	271.52
Nagelkerke R2	0.025	0.032	0.065
n	1592	2736	1565

Note: **P < 0.05; *P < 0.1

Ref: indicates reference category

Chapter 6

Conclusions

CHAPTER-6

CONCLUSIONS

Achieving equality in health status among different socio-economic groups is an important aim of the health policy in a welfare country like India. But it has been found that both in micro and macro level disparities exist in India. On the one hand large proportion of rural, illiterate, low income and backward group people and on the other hand small proportion of urban, literate, high income and upper group people live in the country. In this situation the health equality is a challenge for the Nation. The reproductive and child health programme started in India with the aim to reduce disparities in infant, child and maternal mortality between regions as well as among socio-economic groups. This study tries to find out whether the infant mortality disparities changed or not over the period (NFHS-1, NFHS-2, and NFHS-3) in Orissa as well as in all-India.

Infant survival and overall health of Indians has improved over the past sixty years. But not all Indians are benefiting equally from advances in health sector. The disparities in health status among socio-economic groups as well as between states create an obstacle for inclusive growth of the nation. Substantial differences in infant mortality among states existed. In 2006, infant mortality rate was the lowest in Kerala (15) and the highest in Madhya Pradesh (74) (SRS, 2007). The figure is 73 for Orissa which follows Madhya Pradesh. In Orissa infant mortality was high in the districts where more proportion of SC and ST population live compared to other districts but not one-to-one relation.

From the study it is found that, disparity in neonatal mortality between children belonging to Schedule Caste and 'other' community narrowed down substantially over the study period in Orissa, whereas in India the disparity declined marginally. In this context it can be said that probably the reproductive and child health programme has not been effectively implemented to reduce the disparity in India, but in Orissa the

programme worked out to some extent. The disparity in post-neonatal mortality declined substantially in Orissa, but it was stagnant in India over the study period.

The children belonging to Scheduled Tribe were facing higher neonatal mortality compared to children belonging to 'other' community. The disparity abridged in Orissa, whereas in India the disparity was very low over the study period. If same socio-economic condition experienced by all groups of people then, children belonging to scheduled tribe face significantly lower neonatal mortality compared to children belonging to 'other' community in India. The net disparity contracted over the study period but there was no substantial change. The disparity in post-neonatal mortality between scheduled tribe and 'other' children declined substantially in Orissa, but increased for India over the study period. Controlling all other factors, children belonging to scheduled tribe were facing significantly lower post-neonatal mortality compared to children belonging to 'other' community in India in NFHS-1, but the situation was converse in NFHS-3. The difference was substantial in both the period. From the reproductive and child health programme the children belonging to 'other' community may get greater benefit compared to children belonging to scheduled tribe. Policymakers and health care professionals designing infant survival programmes should pay special attention to the needs of scheduled caste and scheduled tribe women and their infants by developing ethnic specific approaches to reducing infant mortality and eliminating disparities.

The disparity in both neonatal and post-neonatal mortality according to place of residence declined substantially from NFHS-1 to NFHS-2 but further increase in disparity was observed in NFHS-3 in Orissa. The child survival and safe motherhood (CSSM) programme started in 1992 might help more to the disadvantaged groups which was reflected in NFHS-2. But reproductive and child health programme started in 1997 which has not been probably beneficial that much to disadvantaged group as by the CSSM programme. In India the disparity narrowed over the study period but there was no substantial change.

As expected the children of literate mothers were facing lower neonatal mortality than children of illiterate mothers and the difference was substantial over the study period in India, whereas the disparity has declined substantially in Orissa. Mother's education effect is more in post-neonatal mortality disparity than neonatal mortality. Educated women are aware of proper care and feeding practice for their children, which help for increasing survival chances particularly in the post-neonatal period. The disparity in post-neonatal mortality according to mothers' education has not changed substantially over the study period in Orissa as well as India. After controlling all other effects, mother's education affects substantially neonatal and post-neonatal mortality. Better educated mothers are more likely to use basic health services, have fewer children at an older age and are more likely to space the births- all factors positively associated with child survival (UNICEF, 2005). Government and Non Governmental Organizations should give more focus on increasing women's education among SC and ST and it will surely be helpful for reducing infant mortality.

The children of medium and high standard of living households were facing lower neonatal mortality rate compare to low standard of living households. The disparity declined over the study period in Orissa, whereas in India the disparity has not changed. The disparity in post-neonatal mortality according to standard of living households has marginally declined over the study period in Orissa as well as India. After controlling all other effects, standard of living of household has substantial effect on both neonatal and post-neonatal mortality. Poverty directly leads to low education, low income, and inability to spend money for proper health care which affects infant mortality. The public health facility should give priority to these groups to achieve the goal of reproductive and child health programme.

Female children were facing lower neonatal mortality compared to male children in the study period in Orissa as well as India. After controlling all other effects, the same situation was experienced. The reason may be female children were biologically stronger than male children, which should be examined by further research. The disparity has not changed substantially over the study period. Gender disparity in neonatal mortality in

Orissa was higher than in India. But in post-neonatal period female children were facing higher mortality than male children. Over the study period the disparity was substantial in Orissa but it was low in India. It is generally believed that strong son preference exists in India. The mother who has a son gets more respect than the mother who has daughter in the family. So the mother as well as family members discriminate female children particularly in feeding practices and care, which leads to higher post-neonatal mortality among female children than male children. Reducing gender inequality would have a catalytic effect on cutting post-neonatal mortality.

The results of the study are not supporting the hypothesis that disparity in infant mortality among social and economic groups has declined over time. The weaker socio-economic condition among scheduled tribe leads to high neo-natal and post neo-natal mortality compared to 'others' but scheduled tribe membership has no role for higher neo-natal and post neo-natal mortality among children.

Some of the important points noted below brought out from this study will be helpful for the policy makers and planners. Those who are scheduled caste/scheduled tribe, illiterate and low income groups should be considered as high risk groups and taken as targeted groups for bringing equality in health status. Gender disparity in post neonatal mortality should be given emphasis by the Government, Private and Non-Governmental Organizations, which will be an input for reduction of infant mortality rate as well as bringing equality. The educational level of women belonging to scheduled castes and scheduled tribes is one area where there is huge scope for reducing inequalities. Addressing the inequalities and disparities within countries must be an essential component of all programmes and policies that aim to reduce infant mortality, which is the best indicator of overall health status.

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Appendices

Appendices

Calculation of Standard of Living Index

Standard of living index is calculated by adding the following scores: *house type:*- 4 for pucca, 2 for semi pucca, 0 for kachha; *source of lighting:*- 2 for electricity, 1 for kerosene or gas or oil, 0 for other source of lighting; *toilet facility:*- 4 for own flush toilet, 2 for public or shared flush toilet or own pit toilet, 1 for shared or public pit toilet, 0 for no facility; *source of fuel for cooking:*- 2 for electricity, liquid petroleum gas, or biogas, 1 for coal, charcoal, or kerosene, 0 for other fuel; source of drinking water:- 2 for pipe, hand pump, or well in residence/ yard/ plot, 1 for public tap, hand pump or well, 0 for other water source; separate room for cooking:- 1 for yes, 0 for no; ownership of house:- 2 for yes, 0 for no; ownership of agricultural land:- 4 for 5 acres or more, 3 for 2.0- 4.9 acres, 2 for less than 2 acres, 0 for no agricultural land; ownership of irrigated land: 2 if households owns at least some irrigated land, 0 for no irrigated land; ownership of livestock:- 2 if own livestock, 0 if not own livestock, durable goods ownership:- 4 for a car or tractor, 3 each for a moped/ scooter/ motorcycle, telephone, refrigerator, or colour television, 2 each for a bicycle, electric fan, radio/ transistor, sewing machine, black and white television, water pump, bullock cart, or thresher, 1 each for a mattress, pressure cooker, chair, cot/bed, table or clock/ watch.

Index scores range from 0-14 for low SLI, to 15-24 for medium SLI, to 25-67 for high SLI. But in this paper two categories have taken i.e. (i) medium and high standard of living and, (ii) low standard of living.

Appendix Table 5.5: Neonatal Mortality by Background Characteristics,INDIA, NFHS-1.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			33.283	2	.000	
	caste(1)	.100	.088	1.287	1	.257	1.105
	caste(2)	-.515	.095	29.438	1	.000	.597
	V025(1)	.223	.115	3.728	1	.054	1.249
	EDUCA(1)	-.244	.077	10.120	1	.001	.783
	EXPMM(1)	-.058	.071	.657	1	.418	.944
	slindex(1)	-.199	.067	8.780	1	.003	.820
	BIROR			5.323	2	.070	
	BIROR(1)	-.141	.080	3.094	1	.079	.868
	BIROR(2)	.002	.091	.001	1	.981	1.002
	B4(1)	-.114	.059	3.718	1	.054	.892
	agwacb(1)	-.489	.081	36.879	1	.000	.613
	Constant	-2.473	.138	323.136	1	.000	.084

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, agwacb.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.6: Post-neonatal Mortality by Background Characteristics, INDIA, NFHS-1.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			13.993	2	.001	
	caste(1)	.149	.104	2.060	1	.151	1.161
	caste(2)	-.356	.111	10.242	1	.001	.701
	V025(1)	.115	.148	.599	1	.439	1.122
	EDUCA(1)	-.345	.101	11.786	1	.001	.708
	EXPMM(1)	-.111	.087	1.617	1	.204	.895
	slindex(1)	-.249	.083	9.089	1	.003	.780
	BIROR			16.772	2	.000	
	BIROR(1)	.151	.106	2.030	1	.154	1.163
	BIROR(2)	.428	.116	13.726	1	.000	1.535
	B4(1)	.111	.071	2.433	1	.119	1.117
	agwacb(1)	-.295	.106	7.755	1	.005	.745
	SOUDR(1)	.091	.076	1.430	1	.232	1.095
	TOILET(1)	.105	.113	.869	1	.351	1.111
	Constant	-3.395	.191	316.394	1	.000	.034

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, agwacb, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water
TOILET(1)= Without toilet facility; Reference Category is With toilet facility

Appendix Table 5.5: Neonatal Mortality by Background Characteristics,INDIA, NFHS-2.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			2.380	2	.304	
	caste(1)	.061	.053	1.316	1	.251	1.063
	caste(2)	-.043	.059	.522	1	.470	.958
	V025(1)	.265	.057	21.400	1	.000	1.303
	EDUCA(1)	-.305	.051	36.091	1	.000	.737
	EXPMM(1)	-.027	.049	.300	1	.584	.973
	slindex(1)	-.167	.047	12.712	1	.000	.846
	BIROR			28.443	2	.000	
	BIROR(1)	-.095	.055	2.955	1	.086	.910
	BIROR(2)	.184	.065	8.080	1	.004	1.202
	B4(1)	-.125	.041	9.040	1	.003	.883
	AGWACB(1)	-.515	.056	85.942	1	.000	.597
	Constant	-2.653	.082	1054.162	1	.000	.070

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, AGWACB.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.6: Post-neonatal Mortality by Background Characteristics, INDIA, NFHS-2.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			.592	2	.744	
	caste(1)	.042	.070	.361	1	.548	1.043
	caste(2)	.047	.077	.375	1	.541	1.048
	V025(1)	.097	.085	1.309	1	.253	1.102
	EDUCA(1)	-.385	.071	29.622	1	.000	.680
	EXPMM(1)	-.179	.066	7.375	1	.007	.836
	slindex(1)	-.110	.062	3.168	1	.075	.896
	BIROR			36.826	2	.000	
	BIROR(1)	.134	.077	3.003	1	.083	1.143
	BIROR(2)	.483	.089	29.600	1	.000	1.621
	B4(1)	.131	.055	5.754	1	.016	1.140
	AGWACB(1)	-.510	.076	44.857	1	.000	.600
	SOUDR(1)	.054	.062	.754	1	.385	1.056
	TOILET(1)	.230	.078	8.628	1	.003	1.259
	Constant	-3.578	.121	869.891	1	.000	.028

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, AGWACB, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water
TOILET(1)= Without toilet facility; Reference Category is With toilet facility

Appendix Table 5.5: Neonatal Mortality by Background Characteristics,INDIA, NFHS-3.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			6.137	2	.046	
	caste(1)	-.047	.067	.507	1	.476	.954
	caste(2)	-.178	.072	6.119	1	.013	.837
	V025(1)	.171	.060	8.264	1	.004	1.187
	EDUCA(1)	-.258	.060	18.265	1	.000	.772
	EXPMM(1)	-.138	.060	5.247	1	.022	.871
	WEALT(1)	-.113	.062	3.315	1	.069	.894
	BIROR			29.394	2	.000	
	BIROR(1)	-.246	.065	14.302	1	.000	.782
	BIROR(2)	.080	.078	1.065	1	.302	1.084
	B4(1)	-.152	.051	8.803	1	.003	.859
	awacb(1)	-.593	.068	75.698	1	.000	.552
	Constant	-2.505	.096	685.811	1	.000	.082

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, WEALT, BIROR, B4, awacb.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.6: Post-neonatal Mortality by Background Characteristics, INDIA, NFHS-3.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			11.537	2	.003	
	caste(1)	.273	.093	8.686	1	.003	1.314
	caste(2)	.245	.100	6.038	1	.014	1.277
	V025(1)	-.074	.096	.594	1	.441	.929
	EDUCA(1)	-.440	.091	23.461	1	.000	.644
	EXPMM(1)	-.079	.088	.817	1	.366	.924
	WEALT(1)	-.123	.090	1.847	1	.174	.885
	BIROR			47.375	2	.000	
	BIROR(1)	.179	.104	2.948	1	.086	1.196
	BIROR(2)	.725	.119	37.267	1	.000	2.064
	B4(1)	.152	.074	4.195	1	.041	1.164
	awacb(1)	-.664	.107	38.806	1	.000	.515
	SOUDR(1)	.057	.095	.355	1	.551	1.058
	TOILET(1)	.027	.098	.075	1	.784	1.027
	Constant	-3.722	.158	556.795	1	.000	.024

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, WEALT, BIROR, B4, awacb, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water
TOILET(1)= Without toilet facility; Reference Category is With toilet facility

Appendix Table 5.7: Neonatal Mortality by Background Characteristics, ORISSA, NFHS-1

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			2.305	2	.316	
	caste(1)	-.677	.530	1.628	1	.202	.508
	caste(2)	-.290	.289	1.011	1	.315	.748
	V025(1)	.327	.420	.608	1	.436	1.387
	EDUCA(1)	.185	.266	.484	1	.487	1.203
	EXPMM(1)	-.537	.282	3.621	1	.057	.585
	slindex(1)	.045	.278	.026	1	.872	1.046
	BIROR			2.979	2	.226	
	BIROR(1)	-.461	.277	2.762	1	.097	.631
	BIROR(2)	-.419	.321	1.702	1	.192	.658
	B4(1)	-.305	.221	1.906	1	.167	.737
	agwacb(1)	-.254	.296	.734	1	.392	.776
	Constant	-2.258	.493	21.001	1	.000	.105

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, agwacb.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.8: Post-neonatal Mortality by Background Characteristics, ORISSA, NFHS-1.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			.799	2	.671	
	caste(1)	.357	.405	.776	1	.378	1.429
	caste(2)	.115	.336	.118	1	.731	1.122
	V025(1)	.333	.507	.430	1	.512	1.395
	EDUCA(1)	.143	.289	.244	1	.621	1.154
	EXPMM(1)	.377	.296	1.623	1	.203	1.457
	slindex(1)	-.487	.311	2.458	1	.117	.614
	BIROR			1.973	2	.373	
	BIROR(1)	-.240	.329	.530	1	.467	.787
	BIROR(2)	.163	.351	.216	1	.642	1.177
	B4(1)	-.026	.243	.011	1	.916	.975
	agwacb(1)	.133	.376	.125	1	.724	1.142
	SOUDR(1)	-.444	.279	2.534	1	.111	.641
	TOILET(1)	.594	.579	1.052	1	.305	1.811
	Constant	-3.908	.758	26.581	1	.000	.020

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, agwacb, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water
TOILET(1)= Without toilet facility; Reference Category is With toilet facility

Appendix Table 5.7: Neonatal Mortality by Background Characteristics, ORISSA, NFHS-2

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			.736	2	.692	
	caste(1)	-.104	.226	.212	1	.646	.901
	caste(2)	-.203	.241	.707	1	.401	.816
	V025(1)	-.197	.226	.760	1	.383	.822
	EDUCA(1)	-.204	.223	.836	1	.360	.816
	EXPMM(1)	-.102	.225	.208	1	.649	.903
	slindex(1)	-.018	.219	.007	1	.934	.982
	BIROR			1.764	2	.414	
	BIROR(1)	.289	.220	1.726	1	.189	1.335
	BIROR(2)	.271	.284	.913	1	.339	1.312
	B4(1)	-.181	.174	1.080	1	.299	.835
	AWACB(1)	-.808	.222	13.263	1	.000	.446
	Constant	-2.054	.330	38.838	1	.000	.128

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, AWACB.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.8: Post-neonatal Mortality by Background Characteristics, ORISSA, NFHS-2.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	caste			.013	2	.994	
	caste(1)	-.015	.285	.003	1	.957	.985
	caste(2)	.020	.296	.005	1	.945	1.021
	V025(1)	-.143	.323	.197	1	.657	.866
	EDUCA(1)	-.432	.302	2.035	1	.154	.650
	EXPMM(1)	.280	.288	.943	1	.331	1.322
	slindex(1)	-.722	.320	5.080	1	.024	.486
	BIROR			.496	2	.780	
	BIROR(1)	.135	.302	.200	1	.654	1.145
	BIROR(2)	.249	.353	.496	1	.481	1.282
	B4(1)	.401	.228	3.089	1	.079	1.493
	AWACB(1)	-.084	.318	.069	1	.793	.920
	SOUDR(1)	-.035	.241	.022	1	.883	.965
	TOILET(1)	.394	.541	.530	1	.467	1.482
	Constant	-3.682	.659	31.212	1	.000	.025

a. Variable(s) entered on step 1: caste, V025, EDUCA, EXPMM, slindex, BIROR, B4, AWACB, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water
TOILET(1)= Without toilet facility; Reference Category is With toilet facility

Appendix Table 5.7: Neonatal Mortality by Background Characteristics, ORISSA, NFHS-3

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Decaste			.133	2	.936	
	Decaste(1)	-.131	.371	.125	1	.724	.877
	Decaste(2)	-.073	.349	.043	1	.835	.930
	V025(1)	.478	.355	1.809	1	.179	1.612
	EDUCA(1)	.160	.325	.241	1	.623	1.173
	EXPMM(1)	-.067	.311	.047	1	.829	.935
	WEALT(1)	-.033	.328	.010	1	.920	.968
	BIROR			.870	2	.647	
	BIROR(1)	-.289	.322	.805	1	.370	.749
	BIROR(2)	-.099	.412	.058	1	.809	.905
	B4(1)	-.405	.266	2.320	1	.128	.667
	awacb(1)	-.788	.330	5.696	1	.017	.455
	Constant	-2.626	.528	24.748	1	.000	.072

a. Variable(s) entered on step 1: Decaste, V025, EDUCA, EXPMM, WEALT, BIROR, B4, awacb.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

Appendix Table 5.8: Post-neonatal Mortality by Background Characteristics, ORISSA, NFHS-3.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Decaste			2.393	2	.302	
	Decaste(1)	.402	.480	.704	1	.401	1.495
	Decaste(2)	-.444	.516	.739	1	.390	.642
	V025(1)	.649	.606	1.145	1	.285	1.914
	EDUCA(1)	-.938	.512	3.349	1	.067	.392
	EXPMM(1)	-.426	.457	.869	1	.351	.653
	WEALT(1)	.331	.469	.499	1	.480	1.393
	BIROR			2.479	2	.290	
	BIROR(1)	-.286	.539	.282	1	.595	.751
	BIROR(2)	.447	.567	.620	1	.431	1.563
	B4(1)	.769	.397	3.755	1	.053	2.158
	awacb(1)	.106	.628	.028	1	.866	1.112
	SOUDR(1)	.174	.451	.149	1	.699	1.190
	TOILET(1)	-.505	.632	.638	1	.424	.604
	Constant	-4.240	.983	18.620	1	.000	.014

a. Variable(s) entered on step 1: Decaste, V025, EDUCA, EXPMM, WEALT, BIROR, B4, awacb, SOUDR, TOILET.

Note: Caste = Others (Non SC/ST), (Reference Category)
Caste (1)= Scheduled caste
Caste (2)= Scheduled Tribe

V025 (1)= Rural; Reference Category is Urban

EDUCA (1)= Literate; Reference category is Illiterate

EXPMM (1)= Exposed to Mass Media;
Reference Category is Not Exposed to Mass Media

Slindex(1)= Medium and high SLI; Reference Category is Low SLI

BIROR= First order child (Reference Category)
BIROR(1)= Second and third order child
BIROR(2)= Fourth and above order child

B4(1)= Female; Reference Category is Male

Agwacb(1)= Mother's age at child birth is More than 19 years;
Reference Category is Lees than 20 years

SOUDR(1)= Unsafe drinking water; Reference Category is Safe drinking water

TOILET(1)= Without toilet facility; Reference Category is With toilet facility