CHAPTER I

INTRODUCTION

1.1. Infant and Child Mortality: Concepts and Terminology

Child survival is considered to be an excellent summary index of maternal and
child health, nutritional and health status, level of living as well as socioeconomic
development of a country. The Alma Ata declaration in 1978 of 'Health for All' by the year
2000 was a major milestone which drew the attention of development planners on the
need for improving child survival. Planners and policy makers both at the national and
international level intensified their efforts in identifying the important causes of infant and
child mortality to plan possible interventions. In India, almost one fifth of the children
die before they are five years old. Of those that die in the first year, a little over half die in
the first month, about half of that in the first week and half again of that on the first day
(Ghosh, 1987).

Based on the age at death and causes of death, infant and childhood deaths are
classified into different categories. Deaths in the first month of life (28 days or four
weeks) are termed as Neonatal Deaths. Deaths occurring during the remainder of the first
year (1-11 months) are termed as Post-neonatal Deaths. Mortality in the first week is
sometimes termed as Early Neonatal Deaths. Perinatal Mortality refers to deaths in the
first week of life and still births occurring after twenty weeks of gestation. Infant
Mortality is conventionally defined as the risk of dying during the first year of life. Child
Mortality refers to mortality between exact ages 1 and 5 i.e., in the conventional age
group 1-4, and refers to the period after infancy but during the early childhood.
The causes of infant deaths may be exogenous or endogenous; accidents and infections are said to be exogenous and are a result of diseases arising from inadequacies in care, faulty feeding practices as well as those related to the more general environmental and sanitary conditions, while congenital malformation, birth trauma etc., are called endogenous causes and arise due to genetic factors or from damage occurring during gestation or birth. The endogenous biological factors largely determine mortality in the first few days of life (perinatal and neonatal) while exogenous factors are more important in the later age groups (post-neonatal, and childhood).

1.2. Trends in Infant and Child Mortality

Ever since the turn of this century, infant and child mortality in the economically developed countries has declined steadily and currently reached a very low level in both rural as well as urban areas. Levels and trends in infant mortality vary widely between the developed and developing countries. About 150 years ago infant mortality rates (IMR, number of deaths of infants per 1000 live births) of 200 or more prevailed in the industrialised countries. Asia and Africa had even higher risks of infant deaths. In 1870s the rate in the European countries is reported to have varied from 100 in Norway and 150 in the United Kingdom to 300 in Southern Germany (Bhende and Kanitkar, 1992). By the beginning of the twentieth century it had fallen considerably in some countries but remained high in others. During the present century, large declines have taken place in almost all the countries including the developing countries. However, there
is a wide disparity in the levels of infant mortality even now. At one extreme are certain African and Asian countries with very high infant mortality rates-Afghanistan (163), Mozambique (118), Guinea (136), Angola (124), Iraq (127), and Cambodia (111). At the other extreme are countries like Japan (4) and Sweden (4) with very low infant mortality rates. Infant mortality in some of the Eastern and Southern European countries is high e.g., Albania (33) and Romania (21). A few Asian countries like Singapore (4) and Taiwan (5) etc., also have very low IMRs (Population Reference Bureau, 1997).

In the past, infant mortality rates were very high in India (285 to 290 in 1901-1911; Bhende and Kanitkar, 1992). During recent years, there has been a decline in infant mortality in India as elsewhere in the world, but, the risk is still moderately high; 71 in 1997. Large inter-state variations exist within India. Among the major states, during 1997, Orissa recorded the highest IMR (96) while the lowest average (71) are Madhya Pradesh (94), Uttar Pradesh (85), Rajasthan (85) and Assam (76). In Delhi, Haryana, Himachal Pradesh, Gujarat, Maharashtra, Punjab, West Bengal, North Eastern states and Southern states it is below the national average. Among the southern states infant mortality rate was the highest in Andhra Pradesh (63) followed by Karnataka (53) and Tamil Nadu (53). Further, infant mortality rate varied from 77 in rural areas to 45 in urban areas (Registrar General, India, 1998).
Age Specific Death Rate (0-4 years) in India is also quite high. In 1993, it was 24 per 1000 per year; 27 in the rural areas and 13 in the urban areas. Within India the lowest level of mortality in this age group was observed in Kerala (3) while the highest was in Madhya Pradesh (37), followed by Orissa (34), Uttar Pradesh (33), Assam (30), and Rajasthan (26). In the other states it was below the national average (Registrar General, India, 1993).

1.3. Determinants of Infant and Child Mortality

In the developed countries, deaths in infancy have already been almost totally restricted to the first few days of life wherein genetic factors, congenital anomalies etc., predominate as important causes. Deaths due to exogenous factors have reduced as a result of control over infectious diseases through improved medical care, better sanitation and hygiene and so on. In developing countries mortality in infancy and early childhood is high. Diarroheal Diseases and Acute Respiratory Tract Infections are the leading causes of morbidity and mortality. The other important causes include deaths due to birth injury and obstructed labour, congenital anomalies, low birth weight, immaturity, malnutrition as well as other communicable diseases like whooping cough, influenza and pneumonia.

While examining the determinants of infant and child mortality, it is useful to distinguish between immediate and indirect determinants. The immediate determinants refer to the nutritional and health status of both the mother and the child, the incidence of infection, and the accessibility and utilisation of health services. Indirect determinants on
the other hand, are those related to the socioeconomic and environmental conditions which make infants and children more vulnerable to immediate cause of death (Figa-Talamanca, 1984).

Mortality in infancy and early childhood is a result of a complex set of interrelated biological, social, economic, cultural, environmental as well as health factors. Surviving through the first few hours, days, weeks, months and years of life is particularly hazardous for an infant as it is exposed to various risks. First of all when the baby is in his mother's womb, factors such as her health and nutritional status, her age at confinement, parity, inter-pregnancy interval and maternity care are important in determining optimal growth of the foetus and survival after birth. Inadequate prenatal care and delivery assisted by untrained personnel increase the risk of birth injuries. Once out of the womb, the environment, adequacy of food, hygiene etc., determines his survival. Inadequate care, faulty feeding practices etc., lowers the survival chance.

1.3.1. Biodemographic Factors

Among the biological determinants, maternal age at birth of the child, birth order, period of spacing between births, prematurity, and birth weight of the child are prominent in determining the survival status. Most studies confirm the existence of an age band in the fertile period of women during which the risk is minimal. Infants born to mothers at very early ages (below 20 years) experience higher incidence of neonatal and infant mortality particularly due to immaturity and nutritional deficiency. In societies where early marriage is a norm, child bearing also starts at an early age. As a consequence first born children experience higher risk because of the mother's physical immaturity.
Children of higher order birth (5 and above) also experience higher risk of death. If a mother has experienced a child loss previously, there is a greater risk of subsequent child mortality (Cleland and Van Ginneken, 1988; Gubhaju et al., 1987; Sathar, 1985). Malnourished mothers tend to produce infants with low birth weights who experience higher risk of infant mortality (Galway et al., 1987; Lechtig et al., 1978). Shorter birth intervals and high parity have been closely linked with higher mortality as a result of prematurity and low birth weight. Low birth weight is beyond doubt the single most important determinant of infant survival (WHO, 1980). Birth weight depends on maternal nutrition and weight gain during pregnancy. Short birth intervals result in greater competition among siblings for food and other necessities resulting in poor nutrition and high mortality. With longer interval between births or proper spacing of births, the mother may be able to provide adequate child care as well as other maternal resources in terms of breastmilk etc. This in turn may enhance the chances of survival of the infant.

1.3.2. Behavioural Factors

Among the behavioural factors, breastfeeding is regarded as a crucial factor in infant survival and nutritionally ideal at least for the initial period of infancy as it provides immunity against gastrointestinal illness. Breastmilk contains antibodies against bacterial and viral agents that cause Diarrhoea and other infections in the infant. However, by itself, maternal milk does not provide all the nutrients that the growing child requires beyond a certain age. Proper supplementary food needs to be given. Poor feeding patterns and insufficient breastmilk worsens child survival. Besides, artificial feeding also has its own disadvantages which depend on the quantity and quality of substitute foods, the hygienic
conditions etc. Deficiencies of various kinds such as Protein Energy Malnutrition, Kwashiorkor and Marasmus are common particularly in the rural areas of many developing countries. Unhygienic bottle feeding can result in an increase in incidence of gastrointestinal infections. Studies have shown that even under the best hygienic conditions, breastfed infants have lower mortality rates than artificially fed infants (Butz et al., 1982; Janowitz et al., 1981; Knodel and Kitner, 1977).

1.3.3. Socioeconomic Determinants

Deaths occurring after the first month of life i.e., post-neonatal deaths arise mainly due to the effect of various social, economic, cultural or environmental factors. The socioeconomic determinants include socioeconomic status of household in terms of income, education, social class, occupation, residence, parents' sex preference, ethnicity etc. Income, both at the aggregate level and individual family level, has shown close association with infant and child mortality. The effect of income on mortality is mostly indirect through enhancing the availability of and consumption of nutritious food, better housing, utilisation of medical care, etc. With data from 46 developing countries, Flegg (1982) concludes that priority on enhancing women's education and achieving a more equitable distribution of income would lead to a rapid fall in infant mortality rates. Education has emerged as the single most important factor influencing child survival.

In recent years there has been a spate of research mainly based on data from developing countries to suggest maternal attributes as important determinants of child mortality. Education of mother particularly has been identified as a crucial determinant. A rigorous analysis of Nigerian survey data makes Caldwell (1979) to conclude that maternal education is the most important single determinant of mortality in childhood.
According to him the pathways through which maternal education influences child survival is the shift from fatalistic acceptance of health outcomes towards acquisition of simple health knowledge, increased capability to manipulate the modern world, including interaction with health personnel, a shift in familial power structures permitting the educated women to exert greater control over the health choices of her children. The inverse maternal education mortality-relationship has been found in a number of studies from developing countries (Caldwell and McDonald, 1981; Chowdhury, 1982; Cleland and van Ginneken, 1988; Cochrane, 1980; Da Vanzo and Habicht, 1986, D'Souza and Buhiya, 1982; Farah and Preston, 1982; Frenzen and Hogan, 1982; Haines and Avery, 1982; Mosley, 1989; Visaria, 1988; United Nations, 1985, 1991, 1994). Besides, several studies based on the World Fertility Survey and Demographic and Health Survey appear to confirm these findings. Higher female education leads to improved child care skills and preventive care (Das Gupta, 1990), better child feeding patterns (Caldwell and McDonald, 1981) greater control over household decisions and better understanding of the importance of hygiene and sanitation (Ware, 1984); enhanced focus on child quality (Caldwell, 1979) and a preference of modern health care practices that improve survival (Mosley and Chen, 1984; Nag, 1981).

In countries where adult females are largely illiterate, the education of the father stands out as a more important determinant. Husband's education is an important determinant of post-neonatal and child mortality in most African and Latin American countries (Hobcraft et al., 1984).

The other prominent socioeconomic factors influencing infant mortality include the work status of the father and mother, household economic status and place of residence. An inverse relationship exists between economic status and mortality. Infant and child mortality is higher in rural areas when compared to urban areas.
Sex preference in many countries could lead to preferential care and nutrition of male infants. Cultural values associated with gender discrimination result in excess female mortality (Chen et al., 1981; Choe, 1987). Differences in nutrition and parental care are likely between sexes in such cultures.

1.3.4. Health Service Utilisation

Disease prevention measures such as inoculation programmes for the mother and child as well as maternity care of the mother are important. The availability, accessibility and appropriateness of health services are of vital importance. Health services are a necessary component of any overall strategy aiming at reducing infant and child mortality.

1.3.5. Environmental Factors

Environment is also an important factor determining child survival. The influence of environmental sanitation on infant and child mortality has been well documented. The prevalence of poor environmental conditions in many developing countries is the main reason for high infant and child mortality. These include facilities such as non availability of safe drinking water, improper drainage, poor housing conditions, poor toilet facilities or in certain cases lack of system to dispose off human excreta. The presence of toilet facilities in the household results in reduction in mortality (Cabigon, 1990; Martin et al., 1983; Meegama, 1980).

1.4. The Research Problem

Life expectancy has increased both in the developed and developing countries. However, the risk of dying during infancy and early childhood is still very high and deaths
under 5 years of age constitute a substantial proportion of all deaths in developing countries. In India, decline in infant mortality has been less than that of the overall mortality decline. Despite recent improvements, infant mortality rate continues to be high; 71 per 1000 live births in 1997. Large variations exist between states as well. Orissa experienced the highest IMR of 96 per 1000 births in 1997 while the lowest (12) was in Kerala (Registrar General, India, 1998). Hence, a better understanding of the determinants of infant and child mortality deserves high priority.

By and large, social scientists approach child survival from their own points of view largely emphasising on socioeconomic determinants thereby sidelining the biological factors. Biologists on the other hand primarily focus on the biological determinants and neglect the socioeconomic determinants. To seek a compromise Mosley and Chen (1984) proposed an analytical framework incorporating both social and biological variables to study the determinants of child survival. According to them all social and economic determinants operate through a common set of biological mechanisms or proximate variables to exert an impact on mortality.

But how social and economic factors influence through biological and environmental factors during the neonatal and post-neonatal period is not clearly understood. An understanding of how interventions such as public health programmes could influence the young age mortality under the given social and economic conditions has policy and programme relevance to India, where the pace of economic development is very slow. It is, therefore, necessary to examine the determinants of child survival by making use of an appropriate framework, keeping the distinction between neonatal and
post-neonatal mortality. With the exception of Kerala, which exhibits a feature similar to that of most developed countries, with very low infant and child mortality, the level of infant mortality in most of the other states is very high, Orissa having the highest mortality. Therefore, the two states Kerala and Orissa have been chosen. In addition, Uttar Pradesh, where fertility and infant mortality are very high, utilisation of health services is low, and lags behind in terms of social development is also included in the study. The main purpose of this study is, to identify the possible determinants of neonatal and post-neonatal mortality in the high and low mortality states. Such a comparative inquiry is expected to throw more light on factors responsible for high mortality. Only through the identification of important proximate variables as well as socioeconomic factors and their independent effects, could programmes to reduce infant and childhood mortality be chalked out.

1.5. Organisation of the Thesis

Chapter I provides an Introduction to the topic of research justifying the need for it. Chapter II Reviews in detail the Literature on the determinants of infant and child mortality in developing countries with special reference to India.

The Research Design stating the objectives of the study, conceptual framework, sources and quality of data and the basic statistical methods to be used is described in Chapter III. Chapter IV gives a detailed Description of the geographical Area of the Study including history, physiography and climate, state of economy and basic demographic indicators.
A detailed description on the Levels and Trends in Infant and Child Mortality in the study areas - Kerala, Orissa and Uttar Pradesh, drawing data from the National Family Health Survey (NFHS) and the Sample Registration System (SRS) is provided in Chapter V. Life Tables Analysis on Levels in Infant and Child Mortality is presented in Chapter VI.

The results from the multivariate logistic regression analysis and path analysis on Determinants of Neonatal Mortality in Kerala, Orissa and Uttar Pradesh are described in Chapter VII. Mortality at the Post-neonatal and Childhood Ages is analysed using proportional hazards model and path analysis and presented in Chapter VIII.

A Summary and Conclusions including Policy Implications follow in Chapter IX.