CHAPTER I
Knowledge of infant and childhood mortality among different cultural and social groups and their determinants are essential for effective planning and implementation of many developmental programmes in any country. Data on various aspects of mortality are necessary for different agencies of the government and the voluntary organization for developing family planning, nutrition, medical and public health programmes. It has been proved in a few studies that infant and childhood mortality has a very strong association with fertility levels and with the acceptance of contraception.

The mortality level of a region indicates the extent of socio-economic advancement. It is assumed that lower the socio-economic development; the higher will be the infant and childhood mortality. Mortality is comparatively high in India and is likely to vary in different social and cultural groups. Therefore, there is an urgent need for undertaking mortality studies in different parts of the country (Bajkhaif and Mahadevan, 1993).

According to UNICEF (2010) in World’s Children Report noted that 8.1 million children across the world who died in 2009 before their fifth birthday lived in developing countries and died from a disease or a combination of diseases that could have easily been prevented or treated. It also noted that, half of these deaths occurred in just five countries namely, India, Nigeria, the democratic republic of Congo, Pakistan and China. India and Nigeria both accounting for one third of the total number of under five deaths worldwide.
Child mortality is probably the world's saddest topic of discussion. The deaths of children in third world countries are often the most saddening because their deaths could have been avoided in most circumstances with 24 hour access to hospitals and doctors in industrialized countries. Unfortunately, in third world countries, these children die because there is simply no access to health care most of the time or simply they could not get facility in time.

Child mortality is one of the important indicators of a country's general medical and public health conditions, and consequently, the country's level of socio-economic development. Its decline is therefore not only desirable but also indicative of an improvement in general living standards. Child mortality reduction, the fourth of the United Nation's Millennium Development Goals (MDGs) to reduce by two thirds the mortality rate of children under five between 1990 and 2015 has become a common agenda of public health and international development agencies (Mutunga, 2007). Many biological and socio-cultural factors are responsible for high mortality rate of the children, specially of the infants. The economically advanced countries were able to reduce their death rate to less than ten per thousand largely by providing their people with adequate and wholesome food, pure drinking water, better hospital facilities, better sewage disposal and taking proper measures to control various diseases (Agarwala, 1988). India is one of the countries where child mortality rate is alarmingly high. The Sample Registration System, in 2010, estimated that, out of the total deaths reported, 14.5% are infant deaths (< 1 years), 3.9% deaths are of 1 - 4 years children, 18.4% deaths are of children of 0 - 4 years and 2.7% deaths pertained to children of 5 - 14 years. As mortality is comparatively high in India and is likely to
vary in different social and cultural groups, within and between states, there is a need for undertaking mortality studies in different parts of the country.

For infant and young children, the risk of dying is closely related to the environment where they live, because they are ill equipped to deal with infection. Inadequate food and lack of elementary hygiene are the other factors. While a baby is in her mother's womb, the health and the nutrition of the mother, her age, the number of children she already had, the interval between them and the care during pregnancy, etc. have profound influence on child survival. Inadequate care during delivery, incomplete or no immunization, inadequate or no breast feeding and improper supplement feeding practices further enhance the hazard to a child. Thus, the determinants of child survival vary according to various socio-economic, cultural, demographic and health care factors.

Although there is lack of consensus, the evidences indicating association between levels of infant and childhood mortality with that of fertility has well documented in the research carried out in the past in both developed and developing nations. Some researchers have shown that the existing levels of high mortality, particularly during the infancy and childhood along with strong preference for sons, reinforce couples to go for as many children as possible, resulting in higher fertility levels. This happens in order to ensure that few of the children would survive to adulthood and be able to provide their parents with the support in old age. Contrary to this, some others have stated that those women who have children in rather quick succession (with shorter birth intervals) also experience higher infant mortality.

Nevertheless, there seem to be short of consensus in taking infant mortality levels as a single most important indicator not only for assessing the quality of public health care
but also for assessing the overall development status of the population (Lahiri and Ram, 2004).

The extensive analysis of World Fertility Survey data indicated that the survival chances of children vary widely between socio-economic strata, with the educational attainment of the mother (Cleland, 1991). Mother’s education might affect child health through five distinct ways. They are: (i) education may affect the productivity of effectiveness of the health inputs used in the production of child health, (ii) education may affect perceptions about the best allocation of the health inputs, (iii) education may increase total family resources, (iv) more educated women may assign a higher value to their own time, particularly, but not only, if they work in the market and receive a higher wage rates; and (v) education may residually affect preference for child health and family size given total resources, prices and technology (Schultz, 1984).

An examination of the relationship between the socioeconomic factors and child mortality among the four south Indian states - Andhra Pradesh, Karnataka, Maharashtra, and Tamil Nadu, revealed that the factors effecting child mortality differ among the selected states. The developmental variables such as electricity, availability of drinking water and female literacy influence a proportion of married females and thereby affect child mortality in Andhra Pradesh. In Karnataka, female literacy level was observed to be the major determinant, accounting for about 50 per cent of variation in child mortality. Moreover, in Tamil Nadu and Maharashtra, household level of literacy and female literacy level were the major determinants of child mortality. The analysis clearly demonstrates that child mortality is highly influenced by community development, female literacy, household literacy, and fertility
variables. It is therefore suggested that efforts be made to concentrate on community development programs, adult female education programs, and provision of formal health education to the mothers irrespective of age, thereby enhancing child survival (Prakasam, et al., 1991).

Morbidity forms an important area in anthropological demography and very much related to mortality. The study of morbidity pattern of an area gives a clear understanding about the health situation in that area. According to UNICEF, most child deaths (and 70% in developing countries) result from one the following five causes or a combination thereof: (i) Acute respiratory infections, (ii) Diarrhoea, (iii) Measles, (iv) Malaria and (v) Malnutrition.

Two-third of child death are preventable. Most of the children who die each year could be saved by low-technology, evidence-based, cost-effective measures such as vaccines, antibiotics, micronutrient supplementation, insecticide-treated bed nets, improved family care and breastfeeding practices, and oral rehydration therapy. Empowering women, removing financial and social barriers to accessing basic services, developing innovations that make the supply of critical services more available to the poor and increasing local accountability of health systems are policy interventions that have allowed health systems to improve equity and reduce mortality.

The international Conference on Primary Health care held in Alma Ata in 1978 (WHO, 1978) was the first global forum to consider how child mortality and morbidity could be reduced by the systematic development of the primary health care system. Since then the United Nations has been actively involved in identifying ways
to reduce the IMR and U5MR in developing countries, and supporting the nations to achieve the same.

The 30th anniversary of Alma Ata provided global momentum behind meeting the health-related Millennium Development Goals (MDG) (UN Summit, 2010). MDG-4 called for achieving a two-thirds reduction in the mortality of children of less than 5 years of age between 1990 and 2015. If this MDG-4 reached, annual under-five death must be reduced to fewer than 5 million by 2015.

According to the WHO (1978) classification of 14 sub regions, India falls within the South East Asian Region-D (SEAR-D) which is characterized as a “high mortality” region. The South-east Asian region has experienced a moderately sustained reduction in mortality among the children under-five years of age during the last four decades. Currently, in almost all the countries of the region, such as Bangladesh, Nepal and Sri Lanka, the under five mortality rate is lower than that of India.

Following the Alma Ata declaration of 1978, The Government of India envisaged a national goal to reduce the child death from all over the country. Since then, substantial resources have been put into child survival programmes over the past 35 years. The Sixth and Seventh Five Year Plans established nationwide programme to realize this goal. In 1977, the Family Planning Programme evolved into Family Welfare Programme. In this context, the Maternal and Child Health became an integral part of the Family Welfare Programme. The integration was based on the understanding that reductions in the birth rates will also contribute significantly to
reduction in infant and child mortality rates, and contribute to safe motherhood. (MoHFW, 1998).

The National Diarrhoeal Disease Control Programme began in 1978. In 1979, The Expanded Programme of Immunization (EPI) was established to provide the tetanus toxoid (TT) vaccine to pregnant women, and BCG and DPT, polio and measles vaccines to the children. The Universal Immunization Programme (UIP) and Oral rehydration therapy (ORT), both launched in 1985, and the safe Motherhood Programme initiated during the Eight plan, were prominent components of the Family Welfare Programme. The Acute Respiratory infection (ARI) control programme was established in 1990, initially in 14 districts.

In the early 1990s, these programmes (UIP, Diarrheal Disease Control Programme, Safe Motherhood Programme and ARI Control Programme) were integrated and further strengthened to shape the Child Survival and Safe Motherhood (CSSM) Programme. In 1997, the CSSM programme was further expanded to the Reproductive and Child Health (RCH) programme, with a larger basket of services and greater focus on reproductive rights of women.

In 2005, the Government of India launched The National Rural Health Mission (NRHM) to improve the availability and quality of accessible health care, specially for those residing in rural areas, including the poor, women and children. The major goal of the mission are to reduce the Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR), improve universal access to public health services such as women’s health, child health, water, sanitation and hygiene, immunization and nutrition; and enhance the prevention and control of communicable and non-
communicable diseases, including locally endemic diseases. (NRHM, MoHFW, 2005).

Keeping these views in mind in the present study an attempt has been made to study the infant and child mortality and morbidity among the Bodos and the Rabhas, two scheduled tribes living in the same ecological setting under Udalguri Public Health Circle area, of Udalguri District, Bodoland Territorial Autonomous District, Assam.

AIMS AND OBJECTIVES

(i) To study the demographic and socio-economic background of the Bodos and the Rabhas.

(ii) To study the infant mortality, child mortality and patterns of morbidity among the Bodos and the Rabhas.

(iii) To see the influence of bio-demographic factors like mothers age at first child birth, birth intervals and birth order on infant and child mortality.

(iv) To see the influence of socio-economic factors like type of family, type of house, parents education, parents occupation, monthly household income, sanitary facility and drainage facility on infant and child mortality.

(v) To see the influence of child health care factors such as place of delivery, delivery attendant, nature of delivery, instruments used for cutting umbilical cord, umbilical cord care and status of immunization on infant and child mortality.
(vi) To find out the weight for age of the children to see their nutritional status.

LITERATURE REVIEW

Literature review is an account of what has been published on a particular topic by accredited scholars and researchers. Literature review provides a handy guide to a particular topic. For Scholars, the deep and breadth of literature review emphasizes the creditability of the writer in his or her field. Literature reviews also provide a solid background for a research investigation. Comprehensive knowledge of the literature of the field is essential to most research studies.

The determinants of infant and child survival vary according to various bio-demographic, socio-economic and health care factors. Hence, an attempt has been made to review the literature on the bio-demographic, socio-economic, and health care determinants of child mortality and morbidity to get an overview of the existing knowledge on infant and child survival.

(i) Bio-Demographic Factors

Bio-Demographic factors such as maternal age at the time of child birth, birth order, the occurrence of multiple birth, the duration of previous birth intervals are some of the important predictors of child survival. Especially significant is the birth interval where infant is born within two years of another child, both children are at greater risk of dying (Chidambaram, et al., 1985). Evidence from around the world showed that illness and death in both the industrialized and developing countries are highest in four specific type of pregnancy: (i) Before 18 years of age; (ii) After 35 years of age; (iii) After four deliveries; and (iv) Less than two years apart (Idayatullah, 1986; Singh, et al., 1987).
The multivariate analysis of WFS data from rural Bangladesh showed that the strongest determinants of infant and child mortality in rural Bangladesh were the length of the previous birth interval and the birth order (Ahmed, 1984).

The examination of the determinants of infant and child mortality variations in Jordan, Yemen, Egypt and Tunisia using data from WFS Surveys indicated that mortality risk was higher for infants born to very young and very old mothers with short previous birth orders and where previous infants had died (Adlakha, and Suchindra, 1985).

The analysis of WFS data established a strong relationship of birth spacing to infant and child survival in developing countries. The WFS data showed that the short interval (less than 2 years) endanger the births of both the child born at the start of the interval and the child born at the end of the interval. The effect of short interval is greater in infancy. The effect of birth spacing lasts at least 5 years. Children born either at the start or at the end of a short interval are about 50 per cent likely than other children to die at ages 1-4 (Maine and Namara, 1985). It is also found that very short intervals have an adverse effect on child survival and the birth interval effects were strongest in situations where infant and child mortality were already high (Winikoff, 1987).

Children throughout the developing world are much more likely to die if they are born less than 2 years after the mothers previous birth than they are, if the birth interval is longer (Pebley and Millman, 1986, Gubhaju, 1986). Both preceding birth interval and following birth interval had substantial effect on infant mortality, but the
birth interval effects are smaller in the case of child mortality (Rutherford et al., 1989).

A study on the demographic, socioeconomic, health and nutritional correlates of infant mortality in Gujarat, India found that the lowest neonatal mortality rates occur for women aged 20 – 34, and the highest for women under age 20 or over age 35. The 2\textsuperscript{nd} birth has the lowest mortality, unless it happens to a mother under age 20. 1\textsuperscript{st} births have the highest mortality risk since these births often occur before the mother’s 20\textsuperscript{th} birthday. Higher order births also have increased mortality rates, even when the mother’s increasing age is controlled. 25 per cent of rural births and 23 per cent of urban births in India are order 5 or above. Birth spacing of less than 18 months results in an infant mortality rate greater than 200 per 1000 live births; 36 month intervals reduce infant mortality to 1/3 this level. Children spaced 30 months or more, and born to women ages 20 – 29, have the greatest chances for survival (Population Research Centre, Baroda, 1983).

A study conducted in rural Chithoor district of Andhra Pradesh found a high correlation of birth order to both infant and child mortality and number of living children to childhood mortality (Mahadevan, et al., 1985). A classic ‘U’ shaped relationship of age of mother at birth and mortality during the first year of life is evident from many studies (Ahmed, 1984; Tiwari, 1989; Gunasekaran, 1988).

The net effect of maternal age on neonatal mortality examined in a study conducted in Gujarat State of India showed that only the offspring of the youngest mothers (less than 20 years old) were exposed to high risk of death during neonatal period, while the babies born to old mothers (30 years and older) were exposed to a much higher risk of death during the post neonatal period (Gandotra, 1988). Many
studies in India showed extremes of maternal age (< 20 and > 30 years) as risk factor associated with infant mortality (Choudhery and Jayaswal, 1989; Bhandari et al., 1988; Roy, 1996).

The effect of maternal age on neonatal and post-neonatal mortality shows that the offspring of the youngest mothers (less than 20 years old) are at a high risk of death during the neonatal period, while the babies born to older mothers (30 years and older) are exposed to a much higher risk of death during the post-neonatal period. Male babies are exposed to a higher risk of death in the neonatal period but female babies are exposed to a higher risk of death in the post-neonatal period. 1st order births may not be at as high a risk of death as those which follow quickly after short intervals irrespective of their order (Gandotra and Das, 1988).

A study carried out in rural Uttar Pradesh of India found high mortality to be casually related to short birth spacing. Where mothers in spacing categories under 3 years to increase to intervals of 3 or more years, a 51 per cent reduction in infant mortality and a 42 per cent reduction of total mortality in early childhood would be realized (Srivastava, 1990).

A study on the correlation between infant mortality and socioeconomic, demographic, cultural, and community factors conducted in 11 villages in East Godavari (developed) and 21 villages in Medak (underdeveloped) districts of Andhra showed that first conception, maternal age, birth order, birth interval, age and sex of the child were important demographic determinants of infant mortality. Poor survival chances were given to births among young mothers with a first birth. Increased birth interval only in Medak contributed to lower infant mortality. A male infant death led to a shorter birth interval than a female death (Sandhya, 1991).
The risk of infant death fell as maternal age at 1st conception increased from 15 to 25 years. First birth order infants were at greater risk of infant mortality than other orders (52.15 per cent vs. 2.45-30.06 per cent), probably due to early age at 1st conception, untrained birth attendants, and improper delivery care. A higher incidence of infant mortality reported among those mothers whose succeeding birth interval or whose preceding birth interval was less than 24 or 12 months, respectively. Infant death were rare rate and almost nonexistent when the succeeding birth interval was 36 and 48 months, respectively (Dhanalakshmi, 1993).

The findings of the analysis of NFHS-1 (1992 – 93) data on the patterns and determinants of infant and child mortality (IM / CM) in India indicated that adjusted IM and CM rose with increasing birth order. Third order births had the lowest IM. Higher mortality of first births was related to mother’s young age. Maternal age at childbirth at second and higher birth orders was related to mortality in a U-shaped pattern. CM was higher among children born with a short birth interval (SBI), and children with an older sibling who died (Pandey et al., 1998).

Children born to mothers’ having experience of earlier child deaths faced 41 percent more risk than that of mothers’ who did not have such experience. Similarly, the birth with a short preceding birth interval (≤18 months) faced more than twice the risk of neonatal deaths than that of births with longer duration (> 18 months) (Patel, 2000).

The comparison of the determinants of infant and child mortality in Tamil Nadu and Uttar Pradesh, revealed young – age deaths are influenced by the
background characteristics of socioeconomic and demographic variables it is also noted that birth intervals and child deaths are negatively related (Srinivasan, 2000).

The greatest risks of an infant following a short birth interval are among those whose previous sibling died, high parities, those with young mothers, and those whose previous sibling was breastfed for a short duration (Whitworth and Stephenson, 2002).

A number of studies have suggested that the environmental factors play crucial role in determining the levels of mortality during early childhood which, beside infant mortality, also reflect of the general health conditions in a population. Incidentally, in comparison to the later ages, the gaps between levels of mortality during infancy and early childhood are widest in developed and developing nations (Lahiri and Ram, 2004).

In North east India, Baruah (1982) undertook a study on bio-demographic factors associated with offspring mortality among the Hajongs of Meghalaya and found that multiple births are associated with higher death risk among the offspring. His study indicates that offspring mortality generally decreases with increasing birth order.

Buzarbaruah and Phookan (1986) in their study among the Mishing of Disangmukh of Sibasagar, Assam, showed that pregnancy wastage is high among the younger and the older mothers, while it is found to be low among the middle aged mother. On the other hand, wastage is high in the higher birth order than in the lower birth order.

A multivariate hazard models analysis of 1988–89 retrospective survey from 39 villages selected randomly in the Karimganj district of Southern Assam
representing 1805 scheduled caste households revealed that babies born between 15 and 27 months and > or + 27 months from the preceding birth were 25 per cent and 72 per cent, respectively, less likely to die in the first 24 months. Children born to a mother younger than 25 years were more likely to die early compared to mothers 25 – 35 years or older . The risk of death increased by 1.085 times for every increase in party of children. The relative risk of death of a male child compared to a female child was 0.4 (Nath et al., 1994).

Pathak, (2006) studied the data of NFHS-1 and NFHS-2 of Assam and summarized that in women of age below 20 years and above 30 years the neonatal mortality rate have been found higher while the mothers in between 20-29 years, the neonatal mortality is found to be low. Neonatal mortality in the 1st birth order have been found higher while in the 2nd order it has been found lower.

The results of the review indicated that demographic factors such as age at birth, parity, and birth interval are having significant relationship with infant and child mortality.

(ii) Socio-Economic Factors

Most of the scholars are of the opinion that an inverse relation exists between education (specially maternal education) and mortality. Bhende and Kanitkar (1988), note that the educational attainment of parents especially that of mothers has a significant relationship with the levels of infant mortality. The education of mother has strong bearing on infant mortality (Khan et al. 1986). One of the important social factors that has been observed to be consistent in explaining the child mortality differential is the mother’s educational level; the higher the level of mother’s educational attainment, the lower is the risk of dying for her children (Rahman et al. 1986).
Maternal education has frequently been stressed as an important determinant of child survival in developing countries (Caldwell 1979, Cochrane 1980).

A generalized linear model is used to associate five socio-economic variables (mothers education, work status, husband's occupation, husband's education and residence) with the neonatal, post-neonatal and child (1 – 4 years) mortality rates found that the mother's education and place of residence were highly associated with the three mortality rates. The father’s occupation and education were associated with both neonatal and post-neonatal mortality (Hobcraft et al., 1984).

The demographic and family health survey of Ecuador in 1987 indicated a strong correlation between female education and infant and child mortality. Children born to mothers without any schooling have a higher probability of dying before the age of 1 year and five times greater before reaching the age of 1 – 4 years in comparison to those women with high school education. Literacy especially maternal education is observed to have consistent and significant relationship with infant and child mortality which are independent of culture or level of economic development (Grosse and Auffrey, 1989).

The logistic regression analysis of Egyptian Fertility Survey showed that household income had no effect on survival of infants, but pronounced effects of survival in childhood. The impact of income on childhood mortality persisted when other variables (sanitation, water sources and material demographic factors) were controlled. The impact was somewhat greater for educated mothers and for fathers of higher socio-economic status and homes with pipe water (Casterline et al., 1989).

An examination of the intervention mechanisms which parental education influences health and survival of children in developing countries found a remarkable
sensitivity of childhood survival to the length of formal schooling of the mother. Even after adjustment for economic factors, 1 – 3 years of schooling was associated with a fall of 20 per cent in childhood risk of death and further large decreases were recorded with successive increments in educational attainment. This strong relationship was found in all major regions of the developing world and persists both in countries with accessible and effective health services and in those with weak primary health care system (Cleland and Ginneken, 1989).

Another study showed that the per capita income did not have a consistent correlation with infant mortality rate in Indonesia. But mother’s educational status emerged as one of the strongest determinant of infant and child mortality. Mother’s standard of living did not make much influence on infant and child mortality (Utomo and Iskandar, 1989).

Many studies had indicated a strong inverse relationship between mother’s education and child mortality (Behm and Hugo, 1979; Caldwell, 1979; Caldwell and McDonald, 1981; Kathryn and Amin, 1992).

Using data collected through follow-up home visit to a sample of mothers, whose singleton were born at the Dufferin Hospital, Lucknow, during September 1976 – August 1977, estimates are made of infant mortality in Lucknow city, and its differentials by socio-economic, demographic and health care characteristics of the infants and their families. Among socioeconomic factors considered, infant mortality is found to be inversely related with caste status among Hindus, education of mother, father’s monthly income, and father’s occupation (Srivastava and Saksena, 1981).

A study on the demographic, socio-economic, and health and nutritional correlates of infant mortality in Gujarat, India found that the mother’s education
affects infant mortality more than any other socio-economic variable. Illiterate mothers experience an infant mortality rate 3 or 4 times greater than more educated mothers and also have a larger infant death concentration during the post-neonatal period. Other socio-economic factors such as household income and householder occupation influence infant deaths. This study shows a 0.25 per child infant death rate difference between upper and lower socioeconomic classes (Population Research Centre, Baroda, 1983).

Child mortality rates in Madhya Pradesh were higher for children of manually employed mothers when compared with children of non-manually employed mothers (Registrar General of India, 1987b). It is also observed that mothers engaged in traditional sector jobs had a lower infant and child mortality rates than those engaged in farming or modern sector jobs (Bailey, 1989). The infant mortality rate was also observed to be higher among working women (Singh, 1989). In another study, it has been demonstrated that greater female autonomy had lowered child mortality in South Indian than in the North (Dyson and Moore, 1983).

Khan (1988) found in his studies in Uttar Pradesh that the material used in the roof and the floor of the home shows a sustainable effect on infant mortality. Infant mortality was the lowest among the families who live in houses with a concrete roof and it was the highest in those families who live in mud houses with thatched roofs.

Mukhopadhyay (1989) studied the differentials of infant mortality in rural West Bengal and found that in order to raise the standard of life of people at large in terms of higher expectation of life at birth, lower infant mortality etc. and different emphasis should be put on the enhancement of socio-cultural factors of life of the people.
The influence of maternal education, sex of the children and birth order interacted in a complex manner. 2nd and higher order daughters have a higher mortality rate relative to 1st daughters and sons. Children of educated mothers had a lower risk of dying even though the population's level was low. Even among educated mothers, daughters of 2nd or higher birth order had abnormally high mortality in the 1st month of life. This is theorized to reflect the fact that resource allocation is devoted to 1st order sons and daughters. Four factors determined the health of the children: (i) the resources like money, time and skills available to the family, (ii) the disease environment in which the child lives, (iii) the child's genetic endowment, (iv) the allocation decisions made by the family regarding distribution of available resources (Amin, 1990).

A study on the correlation between infant mortality in India and socio-economic, demographic, cultural and community factors conducted in 11 villages in East Godavari (developed) and 21 villages in Medak (underdeveloped) districts of Andhra showed that infant mortality did not differ by caste, family type (nuclear or non nuclear), or maternal educational level. Infant mortality declined with an increase in socio-economic status (SES) of nuclear and non nuclear families. Infant mortality was higher among lower status nonnuclear families compared to higher status nonnuclear families. 21 per cent of the variation in East Godavari was explained by proportion of literates, labourers, and scheduled castes. Infant mortality was higher among those who lived in huts than who lived in "kutch and pucca" housing (Sandhya, 1991).

An impact evaluation study conducted in Panchmahals district of Gujarat State, western India, revealed that more children died when their birth interval was
less than 24 months, particularly those under 3 years old. Deaths were higher among children with poor nutritional status especially among females. A significantly higher number of deaths occurred in females over 36 months of age who had poor nutritional status (Gujral et al., 1992).

Excess female child mortality prevailing in certain parts of India has an inverse relationship with length of mothers' education and female labor force participation. Female labor force participation has a stronger influence on excess female child mortality than on absolute child mortality (Tulasidhar, 1993).

Jain (1985) identified six proximate determinants: prenatal medical care, postnatal preventive nonmedical care, medical care at birth, postnatal nonmedical care, postnatal preventive medical care, and postnatal curative child care. Other key factors identified are conception variables, prenatal variables, delivery variables, and postnatal variables. The interaction and impact of these factors is best analyzed in a micro context. Low age at marriage is a cultural factor which places the infant at greater risk. Marriage age is low due to conformity with tradition, to the need to assure the chastity of daughters, and to reduce financial liabilities. Other factor influencing infant mortality are the subordinate status of women, childbearing practices, and breast feeding and weaning practices (Khan, 1993).

A study carried out in Punjab, Ludhiana district showed that the factors significantly associated child survival were women's autonomy, social class and mother's education (Dasgupta, 1990). The comparison of child loss experiences by rural women in four states (Kerala, Punjab, Maharastra and Orissa) of India showed that percentage of women experiencing child loss declined consistently with the increase in the level of education of women in all the four states. Standard of living
also made a difference, but the decline in the per cent of women experiencing child loss according to standard of living was less apparent (Roy and Jayachandran, 1996).

The survival through infancy is dependent on the socioeconomic level of the household, as well as on availability of health facility and certain proximate variables like maternal condition, antenatal and natal care, infant feeding practices, malnutrition and environmental sanitation. Multivariate analysis has revealed the equally important role of development and program factors in the reduction of infant mortality. Finally, the direct, indirect and the total effect of various independent variables on the dependent variable through path analysis were identified. These findings suggest that it is the effective utilization of the available public health services that has resulted in reducing infant mortality in the country (Das, 1996).

Rao et al., (1997) showed that children from better socioeconomic backgrounds had significantly lower risks of mortality. Children with a medium SLI had about 40 per cent lower risk of dying than children from low SLI households. The risk of dying was significantly related to presence of a toilet. Religious affiliation did not affect survival chances. Higher maternal education was related to improved child survival. Risk of dying among children of illiterate women was reduced by 65 per cent by increases in maternal education to the primary level.

A study on the influence of mother’s employment on child survival in India indicates that infant mortality did not vary by mother’s employment and had a negative impact on infant survival (Kishor and Parasuraman, 1998).

An immediate reduction in childhood mortality is feasible by enhancing accessibility to maternal and child health services and safe drinking water (Rajana et al., 1998).
Female literacy, marriage age, percentage of electrified households, and health personnel were highly, negatively correlated with child mortality. Access to safe drinking water, normal rainfall, proportion urban, and sex ratio were negatively, weakly correlated. Child mortality was negatively associated with population density and positively associated with the proportion of scheduled tribes / castes. Over 73 per cent of variation in child mortality was explained by socioeconomic, regional dummies, and interaction effects. Female education had the strongest impact on declines in child mortality. An increase to 100 per cent female literacy would halve child mortality (Deshpande, 1998).

The analysis of Gujarat NFHS (1992 – 93) data demonstrated that children born to medium and high SLI group mothers faced 47% and 61% less risk of infant deaths as compared to that of low SLI group mothers (> 18 months) (Patel, 2000).

The comparison of the determinants of infant and child mortality in Tamil Nadu and Uttar Pradesh revealed that young-age deaths are influenced by the background characteristics of socioeconomic and demographic variables. In comparing both states, results show that mother’s education is an independent determinant in influencing child survival status, more so in Uttar Pradesh than in Tamil Nadu (Srinivasan, 2000).

The strongest predictors of mortality were demographic and biological factors, breast – feeding behavior, and use and knowledge of health services. Variable such as the presence of a mother – in – low in the household, did not have a significant direct effect on child survival at the individual level, and their indirect effects were very limited (Griffiths et al., 2001).
An analysis of the National Family Health Survey - 2 data on women’s empowerment and its relevance to fertility and child mortality in Gujarat state revealed that educated women are more likely to have decision making power, freedom of mobility, and access to resources in order, thus enabling them to act upon the aspects that may affect their own health as well as of their children, thereby leading to increased contraceptive use and reduced child mortality (Dey and Bhavsar, 2002).

Das and Das, in 1985 conducted a study on child mortality among rural Assamese. They found that the infant mortality rate among the rural Assamese of the Brahmapurtra Valley of Assam was low in comparison to the Hindu and Muslim.

A study on family type, fertility and mortality among the Ahoms of Assam shows that the nuclear family had a higher total fertility rate as well as foetal wastages as compared to the joint family among the Ahoms of Upper Assam. (Sengupta and Chakravarty, 1995)

A comparative analysis of the prenatal and postnatal mortality among the War Khasi of Meghalaya reported that the infant and juvenile mortality rates were quite moderate, as compared to other populations in the Northeast India. Religion seemed to have played its role in regulating the prenatal and postnatal mortality rates among the War Khasi of Meghalaya. (Khogsdier, 1995)

A study on infant and early childhood mortality among the Khasis of Shillong reported that infant mortality rate is high to the mothers who married between 13 to 17 years of age, illiterate mothers, mothers belonging to family having 10 or more members and the mothers who were attended during delivery by neighbours or
relatives. This study further estimated infant and early childhood mortality of the population and found that greater percentage of infant and early childhood mortality among the mothers were with no lactation, mothers without immunization and medical check-up before delivery and mothers who used water without boil at household level (Adak, 1996).

The findings of the National Family Health survey (NFHS-II) (IIPS, 2000) have reported that education of the mothers is inversely related to fertility and mortality rates in some Northeastern states like Mizoram, Arunachal Pradesh and Tripura though it is not clearly perceptible in the states of Meghalaya and Nagaland.

In an another study carried out among the Bihari Harisjan of Guwahati, Assam found that diarrhoea is the main killer disease among the children. Poor environmental sanitation, lack of sense of personal hygiene, lack of seriousness of the mothers towards the child care may be attributed as the cause of diarrhoea among the children (Das and Majumder, 2003).

Based on the Indian National Family Health Survey data, an analysis was carried-out to examine the relevance of socio-cultural and environmental factors in explaining child mortality in Northeast India, considered to be the most inaccessible region in the country. The results indicate lack of hygiene in the household and poor women’s engagement in physically demanding agriculture based work contributes to higher risk of child mortality. Unlike in other parts of India, female children have an edge over boys in childhood survival and living with paternal grandmother tends to lower the risk of child death in the first five years of life. Community education is found as the dominant factor outside the household to have a significant effect on child mortality (Ladusingh and Singh, 2006).
The findings of the review indicated that the socio-economic factors, particularly education of mother is significantly influencing infant and child mortality.

(iii) Health Care Factors

Maternal care services, such as Tetanus Toxoid immunization, iron and folic acid tablets, attendance for a checkup during pregnancy, delivery assistance by trained health personnel during pregnancy and institutional deliveries play a vital role in improving the survival status of children. In developing countries, child survival is affected by prenatal care, prenatal management, maternal age, maternal nutrition, the process of child birth, treatment of obstetric emergencies and treatment of birth injuries (Rajaram, 1990). The importance of maternal health services in reducing infant morbidity and mortality has received significant recognition in the past decade (Ebrahim, 1982).

A Study in Sri Lanka found that the decline in the neonatal mortality rate in the non - estate sector of Sri Lanka was due to the factors such as proportion of mothers receiving antenatal care and the proportion having institutionalized births (Meegama, 1980).

An examination of the differences between death rates among infants whose births were attended by trained personnel e.g. doctors, lady health visitors (LHVs), auxiliary nurse – midwives (ANMs), trained dais or traditional birth attendants and untrained personnel showed that mortality rates are somewhat higher among infants whose births were attended by untrained personnel; but the differences are not statistically significant. (Reddy and Sholapurkar, 1983).
Percentage of births attended by trained medical personnel and poverty were the two important determinants of neo-natal mortality. Availability of medical facilities and the extent of vaccination coverage were the two important determinants of post-neonatal mortality. An examination of the difference between the death rates among infants whose birth were attended to by trained personnel (including Doctors, LHV's, ANMs and Trained Dais) and untrained personnel revealed that mortality rates were comparatively higher among infants whose birth were attended by untrained personnel (Jain, 1985). Similar findings were observed in a number of other studies carried out in India (Khan, 1988; Badari et al., 1991).

A study conducted in five primary health centers (PHCs) in Bangalore Division of Karnataka State in India between August 1977 – November 1977 to determine the infant mortality rate (IMR), its components and correlates found that untrained traditional birth attendants delivered 69 per cent live births. IMR for these infants was considerably higher than for trained attendants. For women delivered at home the IMR was much higher for home birth than institution births. (Badari et al., 1991).

In a number of studies under utilization of maternal health services has been identified as an important factor in maternal and infant mortality (Bhandari et al., 1989; Paul, 1991).

In a study conducted in a rural area of Varanasi revealed that vitamin A supplementation protects against overall mortality children and in particular death due to gastroenteritis (Agarwal et al., 1995).

A comparative analysis of child loss experiences of women from four States of India (Kerala, Punjab, Maharastra and Orissa) according to their level of utilization of
maternal care services found that the survival chances of births which were delivered with the assistance of relatives or friends were significantly less than those which were delivered with the assistance of health professional. Similarly, births to mother who took antenatal care during pregnancy had a significantly higher chance of survival compared to those where the mother did not receive the antenatal care. In Punjab, none of the maternal care factors seemed to have any influence on the survival chance of infants. In Maharastra, the survival chances of infants were lower among births attended by trained health personnel. In case of place of delivery, births which occurred in institutions had higher chance of dying during infancy. The deliveries conducted with the assistance of relatives and friends and the practice of not taking antenatal care during pregnancy significantly decreased the chances of survival of infants in Orissa. It was also observed that births, where the mothers did not receive any antenatal care during pregnancy, but the delivery took place in an institution, had higher chance of dying during infancy (Roy and Jeyachandran, 1996).

A comparative study of infant mortality between two development block in Tamil Nadu, found that the infant mortality rate was lower in both the blocks among the children of mothers who have received antenatal checkups (from any agency). TT immunization, children born in institutions and children whose births were attended by ANMs (Rajaratinam, 1989). Another study carried out in Madurai district of Tamil Nadu revealed that immunization (TT) during pregnancy significantly affects neonatal mortality (Gunasekaran, 1988).
The comparison of the determinants of infant and child mortality in Tamil Nadu and Uttar Pradesh, revealed antenatal care and immunization is highly significant among the two states (Srinivasan, 2000).

Since 1985, when the Universal Immunization Programme of India introduced, there has been a proportionate decline in child (Kabir and Long, 2002).

Immunization of children against six vaccine preventable diseases (tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, and measles) in the first year of life is observed to have significant effect in reducing infant mortality in Ballabgar - an area in rural Northern India. (Zubair et al., 2003).

Pathak, (2006) studied the data of NFHS-1 and NFHS-2 of Assam and found medical care is an important factor of determining the neonatal mortality rate. In Assam neonatal mortality rate without medical care (NFHS-1) has been found highest (63.4) but comes down to 44.0 in NFHS-2.

The results of the review clearly indicate the influence of maternal care such as antenatal checkup, T.T immunization and place of delivery on infant and child mortality.

Till date various studies have been conducted in different parts of the world to know the patterns of infant and child morbidity. Generally, the morbidity studies are described disease wise.

Gour (1961) observed 103 cases of infantile diarrhea during a period of three and a half years and found that the incidence of disease is equal in both the breast fed and artificially fed infants. Other factors that caused diarrhoea were found to be overcrowded localities, poor socio-economic status and other environmental factors.
Mc Dermott in 1966 said that pneumonia and diarrhoea caused half of the total infant
deaths in New York city.

In Addis Ababa, the prevalence of diarrhoea was found in vary according to
housing conditions and parental education (Freij and Wall, 1979). Saran(1979)
reported that the prevalence of diarrhoea in slum areas of Varanasi was significantly
associated with all the epidemiological factors like socio-economic status, presence of
domestic animals in the house, defecation habits of children, washing of hands by the
mothers before attending the children, sources of water supply and water source.
From the study of Sinha et. al., (1979) at Allahahad, it was revealed that the main
causes of morbidity were diarrhoea, cough and cold, skin infections, fever
undiagnosed and bronchitis. The morbidity rate in terms of diarrhoeal episodes
increased with the lower social class.

World Health Organization suggests that children of developing countries
have three-quarters of a billion episodes of diarrhoea each year, causing five million
deaths yearly (Smyder and Merson 1982). Children from low socio-economic
households in Bangladesh found to have higher incident and longer duration of
diarrhoea of several types of origin. These differentials in rates of disease by socio-
economic variable may be due to differences in child care practices such as pre
partition of weaning foods, boiling of drinking water, or personal hygiene (Black et
al., 1983)

Morbidity pattern for a reference period of six months in Tamil Nadu showed
high incidence of sub acute infections, of upper respiratory tract and gastro-enteritis
(Srinivasan et al., 1975). Singh’s study (1979) showed maximum number of children
suffered from either gastro-intestinal tract disease or respiratory diseases. The acute respiratory infection (ARI) morbidity rates are generally lower in Indian children as compared to the children from developed countries (Bulla and Hitze 1978).

Reports from rural Haryana and semi urban areas of Vellore showed a distinctly higher acute respiratory infection (ARI) morbidity belonging to the ages of 1-2 years and from lower socioeconomic strata (Gardner et al., 1984). The presence of asthma in children was found to be associated with parental age, occupation, housing type and overcrowding (Kaplan and Taylor, 1985).

Gordon et al., (1963) listed out, immaturity, birth injury, congenital anomalies, asphyxia, and tetanus neonatorum are the causes of infant morbidity for less developed countries.

In Jaipur the episodes of sickness of children belonging to 0-5 years was higher in low socio-economic groups and for those living in poor housing conditions compared to slightly higher socio-economic groups and to those living in good housing conditions (Sharma et al., 1979).

Inadequate knowledge on proper hygiene and sanitation make both mother and child extremely vulnerable to infection (Bhatia 1981).

To protect children against certain deadly diseases of infancy and early childhood, the child immunization programme has been made an important component of maternal and child health care services in India. A report from Uttar Pradesh showed, consistent increase in the percentage of unprotected children with the increase in the distance from hospital. The polio vaccine coverage declined with an increase in the distance of the respondent’s residence from the PHC. However,
there was no consistent decline by distance in the coverage of the BCG vaccine, while DPT had the highest coverage in the farthest villages (Srivastava, 1988).

The association of environmental influence on the attainment of height and weight have been well documented from the studies of Bakwin and Mc Laughlin, (1964) Jhon Achyama (1965), Adhya and Mukharji (1973). Results of an anthropometric survey conducted by Osuhor and Etta (1980) on 399 Nigerian children aged less than five years revealed that the commonest health problems were respiratory diseases, malnutrition and gastro-enteritis.

Weight and length data were analysed by Cherian et al., (1983), to determine the prevalence of different degrees of nutritional deficit at different ages. From their investigation 89 per cent of the children were found as significantly under weight-for-age. Birth-weight for gestation, birth practices, maternal and child nutrition and levels of immunization are the important determinants of infant/child morbidity and mortality in developing countries (Venkatacharya, 1985).

MATERIAL AND METHODS

The materials of the present study were collected during September 2011 to September 2012. The present investigator has completed this work in different phases, such as pre field work, field work and post-field work. Before going to the field, extensive library work was done for preparation of necessary schedule and to have a clear idea about the work and the people.

For the purpose of collecting data on demography, preliminary census survey schedule was used. Detailed information were collected by using this schedule. Information regarding the name of informant as well as other members of the family,
their age, sex, relation to the head of the family, education, occupation, marital status, type of family, size of family, religion, sanitary facilities, house type and sources of drinking water were collected.

Another schedule was specially designed for collecting data on mortality and morbidity. Altogether 285 Bodo couples and 250 Rabha couples were interviewed for the collection of data on infant and child mortality and morbidity. For the information of child mortality and morbidity, the mothers were mainly interviewed but fathers and other members were also interviewed wherever necessary.

The schedule for child mortality and morbidity includes the questions like name and age of the mothers, age at marriage, age at first child birth, total number of conception including total number of live birth and pregnancy wastage, age, sex of the dead children, causes of death, place of delivery, attendant at the time of delivery, nature of delivery and immunization of the children. For morbidity, patterns of morbidity and nature of treatment were specially asked.

Weight for age of the children in the three age groups i.e. <1 year, 1-4 years and 5-14 years were taken for assessing the nutritional status. The girls and boys were considered separately. The formula and classification of WHO were followed (Nelson's textbook on pediatrics).

Interview with structured schedules was the prime method of data collection. The observation method was also applied whenever necessary. Parents specially mothers were the main informants. Doctors, nurses and other staff of the hospital were also contacted whenever necessary.
For the present study, data have been collected from ten villages viz. Amjuli, Christainpara, Mantikiri, Kathalguri, Phutkibari, Kuwabil, Baniapara, Sastrapara, Batabari and Belguri under Udalguri PHC, Udalguri district. First five consecutive villages are inhabited by the Bodos and the remaining five villages are inhabited by the Rabhas. 264 Bodo families and 226 Rabha families having the children of 0-14 years age group are considered for the present purposes. The children are grouped into three different age group like infant (<1 year), pre school(1-4 years) and school going (5-14 years). The total number of studied children of the Bodos and the Rabhas are 569 and 562 respectively.

**STUDY AREA**

**Assam**

Assam is situated in the North-East region of India-bordering seven States viz. Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and West Bengal and two countries viz. Bangladesh and Bhutan. With a geographical area of 78,438 sq. kms. i.e, about 2.4 percent of the country’s total geographical area, Assam provides shelter to 2.57 percent population of the Country. Most of the State’s population lives in the lush and verdant valleys of its two major river systems in the twenty four districts of the Brahmaputra valley and the three districts of the Barak valley. The less densely populated two hill districts - Karbi-Anglong and Dima Hasao, separated the two valleys. For administrative and revenue purposes, the State has 27 districts including Kamrup (Metro) district and four districts under the Bodoland Territorial Council (BTC) areas viz. Kokrajhar, Baska, Chirang and Udalguri.
### Table I.1: Assam at a glance

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Geographical area (in sq. km)</td>
<td>78438</td>
</tr>
<tr>
<td>B</td>
<td>Administrative Units</td>
<td></td>
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<td></td>
<td>(a) District</td>
<td>27</td>
</tr>
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<td></td>
<td>(b) Sub Division</td>
<td>56</td>
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<tr>
<td></td>
<td>(c) Revenue Circle</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>(d) Block</td>
<td>219</td>
</tr>
<tr>
<td></td>
<td>(e) Villages</td>
<td>2202</td>
</tr>
<tr>
<td></td>
<td>(f) Towns</td>
<td>214</td>
</tr>
<tr>
<td>C</td>
<td>Population</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Total Population</td>
<td>31169272</td>
</tr>
<tr>
<td></td>
<td>(b) Sex Ratio (Female per thousand male)</td>
<td>954</td>
</tr>
<tr>
<td></td>
<td>(c) Population Density (Per Sq. Km.)</td>
<td>397</td>
</tr>
<tr>
<td></td>
<td>(d) Proportion of total child population (0-6 yrs)</td>
<td>14.47</td>
</tr>
<tr>
<td></td>
<td>(i) Male</td>
<td>14.45</td>
</tr>
<tr>
<td></td>
<td>(ii) Female</td>
<td>14.5</td>
</tr>
<tr>
<td></td>
<td>(d) Total Literacy Rate</td>
<td>73.18</td>
</tr>
<tr>
<td></td>
<td>(i) Male Literacy Rate</td>
<td>78.81</td>
</tr>
<tr>
<td></td>
<td>(ii) Female Literacy Rate</td>
<td>67.27</td>
</tr>
<tr>
<td>D</td>
<td>Health</td>
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<td></td>
<td>(a) Medical College</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(b) Government Hospital</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>(c) Primary Health Centres</td>
<td>844</td>
</tr>
<tr>
<td></td>
<td>(d) Dispensaries</td>
<td>261</td>
</tr>
<tr>
<td></td>
<td>(e) Sub Centres</td>
<td>4592</td>
</tr>
</tbody>
</table>

Source: Census of India, 2011

As per 2011 census, total population of Assam was 31,169,272. The total population of the state has increased from 26,638,407 to 31,169,272 in the last ten
years with a growth rate of 16.93%. Of the 27 districts of Assam, eight districts registered rise in the decadal population growth rate. Interestingly, religious minority-dominated districts like Dhubri, Goalpara, Barpeta, Morigaon, Nagaon, Hailakandi etc. recorded growth rates ranging from 20 per cent to 24 per cent during the last decade. On the other hand, eastern Assam districts like Sivasagar, Jorhat etc. registered around 9 per cent population growth, and for the record, these districts do not share any international border. The literacy rate in the state was recorded as 73.18%. Male literacy rate was 78.81% and female literacy rate was 67.27%. In 2001, the census had recorded literacy in Assam at 63.3% with male literacy at 71.3% and female at 54.6%. Urbanisation rate was recorded at 12.9%.

Growth of population in Assam has experienced a very high trajectory since the mid-decades of the 20th century. Population grew steadily from 3.29 million in 1901 to 6.70 million in 1941, while it has increased unprecedentedly to 14.63 million in 1971 and 22.41 million in 1991 to reach the present level. The growth in the western and southern districts was extremely high primarily due to the rapid influx of people from East Pakistan, now Bangladesh. An estimated 400,000 people have been displaced in the recent ethnic violence between indigenous Bodos and Bengali-Muslims.

Rice is the main food crop. Assam produces over half of India's tea and about 60% of world tea production. Jute, Oil, Seeds, Sugarcane are also grown in this region. Oil is known as the "Liquid gold" so Assam. Oil and petroleum field in Assam are concentrated several places of Dibrugarh, Sivasagar and Jorhat district.

Assamese is the principal language of the state and is regarded as the lingua franca of the whole north-east India. The Assamese language is the easternmost
member of the Indo-European family. The earliest settlers were Austroasiatic, followed by Tibeto-Burman, Indo-Aryan speakers, and Tai–Kadai speakers.

Table 1.2: Birth rate, death rate and infant mortality rate in Assam

<table>
<thead>
<tr>
<th>Year</th>
<th>Birth Rate</th>
<th></th>
<th></th>
<th>Death Rate</th>
<th></th>
<th></th>
<th>Infant Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
<td>Urban</td>
<td>Total</td>
<td>Rural</td>
<td>Urban</td>
<td>Total</td>
<td>Rural</td>
</tr>
<tr>
<td>2005</td>
<td>26.6</td>
<td>15.3</td>
<td>25.0</td>
<td>9.2</td>
<td>5.6</td>
<td>8.7</td>
<td>71</td>
</tr>
<tr>
<td>2006</td>
<td>30.7</td>
<td>23.0</td>
<td>24.6</td>
<td>9.2</td>
<td>5.8</td>
<td>8.7</td>
<td>70</td>
</tr>
<tr>
<td>2007</td>
<td>25.7</td>
<td>15.5</td>
<td>24.3</td>
<td>9.1</td>
<td>5.7</td>
<td>8.6</td>
<td>68</td>
</tr>
<tr>
<td>2008</td>
<td>25.3</td>
<td>15.7</td>
<td>23.9</td>
<td>9.0</td>
<td>5.6</td>
<td>8.6</td>
<td>66</td>
</tr>
<tr>
<td>2009</td>
<td>24.9</td>
<td>15.9</td>
<td>23.6</td>
<td>8.8</td>
<td>5.9</td>
<td>8.4</td>
<td>64</td>
</tr>
<tr>
<td>2010</td>
<td>24.4</td>
<td>15.8</td>
<td>23.2</td>
<td>8.6</td>
<td>5.8</td>
<td>8.2</td>
<td>60</td>
</tr>
</tbody>
</table>

Source: Sample Registration Bulletin System Statistical Reports, RGI, Govt. of India

The state has the largest number of tribes with their variety in tradition, culture, dresses and exotic way of life. Most of the tribes have their own languages. There are 23 notified Scheduled Tribes (ST) in Assam with the Bodos (40.9 per cent) making half of the total ST population (around 13 per cent) of the state. The other STs (both plains and hills) include Mising, Karbi, Rabha, Kachari, Tiwa, Barman in Cachar, Boro kachari, Deori, Hajong, Mech, Dimasa, Hajong, Singhphho, Khampti, Garo, Biate, Khasi, Jaintia, Synteng, Pnar, War, Bhoi, Lyngngam, Kuki, Chakma and Hmar.

The state has five Medical colleges namely Guwahati Medical College in Kamrup (M) district, Assam Medical College in Dibrugarh district, Silchar Medical College in Cachar district, Jorhat Medical College, Jorhat district and Fakhruddin Ali
Ahmed Medical College in Barpeta district and one state hospital namely Mohendra Mohan Choudhury hospital in Guwahati. It has three Tuberculosis Hospitals and three clinics with a total of 656 beds. There are 844 Primary Health Centre and 4592 sub Centre all over the Assam. For 87 percent of the rural population in Assam, the Sub-Centres and the Primary Health care centres are the principal sources of providing health care facilities and also of service to the needy and vulnerable groups.

Though crude birth rate, crude death rate and infant mortality rates have shown a secular declining trend since 1981 which is a positive development, it has been found to be higher for the state than that of the country as a whole. During the year 2010, the CBR, CDR and IMR were found to be 23.2, 8.2 and 58 respectively.

**Udalguri District**

Udalguri district is one of the twenty-seven (27) districts of Assam and Udalguri town is the headquarters of the district. Udalguri was a Civil Sub-Division under the erstwhile Darrang district prior to the formation of Bodoland Territorial Council (BTC). But after the signing of the Triparties peace agreement on 10th February, 2003 through a Memorandum of Settlement the Bodo Liberation Tigers, Government of India and the Government of Assam, The BTC came into being in the wake of amendment of the Sixth Schedule of the Constitution of India. As a part of the settlement, an Autonomous Council called Bodoland Territorial Autonomous District (BTAD) was created and Udalguri is now one of the four districts under BTAD. It was formally inaugurated as a district on June 14, 2004.

This district is bounded by Bhutan and Arunachal Pradesh in the north, Sonitpur district in the east, Darrang district in the south and Baksa district in the west. The district of Udalguri lies between 26°46' and 26°77' North Latitude
and 92°08' and 95°15' East Longitude at an altitude of about 345' above the mean sea level (MSL).

The name of the district is derived from its headquarter, Udalguri. There are three traditions regarding the etymology of Udalguri. According to one tradition, the name is derived from *Odal* (a tree) and *Guri* (roots or surrounding) and it was named because originally the town developed around an *Odal* tree. According to another tradition, this town derived its name because this place was originally a hermitage of sage named Uddalaka. According to the third tradition, the name is derived from two Bodo words *Ordla* (wide and spacious) and *Gundri* (powdered object).

The district has two sub-divisions: Udalguri and Bhergaon. These two sub-divisions are further divided into 9 revenue circles: Udalguri, Majbat, Harisinga, Kalaigaon, Khoirabari, Dalgaon, Patherighat, Mangaldai and Dhekiajuli. Three Vidhan Sabha constituencies of this district are Panery, Majbat and Udalguri. All of these are part of Mangaldoi Lok Sabha constituency.

Apart from these three Legislative Assembly constituencies, majority of the villages are under the Kalaigaon Legislative Assembly Constituency and a few villages fall under the Borsola Legislative Assembly Constituency in Udalguri District. While Kalaigaon LAC is a part of Mangaldai Lok Sabha Constituency and Borsola LAC is a part of Tezpur Lok Sabha Constituency.

Total geographical area of the district is about 1,852.16sq. km. According to the Census of India 2011, the total population of the district is 832,769 accounting for 2.67% of the total population of Assam. The density of the district is 497 people per sq. km. Sex ratio of the district is 966 which is higher as compared to the state average i.e 954. The literacy rate of Udalguri district as per Census 2011 is 66.60
Table 1.3: Udalguri district at a glance

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Area</td>
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</tr>
<tr>
<td>(a)</td>
<td>Geographical area (in Sq. Km)</td>
<td>1,852.16</td>
</tr>
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<td>B</td>
<td>Administrative Units</td>
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</tr>
<tr>
<td>(a)</td>
<td>District Head Quarter</td>
<td>Udalguri</td>
</tr>
<tr>
<td>(b)</td>
<td>Sub Division</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>(c)</td>
<td>Revenue Circle</td>
<td>9 Nos.</td>
</tr>
<tr>
<td>(d)</td>
<td>Block</td>
<td>11 Nos.</td>
</tr>
<tr>
<td>(e)</td>
<td>Villages</td>
<td>802 Nos.</td>
</tr>
<tr>
<td>(f)</td>
<td>Towns</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>C</td>
<td>Population</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Total Population</td>
<td>832,769</td>
</tr>
<tr>
<td>(b)</td>
<td>Sex Ratio (Female per thousand male)</td>
<td>966</td>
</tr>
<tr>
<td>(c)</td>
<td>Population Density (Per Sq. Km)</td>
<td>497</td>
</tr>
<tr>
<td>(d)</td>
<td>Proportion of total child population (0-6 yrs)</td>
<td>13.12</td>
</tr>
<tr>
<td>(i)</td>
<td>Male</td>
<td>13.13</td>
</tr>
<tr>
<td>(ii)</td>
<td>Female</td>
<td>13.11</td>
</tr>
<tr>
<td>(d)</td>
<td>Total Literacy Rate</td>
<td>66.60%</td>
</tr>
<tr>
<td>(i)</td>
<td>Male Literacy Rate</td>
<td>73.79%</td>
</tr>
<tr>
<td>(ii)</td>
<td>Female Literacy Rate</td>
<td>59.17%</td>
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<td>D</td>
<td>Health</td>
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<tr>
<td>(a)</td>
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<td>Government Hospital</td>
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<td>(c)</td>
<td>Primary Health Centres</td>
<td>3</td>
</tr>
<tr>
<td>(d)</td>
<td>Dispensaries</td>
<td>9</td>
</tr>
<tr>
<td>(e)</td>
<td>Sub Centres</td>
<td>113</td>
</tr>
</tbody>
</table>

Source: Census of India, 2011

percent with 73.79 percent for males and 59.17 percent for females. Distance of the
District Headquarters from the state capital of Guwahati is about 140 km.
The southern parts of the district are situated on the plains of the Brahmaputra Valley Zone. Major tributaries of the river Brahmaputra viz. Pachnoi, Dhansiri, Jiya Dhansiri, Mora Dhansiri, Noa, Kulsi, Dipila and Bornoi, which originate from the foothills of the Himalayan Range flow through the district and they mainly contribute towards the sustenance of the agrarian economy of the district.

The soil of the district is more or less heterogeneous in nature. The northern part of the district is composed of clay and clay-loam soil whereas the middle part is loamy and sandy. The soil of the southern part of the district is composed of deposited sand and clay.

The district has a sub-tropical humid climate with semi-dry hot summer and cold winter. Agro-climatically, the district falls under the North Bank Plain Zone. During summer (May to Early September), heavy rainfall occurs due to south-west monsoon for which the district experiences flood. It is observed that the district receives an average annual rainfall (normal) of about 2,000 mm and the temperature varies between Max= 34.500C and Min= 13.500C. Relative humidity ranges between 82% and 88%.

The economy of the Udalguri district is principally agro-based. Sericulture, fishing, driftwood business is carried out by the people in smaller scale. Despite various efforts made in the past, the present status of irrigated agriculture in the district is not satisfactory (compared to the state and the national standard). More and more agricultural land is required to be brought under irrigation on priority basis (there being potentiality), both for increasing production and productivity through intensification of agriculture.
According to 2011 Census of India, Udalguri district stands 23rd position in terms of literacy rate among all districts in Assam. Beside this Udalguri is one of the backward districts of Assam from economic, social and educational point of view. Most of the villages in Udalguri district have poor health service facilities. Each and every years a huge no of children died due to communicable and different kinds of diseases. Considering these factors Udalguri district has been selected for the present study.

Table I.4: Access to Udalguri district

<table>
<thead>
<tr>
<th>Transport</th>
<th>Stations</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>There are two ways:&lt;br&gt;1. Lokapriya Gopinath Bordoloi Airport, Borjhar, Guwahati:</td>
<td>It is 140 Km from district headquarter.</td>
</tr>
<tr>
<td></td>
<td>2. Saloni Airport, Tezpur</td>
<td>It is 100 Km from District headquarter.</td>
</tr>
<tr>
<td>Railway</td>
<td>Udalguri Railway Station</td>
<td>It is just in the heart of the Udalguri town. From this station two ways are bifurcated one is towards Upper Assam upto Jonai Station in Dhemaji District and the other one is towards Lower Assam upto Rangia Junction in Kamrup Dist.</td>
</tr>
<tr>
<td>Road</td>
<td>Golma Bus Stand (City Bus), Udalguri town</td>
<td>Udalguri Bhairabkunda Road: This road will lead to Bhutan via Bhairabkunda. The distance is 22 Kms.</td>
</tr>
<tr>
<td></td>
<td>Udalguri Bus Stand (Line Bus), Udalguri town</td>
<td>Udalguri is connected with Guwahati and Tezpur by National Highway 52. From the district headquarter it takes 140Kms. to reach Guwahati via Darrang and Kamrup districts. And it takes 100 Kms. from Udalguri to Tezpur</td>
</tr>
</tbody>
</table>
Medical facilities available in the study area

There is a mini PHC with one medical officer in Sastrapara area. Health sub-centers are present in Kayabil, Amjuli and Batabari village, in each sub center there is only one ANM. In the remaining villages no health sub-center or other health services are available. So, people of those areas either go to the Sastrapara Mini PHC or the State dispensary situated in Harisinga which is near about 10 to 15 km away from the villages. There is one civil hospital in Udalduri town. Due to poor road connectivity and communication system people face tremendous problem while going to the hospital.

THE PEOPLE

The Bodos

The Bodo is an ethnic community of Assam. This tribe is mainly concentrated near Brahmaputra valleys. The Bodos form the largest tribal group in the state. It is considered as the earliest inhabitants in Assam and are said to be the most culturally rich community of the north-western parts of the state. The 6th Schedule of the Constitution of India has conferred the Bodo tribal community the status and prestige of a plains tribe. Bodos are found in several places of Assam and the primitive settlers of the valleys of Assam. Kokrajhar town is regarded as the hub of the Bodo tribal community. Other main concentration includes the Brahmaputra valley and also its adjacent areas.

Ethnic Origin

It is said that the original home of the Bodos was in north of China in between the Huang Ho and the Yang-tzse Kiang rivers from which they moved out and
dispersed in different directions. One of the groups moved into Tibet and settled there for centuries. Thus Tibet became their home before coming to India. As is known, the original name of Tibet was Ti-bod. It is conjectured by some of the scholars that the Mongoloids who lived in Ti-bod were identified as “bod” who later changed to Bodo.

**Traditional Institution**

It has been observed that strong community orientation is experienced conspicuously at the Bodo village society. A few institutions in the nature of peoples’ assembly called “raizani afat or raizani metheng” are formed with the community elders as its members. It can take decisions regarding any welfare issue of the village. Like rendering service for the construction of roads, bridges, community buildings, dongs, etc., take decision on some crisis confronting the village, small cases are also tried out and the culprits are punished accordingly. An institution of collective public granary (raizani bakhri) is also instituted. The needy and the helpless are offered the minimum help from there. Another community space, a plot of land is meant for the entire village. People collectively produce and whatever is earned goes to “raizani bakhri”. During the elaborate festivals people at the end of the festivals do the auditing for the expenses incurred in the event. Then the public is made aware of it. The left over money is spent by organizing a feast.

**Language**

As far as the language is concerned, Bodo people speak Bodo language, which has been derived from famous Tibeto-Burmese language family. Earlier Assamese script was used for the Bodo language. But there was a movement launched by the Bodo Sahitya Sabha in the early 1960s which was revamped again in the early 1970s to recognize the Roman script in place of the Assamese script. However, eventually
the leadership of the movement upon the request of the central government accepted
the Devanagari script. It was Brian Hodgson who first applied the generic name Bodo
to this group of languages. This generic name is also applied to the tribes and sub-
tribes belonging to the Bodo group (Grierson 1967). The controversial spelling of the
word is ‘Bodo’ where the letter ‘d’ is pronounced not as ‘d’ but as hard’ r.’
corresponding to in Assamese or in Devanagari. The variation of the letter ‘d’ as ‘r’ is
a fact. The Bodo intellectual leaders of the national convention who took the decision
to accept the generic name’ Bodo’ as the racial name were aware of it as it was
already in use.

Economy

Over the years following the traditions and culture of some of the other tribal
communities of the whole of the Indian subcontinent, these Bodo people too have
taken up several occupations. In the early years, this Bodos practiced of all types of
cultivation and farming. Rice farming, tea plantation, pig and poultry farming, and
silkworm rearing are quite significant amongst them. Moreover, the Bodos are
excellent bamboo craftsman and they have also developed craftsmanship in creating
several products from bamboos. Weaving is also a popular occupation of the Bodos.
All the exquisite products that they have created over the years have been the main
force of enabling the Bodos to reach to its zenith. Several Bodo families rear
silkworms. Amongst the Bodo females, weaving has gained fame and popularity.
Since a very early age, the Bodo girls learn the art of weaving, and thus loom is an
inseparable thing in the courtyard of a Bodo house.

Food Habit
Rice is the staple food of the Bodos and is usually savoured by a non-vegetarian dish like fish or pork. In fact, the Bodos have developed preference for various kinds of non-vegetarian dishes. Apart from these, the Bodos are fond of *Oma Bedor*, *Napham* and *Onla* and these are their main cuisines. Most Bodo people like *Oma* (Pork) *bedor* (meat). They prepare pork meat with different flavors and style. It could be fried, roasted, and stewed. The first type is pan fried. The second flavor is made by roasting (or smoking) the meat in the sun for several days. The third one called "*oma khaji*" is cooked by mixing blood and meat, - it is tasty and very rich in fat. *Napham* is an unique dish that distinguishes Bodo cuisines from that of the other races. It is made by grinding smoked fish, specific leafy vegetables and rice powder. The mixture is allowed to age in a sealed bamboo cylinder. Thereafter, aged *napham* could be fried or used as is. *Onla* is a gravy made from rice powder and slices of bamboo shoots cooked lightly with oil and spices. Chicken or pork can be added to *Onla*. Rice wine called *Jumai* is produced by the Bodos mainly during the festivals like *Bwisagu* and *Domasi*. *Jumai* could be of two types, (i) *Gishi* (wet) and (ii) *Gwran* (dry). *Gishi* is brewed by fermentation of rice, a piece of plum is added to the *Gishi* mixture during fermentation, *Gwran* is produced by distillation of the *Gishi*. The Bodos examine the strength of the wine by throwing a cup in the fire. A flash of fire indicates the strength of the wine.

**Culture**

The Bodos group is known for their rich and diverse culture. Cultural exuberance of the Bodo community incorporates elements like dancing, singing, language etc. The Bodos have several surnames like *Bargayary, Basumatary, Bodosa,*
Religion

Like many of the tribal communities of Indian subcontinent, these Bodos have got orientation towards religion as well as spiritualism. Despite the advancement of Hinduism amongst the Bodo tribal community, the majority of Bodo Hindus follow a set of rules called Brahma Dharma. Various religious practices and beliefs have been adapted by all the Bodo tribal people over the years. In the ancient years, Bodo people fete their ancestors. However, in the contemporary period, these Bodos have undertaken the diverse practices like Bathouism, Hinduism and Christianity. To be precise, Bathouism is a special type of worship of progenitors, better known as Obonglaoree.

Dress Pattern

The mode of dress of Bodo people is unique and full of colors, with style and attractiveness. The traditional attire is always hand woven. Bodo women are excellent weavers. Both young and old males put on Gamosa (a big towel) woven at home, which hangs down to the knees from the loins. Presently they have started using Gamosas which are mainly stripped and are of different colours. Earliest they used to wear vests made of Endi which is rare nowadays. Besides, they put on Aronai (a small wrapper) around their neck. The women wear a type of dress called “Dakhana” which covers the whole body. The plain woven Dakhana is called Sala Matha and the one with woven designs is called Dakhana Thawsi and it is also important for marriage purpose. The designs commonly used are Dauthu godo (design of dove neck), Phareo Megon (pigeons eye) Phar agar (design of hill scenery), Moiden agen
(designs of elephants foot print) etc. The Christian Bodos use white Dakhana and a veil for marriage purpose. The men wear suits during the occasion. The Bodo women of Udalguri wear Dakhana as their national dress. With designs, patterns and quality of the textile the Bodos in a very short time they have earned a reputation of producing quality material. They have started using Jacquard looms to increase production, efficiency and quality of their textiles.

**Fairs and Festivals**

Fairs and festivals constitute a significant part of the culture of the Bodo people. One of the most cherished festivals of this tribal group is Baishagu. It is basically a springtime festival and is celebrated during mid April. These people are popularly known for their colourful folk dances.

**The Rabhas**

The Rabhas is one of the major plain tribes of North east India. Racially they belong to the Mongoloid stock having similarities with the Bodo tribe. The Rabhas are sub-divided into several endogamous divisions viz.- Pati, Rongdani, Maitori, Bitolia, Dahori, Kocha, Totla etc. They are distributed in different parts of Assam, Meghalaya, Manipur and West Bengal. The Rabhas of the present study mainly belong to the Pati Section.

**Ethnic Origin:**

The Rabhas belong to the Indo-Mongoloid group and have similarities with other members of Bodo group such as Garo, Kachari, Mech, Koch, Hajong and others. According to Hamilton (1838), the aspects of socio-religious and material life of the Rabhas have similarities with those of the Pani-Koch. Dalton (1872) on the
other hand, argues that the Rabhas and the Hajongs are the branches of Kachari race and connected with the Garo.

**Village Administration:**

A person having good knowledge of social norms is nominated as the *gaonbura* (village headman) by the elders of the village. He conducts the village proceedings with the help of the elders of the village forming a council. There is no hard and fast rule about the membership of the council. Usually women do not participate in the deliberation of the village council. This council of elders decides all the matter of common concern of the villagers. It also decides the dates on which particular festivals are to be observed in the village. The council formulates rules and regulations for the villagers. Cases of deviation are solved by the council. The usual punishments pronounced by the council are; (i) compelled the culprit to take a vow at the *mare than* (village sacred grove) not to repeat the offence, (ii) a fine and (iii) excommunication. After the introduction of Panchayati Raj bodies also it has been observed that the council of elders has not given up its functions and the Panchayati Raj bodies have very little impact on the organization of the Rabha villagers.

**Economy**

The Rabhas of Assam are basically cultivators and it is their sole occupation. Most of the families have their own cultivable land. They are the cultivators and the number of landless share croppers or landless agricultural labourer is negligible among the Rabhas. Nowadays, a very small number of Rabhas are engaged in non-agricultural occupations like service, trade and commerce and daily wage labour. Their additional source of income, they sale of vegetables and of poultry products, etc. Some female prepared and sell distilled liquor.
Food Habit

The Rabhas used to take the flesh of any animal, expecting beef, which they strictly avoid. Their staple food is rice and pulses with a number of vegetables. While cooking they use alkali which is prepared by passing water through the ash of dried banana stems or dried mustard planks. They take fermented food also. On all social or religious occasion they drink rice beer in plenty. They prepared distilled liquor from rice which is consumed in all occasions and sold in the village and in the neighboring markets.

Marriage:

Marriage is a social occasion than a religious sacrament among the Rabhas. The bride and the bridegroom are made to sit together in public and the village barika (messenger) advises them about domestic life. Rice beer is served in plenty. It is very important to note that in none of the ceremonies described above the service of a Brahmin priest or the service of any other professional caste people is necessary.

Birth Ritual

Rabhas do not have any strict birth ritual. However, a woman giving birth to a baby is considered to be ceremonially unclean for one month and she is not allowed to enter the kitchen and do the normal domestic work. After the completion of the unclean period, the household precincts are smeared with cow dung and mud, and clothes are washed.
Funeral Rite

At the death of a person ceremonial uncleanliness is observed by the person who performs the last death ritual i.e. lighting fire in the pyre called “mukhagni”. However, there is no time limit for observing the period of ceremonial uncleanliness. The period of ceremonial uncleanliness ends on the day of sharddha (final mourning) which is held according to the convenience of the household usually after ten days or so.

Religion

The main deity of the Rabha people is the Rishi aka Mahakal. Moreover, some other deities worshipped by the Rabhas are Basek, Rungtuk who are the household deities. The Rabhas do not follow any particular Hindu method of worship, the practice of sacrificing in front of the Gods and Goddesses are prevalent among them. They consider that the blood of the sacrifice animal is important to propitiate the God. The Rabhas are the followers of Christianity and Hinduism.

Like each tribal group, the Rabhas also have a uniqueness that makes them separate from others. Their way of leading life, their costumes, their festivals, their religions may have some similarities with some other tribal groups but their own heritage is amalgamated in such a way that their distinctness appears more than anything in the world of human beings.

Data Analysis

Data were managed and analyzed by using SPSS (PC Software), version 18. However some data were calculated manually. Percentage distribution, mean, ANOVA test, chi square test and logistic regression method were used to see the effect of various factors on infant and child mortality and morbidity. The interlinkage
between child mortality and different variables has been tested by applying cross-tabulation analysis. The cross-tabulation analysis is important in first step for studying the relationship between mortality and several characteristics. The logistic regression model was used to estimate the odds-ratios for the different independent factors influencing child mortality. This analysis considered only those variables which were found significant in cross-tabulation analysis.