CHAPTER - II

REVIEW OF LITERATURE
In this chapter, we shall make a brief review on the previous studies conducted by different scholars or researchers relating to bio-social determinants of fertility and child mortality among different populations of India and outside India.

Biological as well as social factors such as women's age, age at marriage, educational level, economic status and religious attitudes have an effect on fertility and mortality (RGI, 1971 and Elamin and Bhuyan, 1999). The infant and child mortality in the Eastern Africa are influenced by age, sex and socio-economic characteristics of the parents (Stephen, 1988). Khongsdier (2005) reported that demographic structure such as fertility and mortality are very important to understand the genetic and social structure of human population.

It is widely accepted that fertility and mortality are influenced by a large number of biosocial factors such as age at menarche, maternal age, age at marriage, age at first child birth, age at menopause, type of marriage, type of family, education, religion, economic conditions, value of children, health condition and adoption of contraceptive devices and so on (Caldwell, 1979; Lee, 1979; Reddy and Reddy, 2006; and others).

Many studies have reported the differences between rural and urban areas in respect of the fertility rate (Ahmed, 1985; UN, 1999; Findley, 2005; Kullu, 2006 and Chanu, 2007) as well as infant and child mortality rates (Macassa et al, 2003; Chattopadhyay and Goswami, 2005; Andoh et al, 2007 and Chanu 2007). NFHS-2 has reported that the fertility rate in all the Northeastern states of India is higher in rural areas than that of the urban areas (IIPS, 2000). Similarly, NFHS-3 reported that the infant and
child mortality rates are higher in rural populations compared to the urban populations in India (IIPS, 2007). Similar finding was reported by Mace (2008) suggesting that reproducing in cities has always been costly and this in turn leads to lower fertility in urban than in rural areas.

NFHS-3 (IIPS, 2007) reported that the fertility rate in the state of Manipur is 2.8. According to the Registrar General and Census Commissioner, India (2009), Manipur has the lowest infant mortality rate recording 12 per 1000 live births among all the states of India.

Though study on bio-social determinants of fertility and child mortality is not very old, yet, several studies on it have been published by many scholars in India and abroad. In Northeast India, very few systematic studies on fertility and mortality patterns have so far been undertaken to understand the different bio-cultural problems of the society that may be related to fertility and mortality.

**Biological determinants**

According to the statistics given by UNICEF in 1973, out of 114 infants per thousand live births die under one year of age in rural areas of India against 78 in urban areas in a year. Three out of four among the babies under one month die due to the causes arising either before or during birth; the most common causes are prematurity, congenital debility, injury at birth, malformation, diarrhoea, influenza, pneumonia, oxygen deficiency, etc.
Stephen (1988) reported that infection, malnutrition and diarrhea were the major causes of infant and child mortality in the Eastern Africa.

Chen et al, (1980) conducted a study on anthropometric assessment of energy-protein malnutrition and subsequent risk in mortality among pre-school children. They estimated that four diseases namely neonatal tetanus, pertussis, measles and acute lower respiratory tract infections cause one third of child deaths under 5 years of age in the developing world. The WHO estimates that 1.5 million children die annually of measles and its complications and those are pneumonia, diarrhoea, under nutrition and systematic infection (Assad, 1983).

Adlakha and Suchindran (1985) examined the determinants of infant and child mortality variations in Jordan, Yemen, Egypt and Tunisia. They concluded that the higher mortality risk is found among infants born to very young and very old mothers, with short previous birth intervals of higher birth orders, and where the previous infant had died.

Gualtieri et al, (1985) compared the perinatal mortality rate to ABO blood type and parity using data from the British Perinatal Study. The findings reveal that within each maternal blood group, the perinatal mortality rate increases with parity. Maternal-fetal ABO incompatibility also increases fetal wastage. Parity effects on perinatal mortality are most strongly felt by O type blood group mothers, who are also most prone to develop an immune reaction to fetal blood group antigens.
Friede et al, (1987) reported that there is a strong association between young maternal age and high infant mortality. They also reported that there is a high prevalence of low birth weight with young maternal age.

Majumder (1991) observed that preceding birth interval, subsequent pregnancy and breast-feeding duration, each have an independent influence on early mortality risk in Bangladesh. Within a specific interval, the risk of dying decreases with increase in duration of breast-feeding and also with an increase in the time between the index birth and the next pregnancy.

The dramatic rise in infant mortality that occurred in the Soviet Union between 1970 and 1990 was accounted for in large part by an increase in death rates from causes which predominate after the first month of life, most notably respiratory, infectious, and diarrhoeal diseases (Velkoff and Miller, 1995).

Fitaw et al, (2004) determined the impact of child mortality and fertility preference on fertility status in Ethiopia and found that high fertility status is strongly associated with child death and hence measures that curb child mortality are believed to decrease fertility status besides promoting child survival. The study also observed that later age at first marriage and first birth showed lower number of children ever born alive.

Thong et al, (2005), based on their study of birth defect in Malaysia concluded that the leading causes of paediatric disability and mortality are birth defects in develop and developing countries. The babies with major defects were associated with lower birth
rates, premature deliveries, higher caesarean section rates, long hospitalization and increase specialist care.

Haque et al, (2010) conducted a study on the women empowerment and its impact on fertility in Bangladesh and concluded that mother’s age and age at marriage, besides some other socio-economic factors are the most important factors determining the fertility rate.

In India, a number of studies have so far been conducted on the biological factors determining the fertility and mortality by many scholars and researchers. Vaidyanathan (1972) in his study on mortality in India found that the rate of infant mortality continues to be high mainly due to some persistent exogenic causes arising from environmental and nutritional conditions. The disorder of the respiratory system appears to be a very important cause of infant mortality. Congenital malformations and diseases in early infancy account for about 50% of all infant deaths in urban areas of India.

Office of the Registrar General, India (1981) reported that India deviates largely from other countries in its mortality patterns and it is characterised by very high levels of infant mortality. The estimate of the census actuaries indicates that the male infant mortality rate has been consistently higher than the female infant mortality rate from 1871-1971.

A retrospective survey carried out by Suleman (1982) in three environmental zones in Punjab shows significantly higher neonatal mortality rates due to tetanus. A
study on child development conducted by Devdas and Jaya (1984) also reported that there are many types of intrauterine distribution that may cause an infant to be born with severe injuries and then be subject to miserable life.

Singhi et al, (1989) revealed that an increased risk of infant and child mortality was associated with maternal age less than 20 and more than 30 years, birth order 4th or higher and previous infant or child death(s) in the family in a rural Haryana.

A study on identifying children with high mortality risk by Choe et al, (1998) revealed that children born less than 24 months after previous birth, children in families where an older sibling has died and children born to mothers less than 20 years old have higher risk of dying in their early age.

Masset and White (2003) examined the infant and child mortality in Andhra Pradesh and found that mother's age and birth order are the most important biological factors influencing the infant mortality rate.

The patterns of mortality of two isolates of Bhoksa tribesman settled in different eco-systems of the state of Uttarakhand i.e., tarai and foothill areas were studied by Singh (2003). The study indicated that Bhoksas of tarai region have lower mortality than the Bhoksas of foothill area which may be due to their greater degree of adaptation to the environment. The study also reported that infant and pre-reproductive mortality are higher as compared to that of the other ages similarly in both the groups. Further, heavy toll of mortality is caused either by delivery infection or by communicable diseases.
A study on the demography and ethnography of fertility behaviour among the non-industrial population in India shows that longer perceived ideal birth interval has been consistently associated with lower fertility (Nanda, 2005).

Bhasin and Nag (2007) in their study on the demography of the tribal groups of Rajasthan reported that child mortality is a very important variable in determining the level of fertility, i.e., the higher the child mortality rate, the higher is the fertility rate. NFHS - 3 (IIPS, 2007) also reported that mother's age at birth, birth order and the interval between births have a strong influence on the infant and child mortality.

Soni and Mukherjee (2009) who conducted a study on foetal wastage and ABO blood groups incompatibility among the Gonds of Garriyaband, Chhattisgarh found that the couple combinations having O type wives and A or B type husbands showed maximum foetal loss. The study also shows that as far as abortion is considered it is higher in A type husband and O type wife while still births is higher in couple combination of A type husband and B type wife.

Reddy and Sudha (2010) made an attempt to find out the influence of bio-social factors on fertility and mortality among Setti Balija of Southern Andhra Pradesh. They found that, age at menarche is correlated strongly with the age at marriage and the net survivorship is high among women of middle range age (14-15 years) at menarche followed by women of late age (16+ years) at menarche and early age (< 12 years) at menarche. The same trend is observed for age at marriage also. The study also found that, women of early menarche and marriage will have higher rates of prenatal as well as
postnatal mortality and the net survivorship of offspring is also related to the onset of menarche as well as age at marriage.

In Northeast India, Barua (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 gradually decreases with increasing birth order.

Khongsdier (2002) reported that the number of live births and surviving children among the Christians and non-Christians War Khasi of Meghalaya tends to increase with the increasing age of the mothers. He also found that the mean number of live births decreases with the rise in age at marriage in both the religious groups. The same author in 2005 reported that the mean number of live births tends to decline with the increase in age at marriage of the mothers.

A study on the ethnic variation in fertility patterns among four communities of Manipur by Singh (2006) reveal that mothers of youngest age group (15-19 years) delivered the least number of children as compared to the mothers of higher age group. This tendency of increasing number of live births with the increasing chronological age of mother in all the four populations is because of exposure to longer period of married life.
Social determinants

Some of the socio-cultural factors that are responsible for differential fertility and mortality are age at marriage, absence of spouse, widowhood or widow-remarriage, polygamy and postpartum sexual abstinence during certain seasons or ceremonies, etc. (Reddy, 2005).

Caldwell (1979) reported that women's education in societies like that of the Yoruba in Nigeria can produce profound changes in family structure and relationships, which in their turn may influence both mortality and fertility levels. A major theory at the linkage between increased maternal education and reduced child mortality is that education gives women the power and confidence to take decisions into their own hands.

A study on fertility and child mortality, level and differentials among Yoruba of Western Nigeria was undertaken by Sembajawe (1977). The study observed the influence of urbanization in the reduction of child mortality for some African countries e.g. South Africa, Senegal, Ghana, Zaire and Kenya.

Rosenzweig and Schultz (1982) reported that education of a mother is strongly and positively correlated with the survival rate of her children in Columbia. The least educated mothers are the most affected, in terms of their reduced fertility and increased child survival rates.

Merrick (1983) conducted a study on access to piped water and early childhood mortality in Urban Brazil. The study shows that when the effects of household contextual
variables are controlled, access to piped water in the house was found to be associated with a reduction in child mortality by approximately 20 percent.

Martin et al, (1983) analyzed the co-variates of child mortality in the Philippines, Indonesia and Pakistan. They concluded that irrespective of the socio-economic condition of the family, better household sanitation and electricity play an important role in reducing child mortality.

A study on the effect of infant mortality on subsequent fertility of women in Jordan indicated that child survival seems to have only minimal influence on fertility among women at low birth orders and less educated women (Suchindran and Adlakha, 1984). It also indicates that the fertility of women with low education is consistently high; consequently, there is little room for fertility to be decreased by the death of an infant. On the other hand, the fertility of women in the highest educational category is relatively low. The same authors in 1985 examined the determinants of infant and child mortality variations in Jordan, Yemen, Egypt and Tunisia. They reported that the education of mother and rural-urban residence are found to affect infant survival. The study also shows the beneficial effect of breastfeeding on the infant’s survival, especially during the early months of life.

A study on household income and child survival in Egypt reveals that the supply of piped water to the dwelling was associated with higher survival probability during early childhood (Casterlin et al, 1989).
Mengistu (1989) estimates the fertility and child mortality for agricultural households of the Gondar and Hararge regions in rural Ethiopia. The study shows that fertility and child mortality are quite high in both regions as in the rest of the country. However, Hararge has significantly higher mean parity and child mortality than Gondar.

A study on cultural and social factors influencing mortality levels in developing countries revealed the surprising fact that social characteristics, such as the level of schooling or fertility control, or cultural characteristics, such as ethnic group, are usually more influential in determining mortality levels than is access to medical services, income, or nutritional levels (Caldwell, 1990).

Gubhaju et al, (1991) in their study on the socio-economic, demographic and environmental determinants of infant mortality in Nepal reported that the availability of toilet facilities as well as drinking water was observed to be important determinants of infant mortality.

O’Toole and Wright (1991) reported that maternal and paternal educations have independently negative effects on child mortality in Burundi. The maternal education is important in reducing the risk of child mortality. However, the household income and father’s occupation is also an important factor in reducing child mortality.

The effect of education without resources might not be important as a factor of lowering infant and child mortality. Both the education and the resources could be
complementary to each other, and access to both of these may improve child survival (Pant, 1991).

Benefo and Schultz (1994) analysed the determinants of fertility and child mortality in two neighboring West African countries: Côte d'Ivoire and Ghana. They found that women's education beyond the primary level is associated with substantially lower fertility in both the countries. Women's education has a smaller effect on child mortality in Côte d'Ivoire, where relatively fewer women are educated, than in Ghana. They concluded that further development of women's education in both the countries is likely to play a significant role in bringing child mortality under control and slowing population growth.

Forste (1994), in his study on the effects of breast-feeding and birth spacing in infant and child mortality in Bolivia shows that birth spacing, lactation, antenatal care and mother's education improved chances of the survival of infant and child.

Adetunji (1994) examined the effects of a child's place of birth, mother's education, region of residence and rural and urban residence on infant mortality in Nigeria between 1965 and 1979. It showed that children born in modern health facilities, irrespective of their mothers' place of residence, experienced significantly lower rates of infant mortality than those born elsewhere.
The decline in infant mortality in Bangladesh is attributed to the introduction of improved public health measures and access to maternal and child health care services (Kabir et al, 1995).

Wahab et al, (1996) reveal that the most frequent type of marriage was between first cousins, in both rural and urban Pakistan where first cousin marriages, those with father's brother's daughter were predominant. They also reported that the incidence of premature mortality was significantly higher only in the offspring of first cousin marriages, while morbidity is significantly higher to the offspring of consanguineous marriages.

Stockwell and Goza (1996) analysed the relationship between infant mortality and economic status by race in metropolitan Ohio in U.S.A. and reported a pronounced inverse association between income status and infant mortality for whites, but not for non-whites. They also reveal that low income whites and non-whites at all income levels have infant mortality rates that are substantially higher than the overall rate for the population.

A study on the contributions of the proximate determinants to fertility change in Botswana shows that breast-feeding is the most important proximate determinant of fertility, followed by contraceptive use, and finally non-marriage (Letamo, 1996). The study also reveals the decline in fertility rate with an increasing contraceptive use. Marriage is also reported to be the least important proximate determinant of fertility, probably due to the high prevalence of premarital childbearing.
Varea et al, (1996) analysed the determinants of modern contraceptive use in the province of Marrakech (Morocco). They reported that women who have never used contraception have smaller family sizes than those who do and the number of live births is the variable with maximum predictive power on contraceptive use, while child mortality is the main inhibiting factor. The paper also evaluates the hypothesis that traditional populations in the initial phase of their demographic transition resort to modern contraception in order to stop childbearing, when they have reached a desired number of children, rather than to space births or reduce their fertility.

Udjo (1996) observed that the fertility decline in Zimbabwe is modest and that the decline is concentrated among high order births. Multivariate analysis did not show a statistically significant effect of contraception on fertility, partly because a high proportion of Zimbabwean women in the reproductive age group never use contraception due to prevailing pronatalist attitudes in the country.

Abortion has played a major role in the fertility decline in Cuba and the Federal Republic of Korea (Noble and Potts, 1996). The study further concluded that access to contraception, voluntary sterilisation, and safe abortion has a direct impact on fertility and has been associated with a rapid fall in family size in these very different countries.

A study on the fertility transition in Bangladesh reveals that the small change in overall fertility may be attributed partly to the change in age at first marriage and partly to the increased use of contraception (Kabir and Uddin, 1997).
Chaudhury et al. (2000) reported that lower infant mortality rates in Bangladesh are found in the urban areas compared to the rural areas, which attributed to the greater availability of health care services, higher income and educational levels in urban areas. They also observed that the risk of dying decreases with increasing breast feed in the early childhood period.

A study on differential child mortality by fertility in north eastern Libya was conducted by Bhuyan (2000). The study shows that education of mother has significant declining effect in different degrees on child loss to mothers of different parity. Similar differential impacts due to different parity levels are observed in case of age at marriage of mother, number of earning members in the family and socio-economic conditions of parents. Apart from social, economic and environmental conditions, parity is one of the important factors responsible infant and child mortality.

Pedersen (2000) reported that infant and child mortality has steadily reduced in West Bank and Gaza Strip since 1967, even though fertility has remained extremely high. The determinations of infant and child mortality are discussed with particular emphasis on the role of consanguineous marriages, short birth spacing and maternal education. The study also showed that birth spacing and types of marriage are more important determinants of infant mortality than maternal education.

A study on women's education and fertility rates in developing countries, with special reference to Bangladesh was conducted by Akmam in 2002. The study revealed that education has a major impact on fertility and even after controlling for other relevant
factors, the education of women stands out as a significant factor in determining fertility. It also shows that education has been found to increase women’s levels of autonomy in decision-making, in acquiring knowledge, in gaining access to economic resources, and in interacting with a wider social circle. It is through this autonomy that education exerts an impact on fertility.

Iyer and Monteiro, (2004) conducted a systematic study on the risk of child and adolescent mortality among vulnerable populations in Rio De Janeiro, Brazil. The study revealed that socio-economic factors such as education, income, religion, family structure and residence have high risk of mortality, and among all, lack of education was found to be a major determinant of mortality at young ages.

A study on the impact of education on fertility and child mortality in Indonesia shows that female education is a stronger determinant of age at marriage and early fertility than male education (Breierova and Duflo, 2004). The study however, stated that female and male education seems equally important factors in reducing child mortality. Similarly, Nag (2006) concluded that female’s education is a significant determinant of fertility in Norway.

Goni and Ramtullah (2005) conducted a comparative study on the decline in fertility among SAARC countries and reported that for reduction in IMR (Infant Mortality Rate) among the SAARC countries, it is necessary to improve sanitation, drinking water and medicine facilities.
A study on the contraceptive use in China suggested that adoption of family planning methods is higher in urban areas than in rural areas due to the differences in the socio-economic factors such as education, occupations, family size, religion, availability and accessibility of contraceptive methods (Cao, 2007). Dodoo (2001) also reported that the high fertility rate in Africa is mainly because of low level in the use of contraceptive methods.

A study on education as correlates of fertility rate in Southern Nigeria conducted by Akpotu (2008) reported that education and fertility rate are inversely related, both in urban and rural societies. However, education was found to be more inversely related to fertility among women and urban dwellers. The Nigerian’s love for children, their polygamous nature, irrespective of their educational attainment and the need for a particular sex of children, among others were identified factors responsible for enlarged family size.

Mondal et al, (2009) observed the influencing factors on infant and child mortality of suburban and rural areas of Rajshahi District, Bangladesh. The study reveals that several socioeconomic, demographic and health related variables affected infant and child mortality. Parents’ education, toilet facilities, treatment places, immunization and ever breastfeeding are significant predictors during neonatal and childhood period but father’s occupation is significant at post-neonatal periods. The study also shows the risk of child mortality decreased with increased female education and wider access to safe treatment places.
Adhikari (2010) analysed the demographic, socio-economic, and cultural factors affecting fertility differentials in Nepal. The study shows that socio-economic factors such as age at first marriage, perceived ideal number of children, literacy status, mass media exposure, wealth status, and child-death experience by mothers were found to have influenced the fertility in Nepal.

Khan and Khan (2010) found that the higher total fertility rate in Pakistan is the result of low contraceptive prevalence rate. Their findings also revealed that, husband’s education, income of the husband, husband’s age at marriage, number of living children, number of sons, household income and urbanity of the household are major determinants of contraceptive prevalence of women.

Haque et al, (2010) reported education, household decision making participation, husband’s education, number of children death, religion, media exposure and discussion on family planning are the most important factors determining the fertility rate in Bangladesh.

Chowdhury et al, (2010) reported that neonatal mortality rates, post-neonatal mortality rates and infant mortality rates are higher among illiterate reproductive mothers and of whom houses have unhygienic latrine in Natore district of Bangladesh. Mother’s education, types of latrine and electricity have significant association with neonatal, post-neonatal, infant and child mortality. They further reported that mother’s education and occupation have significant impact on post-neonatal mortality, whereas parents’
education and occupation, types of latrine and electricity have significant effects on infant and child mortality.

Driver (1963) who studied the differential fertility in Central India observed that fertility declines drastically with the increasing level of mother's education. A study on educational status and differential fertility in India reported that parents with higher educational status are likely to limit the family size as they are more aware of the socio-economic and well-being of their children (Hussain, 1970).

A study on the measures of mortality from Indian Sample Registration System by Rambhadran and Swami (1982) shows that the death rate in urban area is significantly lower than that of the rural area.

Singhi et al, (1989) in their study on the determinants of infant and child mortality in rural Haryana found that increased risk of infant and child mortality was associated with unclean cord care at the time of child birth, failure of breast feeding during the first 3 months of age and lack of immunizations.

A study on fertility and mortality in Bison Horn Madias of Dantewara Tehsil of Bastar District, Madhya Pradesh was undertaken by Kshetriya et al, in 1993. They found that the prevailing socio-economic, cultural and health-care practices are the significant factors of high fertility and high mortality rate.

After conducting a study on the effects of consanguinity and inbreeding on fertility and mortality among the Malas of Chittoor District, Andhra Pradesh, Reddy et al,
(1993) found that the increase in consanguinity leads to the increase in prenatal and postnatal deaths with the decrease in fertility, live births and survival of offspring when compared with non-consanguinity.

A study on the consanguinity and its relationship to differential fertility and mortality among the Kotia of Andhra Pradesh shows that women in consanguineous marriages had a lower mean number of total live births and living children than women in non-consanguineous marriages (Yasmin et al, 1996).

Yadav and Badari (1997) analysed the age at effective marriage and fertility in India. They found that age at marriage can still play an important role in the reduction of fertility in some states in India such as Uttar Pradesh, Bihar and Rajasthan.

Arnold et al, (1998) found that India is a country with a pervasive preference for sons and one of the highest levels of excess child mortality for girls in the world. Son preference fundamentally affects demographic behavior in India. They also reported that family composition affects fertility behaviour in every state examined and son preference is the predominant influence in all but one of this states.

An analysis on accelerating India’s fertility decline by Pathak et al, (1998) indicate that no fertility decline can be expected as a result of lengthening birth intervals. However, the increased use of temporary methods by Indian women to stop childbearing may lower total fertility significantly, whereas increased use of temporary methods holds promise of accelerating it.
Kishore and Parasuraman (1998) in their study on mother’s employment and infant and child mortality in India found that mothers who are employed have a 10 percent higher infant mortality rate and a 36 percent higher child mortality rate than mother who are not employed. The study further reveals that employment of mothers in urban areas has more detrimental effects on infant and child survival than employment of mothers in rural areas.

Luther (1998) who conducted a study on mother’s tetanus immunization in India reported that two doses of tetanus toxoid vaccine given one month apart during pregnancy prevent nearly all tetanus infections in both mothers and their newborn children. The study further reported that mother’s tetanus immunization is also associated not only with reduced neonatal mortality, but also with substantial reduced early-childhood mortality.

Choe et al, (1998) in their study on identifying children with high mortality risk concluded that illiterate mothers, very poor households and without access to a flush or pit toilet are most vulnerable to infant and child mortality.

According to Verma (2002), who conducted a study on the socio-cultural correlates of infant mortality among the Baigas of Mandala District of Madhya Pradesh shows that illiteracy of parents, parents engaged in agriculture related practices and persons married in blood relations had experienced high infant mortality which may be attributed to the belief in indigenous unhygienic method of delivery, primitive method of cutting the cord, discarding the colostrums, etc.
Masset and White (2003) suggested that the infant mortality is found to depend on health service provision such as tetanus injection and use of antenatal services in Andhra Pradesh. They also found that, although economic well-being is a significant determinant of child mortality, other factors such as maternal education and knowledge of health practices (ORS) and access to safe water are more important in influencing the child mortality rate.

A demographic study of Gujjars by Dabral and Malik, (2005) shows that women’s age has the most significant effect on fertility and family planning acceptance. They also observed that women’s education is also an important determinant of these variables as fertility increases with higher infant mortality.

Reddy (2005) conducted a study on fertility and mortality among the Scheduled Caste Madigas of Andhra Pradesh. He observed that the pregnancy wastage is slightly higher in consanguineous than in non-consanguineous matings.

Sharma and Jain (2006) conducted a study on the morbidity and mortality among traditional prostitutes of the Beria Caste of Sagar district, Madhya Pradesh. Their findings revealed that morbidity and mortality rates are very high among them. They also found that infant mortality rate may be associated with sanitary conditions, health status of the mothers and age of the maternity, etc.

Naharani (2007) who analysed the consanguinity, reproductive performance and selection potential among the Khond and Savara of Andhra Pradesh reported that the
Khond who enjoy a better status in demographic transition (i.e., socio-cultural, biogenetic and nutritional factors) have a better reproductive performance than the Savara. The study also reported that infant and child mortality is recorded to be lowest among the families where there is no water stagnation around the house and also among the families who use hand pump water for drinking purpose at household level. Whereas, the highest percent of infant mortality and child mortality are recorded among the families who obtain their drinking water either from canal or river.

A study on demography of the tribal groups of Rajasthan by Bhasin and Nag (2007) shows that mortality differences across Scheduled Tribes reflect the influence of independent economic, socio-cultural and physical environmental determinants.

Gharami and Sharma (2007) who studied the household environment influence on infant and child mortality with special reference to Kol tribe of Madhya Pradesh reported that infant and child mortality is recorded to be lowest among the families where there is no water stagnation around the house, however, high percent of infant and child mortality is reported in families where stagnation nearer to the house is a regular phenomenon. They further reported that both infant and child mortality are found to be lowest among the families who use hand pump water for drinking purpose at household level. Whereas, highest percent of infant mortality and child mortality are recorded among the families who obtain their drinking water either from canal or river.

Paul (2007) conducted a study on the infant and child mortality in Uttar Pradesh and concluded that infants are more vulnerable to death compared to children in the age
group 1-4 years. The study also revealed that birth order, maternal education and place of delivery seem to be the crucial determinants of infant mortality.

Kannan and Nagaranjan (2008) analyse the factors and multiple regression for human fertility in Kanyakumari district. They concluded that higher employment, higher income and nuclear family system could bring the reduction of the fertility rate in the Kanyakumari District women.

Kapoor (2009) reported that female work participation rate, female literacy and the percentage of female labourers in agricultural work seem to have the strongest affect in infant mortality rate in India. Improving the quality of female capitals does seem to have a significant and positive affect on reducing the infant mortality rate. The increase in percentage of male workers outside of agriculture has indirectly reduced infant mortality rates.

A case study among the Setti Balija community of Andhra Pradesh on the influence of bio-social factors on fertility and mortality was conducted by Reddy and Sudha (2010). They reported that, all fertility components are higher for non-consanguineous couples compared to the consanguineous couples. However, reverse trend is observed for mortality measures. They also reported that, low income group shows high fertility and mortality than middle and high income groups.

A study on the determinants of infant and child mortality in periurban areas of Kolkata city in India was conducted by Ghosh and Bharati (2010). They reported that
higher infant mortality rate was noted in the older and younger Munda women, in contrast to lower infant mortality rate in younger Pod women. Child mortality rate was also lower in younger women in both the ethnic groups. The study further reported that stagnation in infant mortality rate in younger Munda women indicates poor delivery practices whereas lower rate among the Pod reflects better adoption of safe delivery practices.

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 Brahmaputra Valley of Assam was low in comparison to the Hindu and Muslim.

Koko (1987) reported that the risk of death among infants and children occurs due to lack of medical facilities to deal with infections, inadequate food and lack of elementary hygiene.

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

Khongsdier (1995) in his study on 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. He also stated that
religion seemed to have played its role in regulating the prenatal and postnatal mortality rates among the War Khasi of Meghalaya.

Adak (1996) in his 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. Adak further estimated infant and early childhood mortality among the Khasi and found that greater percentage of infant or early childhood mortality among the mothers with no lactation, mothers without immunization and medical check-up before delivery and mothers who used unboiled drinking water at household level.

The findings of the National Family Health Survey (NFHS - 2) (IIPS, 2000) have reported that education of the mothers are inversely related to fertility and mortality rates in some of the Northeastern states like Mizoram, Arunachal Pradesh and Tripura, though it is not clearly perceptible in the states of Meghalaya and Nagaland.

Khongsdier (2002) on his study of fertility and mortality differentials among the War Khasi of Meghalaya concluded that the mean number of live births decreases significantly with the increasing level of maternal education in both Christians and non-Christians.

Das and Majumder (2003) reported that diarrhoea is to be the killer disease among the Bihari Harijan children of Guwahati, Assam. Poor environmental sanitation, lack of
sense of personal hygiene, lack of seriousness of the mothers towards child care may be attributed as the cause of diarrhoea among the children.

Murrey et al, (2005), reported the decrease of mortality with proper vaccination and better income level among the Lotha Nagas of Nagaland.

Singh (2006) conducted a study on ethnic variation in fertility patterns among four communities of Manipur. The findings show conformity with the views of inverse relationship between fertility and educational level as the number of live birth decreases with the increase in the literacy rate of the mothers. Illiterate mothers have highest average number of live births. The study further shows that women engaged in manual labour work give birth to higher number of children however, among the labours, those engaged in agriculture give birth to highest number of live birth.

Ladusingh and Singh (2006) examined the relevance of socio-cultural and environmental factors in explaining child mortality in Northeast India. They provided evidence that lack of hygiene in the household and poor women’s engagement in physically demanding agriculture based work contributes to higher risk of child mortality. Community education is also found as the dominant factor outside the household to have a significant effect on child mortality.

Khiloni (2009) reported that age at menarche, education and economic status has an impact on fertility among the Anal women of Lambung village in Chandel district of Manipur.
Dey and Goswami (2009) conducted a study on fertility patterns and its correlates in Northeast India. They reported that mother's education and age at marriage had a significant effect on reducing fertility. The study also indicates that even without the use of family planning method, increasing level of education, age at marriage and providing opportunities for women to work outside the home can go a long way in reducing fertility.