CHAPTER 1

INTRODUCTION

AND REVIEW OF LITERATURE
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1.1 INTRODUCTION:

Health of a person is an index of human welfare and is a vital contributing factor to the economic growth of a nation. It is treated to be an asset which enables a person to develop his potential which in turn increases the productivity of a person individually as well as to a whole nation (Dey and Nandi 2007). A healthy body results healthy mind which positively increases productivity. According to the Noble Prize winner, Robert Fogel (1993), health of the people of a nation is linked to the economic growth of the nation. Thus study of health status of the people find its due attention and considerable importance from the beginning of civilization. Study of health status encompasses both the factor mortality and morbidity. The study of mortality is of great importance and vital interest to the demographers, social scientists, and public health workers throughout the world. Besides, the study of morbidity is also a vital ingredient in health studies as it includes the study of prevalence and incidence of diseases to infant, children and the adult. From the mid of 18th century, modern nation had adopted several means to reduce the impact of diseases and death rate (Vallin 2005). But till now prevalence and incidence of diseases and death has not been completely on the wane. So in this context some studies still remain to be done.

Occurrences of diseases in a region possibly affect the infant and children in a great extent. So study of the health of a child and its up keep has been given due importance by public health workers and social scientists
Diseases that encountered by the infant and the children in the third world countries are mostly diarrhea, fever, pneumonia, dysentery and cough. Among these diseases acute respiratory infection and pneumonia are major causes of illness among the infants and the children and leading cause of childhood mortality (Murry and Lopez 2006). According to National Family Health Survey 3 (NFHS 3), 2005-06, the prevalence of fever is lower among children under six month (approximate percentage of affliction is 21) than among older children (approximate percentage affliction is 28-34). Diarrhea is the one of the leading killer of children under age five year in developing countries among the prevalent diseases (NFHS3). Death from diarrhea is most often caused by dehydration, due to loss of water and electrolytes. Diseases encountered by the children mostly are short lived but some occasion may become fatal. It is recognized that exposure to diarrhea pathogen is conditioned by factors like socio-economic, demographic and environment (Teran 1991, Diame1990, Timaneus and Lush 1995).

Another important aspect of study of health status of people of a region is the study of mortality by life table. In this respect several life tables have been constructed to serve the purpose of different time. Among these UN model life table (1955) were constructed using 158 life tables of different countries. Coale and Demeny (1966) published regional model life tables, Lederman (1959, 69) constructed model life tables based on a factor analysis of some 157 empirical tables, Brass (1964,71) proposed two parameters logist system to construct life tables, UN model life tables(1983) was constructed for developing countries.
Kohli (1976), Census of India (2001), Roy Lahiri (1987) constructed life table for India and various states for different periods. For India, Assam and other states of India SRS based life tables have been constructed by Registrar general of India (RGI) for the period starting from 1970 to 2006 for Rural, Urban and Total (Urban and Rural together) population separately for males and females and persons. From life table we get expectation of life at birth of any region. The expectation of life at birth most frequently used as an index of the level of mortality. It also represents a summarization of the whole series of mortality rates for all ages combined, as weighted by the life table stationary population. In fact the reciprocal of the expectation of life is equivalent to the crude death of the life table population (Shryock and Siegal 1976). More over, life expectancy at birth also being used for comparing mortality situation of two regions. Also expectation of life at birth is an important indicator of health status and development of a region. It is also being an important component of human development index and gender development index.

The occurrence of mortality among the people of a region may also be studied with help of ‘cause of death’. ‘Cause of death’ is a medical term indicates the agent that attacks the vitality of the hosts. Data pertaining to cause of death provide a valuable insight into the network of interactions between a viable human host and a series of environmental, genetic and behavioral factors which result in one or more morbid conditions that ultimately result the death of the host (Preston et al, 1972). Different sort of diseases are the ingredient for the ‘cause of death’. These diseases are mainly communicable and non-communicable or degenerative (Murry and Lopez 2006). As urbanization and
economic growth takes place in recent years, there are significant changes in diet and activity patterns (WHO, the World Health Report 2002) and as a result people sometime lead a sedentary life styles. These are in turn important elements in the epidemiological transition (Omran, 1971). Due to epidemiological transition in health status, deaths due to diseases like parasitic and communicable have gone down (from 45% to 15%) as observed by (Lobarthe 1988) in the United States during the period 1981-85. These happen perhaps due to advancement in medical facilities and health policies of the states. Thus attention to the study of health status has now been shifted from communicable to non-communicable or degenerative diseases. It is also observed that trends of death from cardiovascular disorder, neoplasm, diabetes are increasing (Ghosh and Kulkarni 2004). This phenomena has been noticed in all the developed and developing countries and are in transition towards this state (Criminin et al. 1994). Thus in this context one may endeavour to study the changes of cause of death due to selective diseases in two different periods with respect to age and sex. The data available on ‘cause of death’ with respect to age and sex may be used for the preparation of cause specific mortality table and also for the estimation of gain in life expectancy after partially eliminating the impact of major cause of death.

The industrialization, urbanization and market and economic development in developing countries result a health transition in the health status of the people (Barry M. Popkin 2003). As a result of health transition, the profiles of major causes of mortality and morbidity have been changed. Further owing to the health transition, in developing world these countries
observed significant changes in the impact of socio-economic, demographic, environment and cultural factors and also dietary habit have on health. The changes in these factors pose an impact on the prevalence and occurrence of diseases. So one can made an attempt to examine, the impact of these factors, on the prevalence and occurrences of diseases on infant, children and the adult population of a region. In this case one may use univariate analysis as a preliminary investigation to know the impact of afore mentioned factors for the statistical significance. Further one may use multivariate technique of statistical analysis for in-depth analysis and also to examine the association and to quantify the impact of various covariates like socio-economic, demographic, cultural and environmental factors for the prevalence and incidence of the diseases. The researchers who have done works in this line among the other are Lawrence J. Fine et al (2000), Pronk et al (2004) and Ghosh and Kulkarni (2004).

Life expectancy has long been used as a summary measure for the study of health status of a population. Due to increase in life expectancy of the population in recent years factor morbidity become equally important as mortality. Health expectancy is one such indicator of health status which encompasses both the factor mortality and morbidity (Sander 1964). Health expectancy is defined as the number of years a person could expect to live in good health if current mortality and morbidity persist. So one may, investigate the behaviors of health expectancy in response to the epidemiology of diseases (Omran 1971). Moreover health expectancy collapses both mortality and morbidity into a single index; therefore its study is an important indicator for
health workers, social scientist and demographers. Moreover health expectancies are important indicators for several reasons. First, they allowing the monitoring of the health of population with a greater level of detail than traditional life expectancies (Mathers et al 2003). International comparisons of life expectancies may hide important differences in levels of morbidity and disability. This become particularly critical as countries advance through the epidemiological transition and experience increasing proportion of deaths due to degenerative diseases often preceded by a period of disability. The World Health Organization (WHO) has recognized the importance of health expectancies as population health indicators and has estimated for 191 member states (WHO 2004). The study of health expectancy attracts number of researchers and some of them are Davis et al (2001), Preston et al (2001), Nusselder W.J. et al (2003). Health expectancy of life at birth of population can be estimated by Sullivan method (1971) using life table and disease prevalence rate of a population of a region. But some time in developing countries like India life table functions are easily available but prevalence rate of diseases are difficult to get. In such situation estimation of healthy expectancy by Sullivan method is an impediment. The non-availability of prevalence rate, necessitate in developing an indirect estimation of healthy expectancy. Further here one may try to develop a mathematical formula for indirect estimation of healthy expectancy at birth in term of life expectancy at birth. The functional relation of healthy expectancy and life expectancy so obtained may be used for indirect estimation of healthy expectancy at birth for
rural, urban and total population of India, its states and district level for males and females separately.

Human development of a country may be studied by using an indicator known as Human Development index. Human development index is a composite index (Michael et al. 2007) and which measures average achievement in a country on the basis of three basic dimensions of human development: a long and healthy life as measured by life expectancy at birth, knowledge as measured by the adult literacy rate and combined enrolment ratio for primary, secondary and tertiary gross enrolment (with one-third weight), a decent standard of living as measured by GDP per capita in purchasing power parity terms (PPP) in US dollar (UNDP 2006). Human development reports (UNDP 2006) states that million’s of the world people lack access to safe water not because of scarcity, but because they overlooked out of poverty, inequality and government failure. Further in recent years due to increase in life expectancy the factor morbidity become equal importance as mortality, so one may endeavors to modify the human development index by incorporating both the factor morbidity and mortality and thereby replacing life expectancy index by healthy life expectancy index.

Statistics nowadays plays a vital in the medical Statistics. Medical Statistics deal with application of Statistics in medicine and health sciences including epidemiology, public health, forensic medicine and clinical research. Medical statistics has been a recognized branch of statistics in the UK for more than 40 years ago. Sound Statistical methods are essential in medical science, as they transform uninterrupted raw data into meaningful results (Rothman 1978).
Many pioneering medical discoveries such as cures for infectious diseases were found by doctors with the help of statistics. It is also used in clinical trials for public health for the diagnosis of diseases; find new way in which prevent disease, prolong life and promote health. In epidemiology, Statistics is used to calculate cardiovascular and cancer incident rates and monitoring disease outbreaks.

Mortality by cause of death may be analyzed in terms of death ratios specific for cause. This measure requires simply a distribution of death by cause and can be used even when population figures are lacking. A cause specific death ratio represents the percent of all death to a particular cause or group of cause. A set of cause specific death ratios readily permit comparisons from country to country or year to another for the same country, the relative importance of a particular cause or group of causes (Shyrock and Siegal 1976). Thus one may endeavor to estimate age and sex specific cause of death ratio for country and its states. ‘Cause of death life table’ is one of the important aspects of mortality. This life table high light the role of various causes of death. Besides one of the most important products of such life table is the estimated gain in life expectancy at birth if a particular cause of death is eliminated that is if the death rate from that cause is arbitrarily set to zero while death rates from all other causes remain the same. So may try to attempt to construct ‘cause of death life table’ for a country.

of cardiovascular diseases - a global challenge" opined that as expectancy of life at birth increases above 40 years it results a corresponding increases of death due to cardiovascular and cancer from 20% to 70% whereas death due to communicable diseases fall from 45% to below 10%. This observation of Darwin Lobarthe (1988) may be incorporated for the indirect estimation of cause specific death ratio death due to cardiovascular and cancer diseases. In India and its bigger states mortality due to all causes combined are available with respect to age and sex whereas mortality rate due to degenerative diseases are not easily available. Thus here an endeavor may be made for theoretical development of indirect estimation of cause specific death ratio with respect to age and sex due to degenerative diseases like cardiovascular and cancer for India and its bigger states from the secondary data.

This chapter is also devoted to review of different literatures to substantiate the findings of current study. The review of various literatures has been included with a view to improve the research design on the basis of outcomes of other researcher and to facilitate the interpretation of the results in a logical manner. The present review however, does not consider being exhaustive but endeavors have been made to refer most important and relevant literature on the study. The reviews of literatures included in the study consist of the works done in the developed and developing countries followed by India and its states.

At the World Health Organization (WHO) conference on children's health held in March 2002 at Bangkok, it was estimated that globally environmental hazard kills three million children under five every year. Further,
inadequacy of proper nutrition to children causes child mortality and morbidity, but there is now ample evidence that inadequate nutrition in childhood hinders long term physical development, reduces the development of cognitive skills, and as a consequence affects negatively schooling attainment and several outcomes in later life, including productivity, mortality, and likelihood of developing chronic diseases (Alderman and Hoddinott (2004)) and (Maliccio et.al (2005)).

Lowry et al (1996) opined the relationship between socio-economic status and risk factors responsible for the chronic diseases among a representative sample of adolescents in the United States. They examined the effect of education level of the adult members of the household and family income on five risk behaviors for chronic diseases like cigarette smoking, sedentary life styles, insufficient consumption of fruits and vegetables, excess consumption of foods high in fat and heavy drinking of alcohol. They found that among adolescents, risk behaviors for chronic diseases are common and inversely related to socio-economic status.

Human development index has been introduced as an alternative to Gross national product (GNP) to measure economic development. The United Nations Development Programs (UNDP 2006) introduced the HDI in its first Human development report devised under the able stewardship of Mahabub ul Haq (1990). Now, human development index has been used widely by the government of different nations for planning purposes. Various scholars and organization have under taken different research studies using the human development index to highlight the magnitude of human development of various
sections of the countries. This has also helped a lot for formulating different plan for the neglected sections of different countries.

The Jakarta Declaration of Leading Health Promotion in the Twenty-first century demands for increasing healthy expectancy as an indicator and narrowing the gap in between the countries and groups (WHO (1997)). Thus study of health expectancy is immensely necessary to understand the health status of a particular population. The health expectancy measures make easier health comparisons across populations over time. The results of health expectancy can be used to identify and strengthen the findings concerning health differentials and in turn to propose ways to improve health (Chattopadhyay and Roy (2005)). It incorporates both the factor mortality and morbidity as a single indicator, and therefore health expectancy becomes an increasingly used indicator of population health status (Barendregt and Bonneux (1998)). However, it has been observed that, in this part of the world, we are more interested on life expectancy rather than health expectancy as an indicator of health status.

Efforts to improve the health status of the population are a major thrust area under the social development programme being undertaken in India. The expenditure on health comprises 5.2 percent of Gross Domestic Product (GDP) with public investment at 0.9 percent (Economic Survey; 2007-08). Accordingly, technological advances, improvement in the access to and utilization of health services in the country are given due consideration in our health policies. In fact, India has built up a vast health infrastructure and man
power. However, the extent of access to and utilization of health care services varied substantially between states, regions and society.

New life style trends in developing countries not only changed the dietary habits but also levels of physical activities. The rising intake of saturated fats, animal products, salt and sugar in contributing to an increase in diet related non-communicable diseases, such as obesity, cancer, coronary heart cerevascular diseases, hypertension and type II diabetes. Diet related non-communicable diseases are today more evident in countries with a lower per capita GDP than in the recent past and have become major contributors to the burden of diseases in the developing countries. In 1995, diet related non-communicable diseases accounted for 41% of total mortality in China and 32% in India [Barry M. Popkin (2001)].

Considering the trend and development in the studies related to cause specific mortality, Manton and Stallard (1984) have developed another approach and contributed in the book “Recent Trends In Mortality Analysis” to cause of death analysis. They used the concepts from the stochastic compartment model to develop life table methods for the analysis of the data of cause-specific mortality. They have estimated the gains in life expectancy attributable to cause elimination, assuming an independent competing risk setup. They have also investigated the impact of prevention of the onset of diseases and delay in the time of death, given that a person having chronic diseases.

Hayward et al (1998) made an investigation among the resident of United State on how the major causes of death end active and inactive life in the
older population. After investigation, they observed that many of the gains in life expectancy through the reduction in major causes of death are felt in terms of increased active life, especially among the young and old man.

According to the statistics released by the International Diabetes Federation (IDF 2003), the number of diabetics in the world is expected to increase from 194 million in 2003 to 330 million in 2030 with every three out of four living persons in developing countries. Moreover, in developed countries most people with diabetic are above the age of retirement, whereas in developing nations those most frequently affected are aged between 35 and 64 and this makes burden in terms of DALY (Disability -Adjusted life years) and YLD (Years of healthy life lost as a result of disability)’s heavier in poor countries (Boutayeb et al 2004).

Incidence of non communicable disease in developing countries have been classically associated with urban affluence, but the increasing prevalence of smoking and being over weight among poorer groups the prevalence non communicable also affect these groups. Studies found that non-communicable diseases have higher incidence rate among those with a lower socio-economic status (Tony Blankely (2005)) and (M. Ezzati et.al (2005)). Owing to the malnutrition among population, the six biggest infectious killers are HIV/AIDS, malaria, TB, acute respiratory infections, diarrhea and vaccine-preventable disease and non-communicable disease like cardiovascular diseases, claiming altogether more than 14 million people per year (Brundt land, 2002). Despite the success of vaccination programmes for polio and many childhood diseases, other infectious like AIDS, TB, malaria and dengue and also some non
Communicable diseases like cardiovascular are still out of control in many developing countries. Children remain at high risk. Indeed, in 2002, of the 57 million deaths reported, 10.5 million deaths were among children of less than 5 years of age, of which 98% were in developing countries (Jones et al., 2003; WHO, 2003a, 2005).

In the developing countries, until recently, it was widely believed that economic development was indispensable prerequisite for improving a population's health status, health was often classified as a nonproductive sector. But, recent evidence showed that improved health is more than a consequence of development. It is a central ingredient of social and economic development and poverty reduction. As a result special attention is being devoted to this relationship between development and health [Ezzati et al., 2005; Freedman et al., 2005]. More and more publications are dealing with health of poor [Sanchez and Swaminathan, 2005], health equity and health as a cornerstone of sustained development (Boutayeb, 2004). According to the authors of Dying for growth (Kim et al. 2000), far from being panacea, often accelerates the suffering of poor and marginalized people. The author highlights the 'deadly synergy between poverty and AIDS' and relates other experiences concerning tuberculosis, malaria, and other diseases under economic structural adjustment policies. In another publication (Mc Michael and Kjelstrom, 2002), recalling the principle of Rio Declaration (1992) stating that humans are at the centre of concerns for sustainable development and the need to eradicate poverty, the authors state that human population health becomes more than either a determinant or an incidental consequence of economic development, it
becomes a central criterion. In the same direction, health innovative is expected to be the best solution for dealing with diseases of the poor in developing countries (Mashelkar, 2005). Empirical evidence show how investing in health can achieve economic development and poverty reduction was given in the report published by the Common on Microeconomics and Health in 2001. It was suggested that added investment in health could save at least 8 millions live each year by the end of the decade, resulting in economic benefits adding up to more than US $ 360 per day by year 2015 (Brundtland 2002).

Zaidi and Salam (1998) in their study correlated various indices denoting the life expectancy, educational attainment and real GDP per capita to other parameters of the economics of 15 major States of India for finding out the causes of varying values of these indicators in different states. The study revealed that public expenditure had a more close association with educational attainment than it had with life expectancy as the latter is influenced by the multiplicity of factors like heredity, race, climate and environmental factors apart from public expenditure on health, nutrition on and sanitation.

Jindal S.K. (1993) conducted cross-sectional surveys in India for the prevalence of chronic bronchitis and the found that it was much higher among people exposed to domestic biomass fuel.

In the context of health status of infant and the children not much work has been found and particularly among slum dwellers. Kaliath (1992) conducted a study among the slum children below 6 years in the slums of Bangalore city in India under Integrated Child Development services and found that children under 6 years were affected by the malnutrition.
Dey (2006) in the book "CHLD HEALTH-Issues and country experiences", emphasized that children's healthy growth and development are the foundations of cognitive and social development, healthy adolescence and adult life. She also argued that while formulating a health programme policymakers generally not only take care of issues like financial resources but also they consider behavioral aspects and role of community in the whole programme. Ultimately, the core emphasis should be on the development of an organized health care delivery system, so that the requires health care services should reach to the level of the society which need these facilities most.

Gupta and Rohde (2004) studied about the solution of infant and child nutrition in India. They found that child malnutrition is related to inappropriate infant and young child feeding practices and occurs entirely during the first two years. They pointed out that breast feeding had been identified as the single most effective and preventive solution in India. However, India's famous Integrated Child Development Services (ICDS) has been implanted for the past 25 years but was not successful in reducing malnutrition.

Mehrotra (2006) studied the child malnutrition and Gender Discrimination in South Asia. He found that India, Pakistan and Bangladesh account for child malnutrition rates that are higher than in Sub-Saharan African. The underlying cause is the discrimination against women in South Asia. He also found that India has the world's largest number of malnourished children.

The Hyper tension Study Group of World Health Organization (2001) conducted a comprehensive research "Prevalence, awareness, treatment, and control of hypertension among the elderly in Bangladesh and India: a multi
centre study” to examine the prevalence, awareness, treatment and control of hypertension among elderly individuals in Bangladesh and India. A community-based sample of 1203 elderly individuals were included in the study by using multistage cluster sampling from two cities Bangladesh and three cities in India. The study revealed that the overall prevalence of hypertension rate was 65%. The prevalence was higher in urban than rural areas, but did not differ significantly between the sexes. Multiple logistic regression analysis identified that a higher body mass index, higher education status and prevalent diabetes mellitus as important correlates of the hypertension.


**Robine et al (2009)** studied the relationship between and longevity and healthy expectancy.

**Pieter HM Van Baal et al. (2006)**, they estimated health-adjusted life expectancy with reference to the risk factors smoking and obesity among the cohorts that differ solely in life style (smoking vs. non smoking). Further they tested in combination with the estimate of life expectancy whether the compression of morbidity results from the prevention of smoking and obesity. They found from their study that substantial compression of morbidity can not be expected by the prevention of smoking and obesity.

In the Indian context, not much work appears to have been conducted for chronic diseases. An assessment of cancer mortality was under taken by **Jussawalla et al (1982)**. They found from their study that cancer was
responsible for approximately 3.6 percent of the total number of deaths occurring in Greater Bombay. It was the ninth and eight most fatal causes of death in males and females respectively.

P. Murimuthu (2008) studied cancer diseases in five cities of India namely, Bengalore, Chennai, Delhi, Bhopal and Mumbai with the objective of forecasting its incidence and mortality. His study revealed that death due to cancer increases with respect to age.

Sugathan et al (2006) studied the behavioral risk factors for non-communicable diseases among a sample of 6579 adults aged 30yrs to 74 yrs collected by multistage cluster sampling covering Kerala State. They observed that various behavioral risk factors like smoking, unhealthy diet, stress at home and work place, consumption of alcohol, sedentary life style etc. are known to be the various risk factor for the chronic diseases.

Chattopadhyay and Roy (2005) tried to capture health status of two groups of pensioners in Mumbai in a comprehensive manner by calculating healthy life expectancies for chronic diseases in their study. In this connection secondary data comprising a total sample of 1014 (school teacher=859, and civil servant=155) were collected from the Mumbai Pay and Accounts office, to provide information about pensioners in the two occupational groups who had retired during the period 1980-1999.

1.2 DATA BASE OF THE STUDY:

This study contains primary and secondary data and these are collected from Silchar town by direct and secondary sources. Silchar is located 24.82° N
and 92.8° E of India. It is the head quarter of Cachar district in the state of Assam. Approximately 90% residents of Silchar are Bengali speaking, the rest being Hindi speaking, Manipuri speaking and some tribal groups like Nagas. This town is the economic gate way to the neighboring state Mizaram and part of Manipur, Tripura. This town has acquired tremendous commercial important and is treated as largest town in the South Assam. As a result, this town witnesses the settlement of a sizeable population of traders from distant parts of India. Silchar is situated by the banks of Barak River in what is popularly known as Barak Valley. Over the past few years, the city is constantly witnessing a huge influx of people from nearby smaller places due to city's increasing future prospect and other developments in the field of education, medical facilities and more recently booming real estate market and other commercial businesses, making the town quite an overcrowded one. It has now one of the highest populated towns in the state, although the difference with the highest populated city, Guwahati, the capital of Assam, is quite huge. Geographically Silchar is located in the southern part of Assam. As per 2001 Indian census, Silchar has a population of 144033. But presently in every year population is increasing in alarming rate. In this population 51% are male and 49% are female. Silchar has an average literacy rate 79%, higher than the national average 59.5%; male literacy is 83% and female literacy as 76%. Major religions followed are Hinduism and Islam. The town is connected with the rest of India by road, by railway and by air respectively.
With the foregoing discussions and review of literatures, following objectives are adopted in the present study. The objectives of the present study are

1.3 OBJECTIVES:

i) To study the occurrence and prevalence of diseases among infant and the children, in Silchar town during the year 2005-06, by univariate and multivariate technique.

ii) To prepare Life Table for the year 2001 and 2006 of Silchar town for males and females separately and to study the structure and changes in cause specific mortality of afore mentioned period.

iii) To examine the impact of non-communicable and communicable diseases on the resident of Silchar town during the year 2008 and the estimation of healthy expectancies of the resident of Silchar town for non-communicable disease in the year 2002-06.

iv) To develop formula for indirect estimation of healthy expectancy from life expectancy. By using this formula indirect estimation of healthy expectancy for India for the period 1970-75 to 2002-06, its states for the period 2002 to 06 as well as for district level in the year2001. Further to estimate in direct way the prevalence of diseases in South Asian countries. Also to develop modified form of human development index.

v) Indirect estimation of cause specific death ratios for some chronic diseases in India and its states for urban and combined population (rural plus urban) and few districts of the some of states of India
during the year 2001-05. Further endeavour is also being made for the construction of 'cause of death' life table for India male and female for the period 2001-05.

1.4 CHAPTERS OF THE THESIS:

Chapter wise description of the thesis is given below:

In the chapter II, an attempt has been made to investigate the impact of socio-economic, demographic and environmental factors for the occurrence of diseases among infant and the children of a representative sample collected from the resident of Silchar town during the year 2005-06. Here at first univariate technique is used to find out statistically the significant effect of the covariates on the occurrence of the diseases and then multivariate analysis is done by using Logistic Regression Analysis to quantify and examine the strength of association of the different covariates include in the analysis.

Chapter III is devoted for the demonstration of the structure and changes in cause specific mortality amongst the adult population of Silchar town. The data for the study of 'cause of death' are compiled from the Birth and Death Registration Office under municipality Board, Silchar and population of 2001 is collected from the records of census of India and population for 2006 is estimated from the census data 2001. The age and sex specific death rates of different causes are estimated for two periods 2001 and 2006 to show the structure and change in cause specific mortality in Silchar town. An attempt is also made to estimate the impact of major cause of death due to 'cardiovascular diseases' on life expectancy after the partial elimination of this disease.
In the chapter IV an attempt is made for Multivariate analysis of non-communicable diseases amongst representative sample of population aged 30 years and above on the basis of collected data of household survey from the population of Silchar town and to examine the affect of covariate like socio-economic, demographic, cultural and environmental factors for the prevalence of chronic diseases. An endeavor is also being made for the analysis of the impact of communicable diseases on the resident of Silchar town by logistic regression analysis using field data. Healthy life expectancies of different ages for males and females are computed for non-communicable diseases during the period 2002-06.

In the chapter V, an attempt is made for the derivation of mathematical formula for indirect estimation of healthy expectancy assuming the relationship of healthy expectancy at birth and life expectancy at birth. Data used for mathematical formula is secondary one collected from the core health indicator of world health statistics for 177 member countries of World Health Organization (WHO). This chapter is also devoted for the indirect estimation of healthy expectancy for India in the period 1970-75 to 2002-06 and its states 2002-06. Here special attention is being made for the estimation of district level healthy expectancy for the census year 2001. An attempt is also made for the estimation of prevalence of diseases in South Asian countries. Further modified form of Human development Index is developed by replacing life expectancy at birth by healthy life expectancy at birth.

In chapter VI, we made an attempt for the indirect estimation of cause specific death ratio for urban and combined (rural plus urban) population of the
states of India and for population in district level for some states due to chronic
diseases like 'cardiovascular' and 'malignant neoplasm'. Here indirect
estimation is made by developing regression equations of cause specific death ratio (csdr) for the ages above 50 years corresponding to life expectancy at birth for males and females from the data obtained from the cause specific mortality table of various countries of the world. Also an attempt is also being made for the construction of 'Cause of death life table' for India for males and females during the period 2001-05.