Social Epidemiology: The Theoretical Framework

The approach of 'social epidemiology' has to be understood within the history of development of epidemiology and also the current state of affairs of the debates within the discipline.

Epidemiology: A Historical perspective

Epidemiologists aim at describing health and disease phenomena in population groups, their determinants and changing patterns over a certain period of time. Epidemiology is also now the instrument of choice for measuring effectiveness. This role can be extended to forecasting the outcome at the planning stage [Goodman A Richard 1990]. The use of epidemiology for choices in health policy implies a double leap forward: a leap from the ranking of diseases to the setting of priority objectives for action and a leap from technical priorities to allocating resources on a selective basis [Andre' Prost 1993]. Thus the current multiple uses of epidemiology in public include the following:-

i) Investigating the modes of transmission of a new disease.
ii) Determining preventable causes of disease.
iii) Determining the natural history of disease.
iv) Studying biological spectrum of disease.
v) Evaluating community health intervention.
vi) Setting disease control priority.
vii) Improving the diagnosis, treatment and prognosis of clinical disease.
viii) Improving health service research

Since the development of epidemiology as concept, practice and discipline, it passed through different eras, which are analogous to public health movement and its growth. In fact, initially it was a branch of public health [Dietz AT 1997]. In the face of the miseries in 19th century England – the advance guard of industrialization and rapid urbanization – modern epidemiology gradually took shape and then burst into activity with the sanitary movement [Neil Pearce 1996, Mervyn Susser 1996]. There have been three distinguishable eras in epidemiology, each with its own dominant paradigm.

i) The era of sanitary statistics (first half of 19th century) with its paradigm 'miasma', i.e. poisoning by foul emanations from soil, air and water. Preventive approaches had been taken like drainage, sewage, and sanitation after demonstrating the cluster of morbidity and mortality.

ii) Infectious disease epidemiology (late 19th century through first half of 20th century) with its paradigm "Germ Theory", i.e. single agents relate one to one to specific diseases.
Analytic approach is mainly confined within laboratory isolation and culture from disease sites, experimental transmission and reproduction of lesions. Preventive measures had been taken through interrupting transmission like vaccination, isolation of the affected through quarantine and fever hospitals and ultimately antibiotics.

iii) Chronic disease epidemiology (later half of 20th century) with its paradigm black box i.e. exposure related to outcomes without necessity for intervening factors or pathogenesis. Analysis is being done through risk ratio of exposure to outcome at individual level in population. Preventive approach is by controlling risk factor by modifying life-style (diet, exercise, etc.) or agents (food etc.) or environment (pollution, passive smoking etc.). [Neil Pearce 1996, Mervyn Susser 1989, George Rosen, & Thomas T McKeown 1971, 1977]

Thus, while there have been significant developments in epidemiologic methodology during the past century, including changes in basic concepts, methods of data analysis and methods of exposure measurement, the key issue has been the shift in the level of analysis from the population to the individual. The current dominant trends lack the interest in population level factors as causes of disease, the lack of interest in the history of epidemiology and the lack of integration with other public health activities [Mervyn Susser 1996 (a, b)]. Neglect of social, economic, cultural, historical, political and other population factors have been strong trend in epidemiological methods among modern public health professionals, teachers and researchers [Neil Pearce 1996, Mervyn Susser 1996 (a, b)].

Traditional epidemiology has become unfashionable and is treated somewhat disparagingly in modern texts. There is a strong focus on statistical issues and paradigms and an ignorance of the other modes of thought that were integral to the work of 19th century pioneers such as John Snow. Epidemiology has become a set of generic methods for the measurement of disease occurrence and there has been a concomitant lack of distinct theory to permit an understanding of the demographic pattern of disease occurrence. Most modern epidemiologists still do studies in population, but they do so in order to study decontextualized individual risk factors, rather than to study population factors in their social and historical context [Mervyn Susser 1989, 1996 (a, b), Neil Pearce 1996, Goodman A Richard 1990]. It has been argued that what is now regarded as established epidemiology is characterized by bio-physiologic reductionism, absorption by biomedicine, a lack of real theory about disease causation, dichotomous thinking about disease (everyone is either healthy or sick) a maze of risk factors and confusion of observational association with causality. This approach diverts limited resources, blames the victim, produces a lifestyle approach to social policy, and decontextualizes risk behaviors.

Traditional epidemiology was not a monolith. A wide variety of approaches were used and there is a danger of setting up caricatures of ideal types. It should be emphasized that traditional...
epidemiology gave rise to modern epidemiology. The population-based inferences had fallen into decline with the emergence and success of the germ theory. The decline in infectious disease (essentially due to improvement in nutrition, sanitation and general living condition through effective public health measures) and rise in relative importance of non communicable disease led to the development of a new epidemiologic paradigm further reducing the importance of population based study. [Krieger N 1994, Papas G 1993, Smith GD 1994, Neil Pearce, 1996, 1985, Mervyn Susser 1989, 1996 (a, b)]

There are still major socio economic differences in health and the relative differences are continuing to increase. Nevertheless, modern epidemiologists rarely consider socio economic factors and population perspective except perhaps to occasionally adjust for social class analyses of the health effects of tobacco smoke, diet and other life style factors in individuals. In many contemporary epidemiological studies, economic status has been briefly mentioned like just income range or ordinal variation of SES (very poor, poor ..... rich). All these factors are described individually and there has been little attempt to establish inter linkages among these socioeconomic and various cultural factors. Due to lack of establishing the process among these factors, there was no clear understanding of disease occurrence and distribution. Moreover, population is often understood as just sum of some individuals.

Perhaps, tobacco smoking and its linkage with lung cancer and other diseases and also with Government policy is the best example of modern epidemiology (risk factor epidemiology) which failed to address the main issues which are primarily responsible for smoking habit and consequent ailments (such as why manual workers smoke more than non-manual workers, why urban upwardly mobile women smoke more than middle or lower class women). Further more, due to strict rules and regulations in developed nations many multinational tobacco companies are shifting their promotional activities to developing countries, to generate markets. Taking advantage of weak rules and regulations in developing countries, young people here are given free cigarettes and promoting cheap tobacco is promoted. But influencing government of poor countries in amending laws against the tobacco giants have never been addressed in any modern epidemiological research. Legislation to restrict advertisement of tobacco and smoking in public places is a clear indication of the individual life style approach, which is an essential component of the modern epidemiological approach. It also shows a failure to apprehend the tobacco problem as it lies in its consumption not in production. In fact very recently WHO accused tobacco giant (like Phillip Morris) and global financial institutions nexus in blocking its global anti tobacco campaign. [Ong E, 2000] In the globalised world the health problem has become more complex as varying degrees of socio economic and political issues ranging from local to global context playing major role in determining health status of every citizen in the world.
Looking Beyond the Dominant Contemporary Epidemiological Paradigm

It is important to keep in mind that epidemiology is first and foremost, a branch of public health. But we cannot also deny the utility of recent advances in methodology in all disciplines. In fact, it is necessary to take a scientific approach to discover the major causes of disease in populations. Presently the disease pattern has become more complex and varied in nature and adoption of modern technology has become popular trend. However, if the goal is to understand and prevent the causation of disease in the population, then epidemiology should start at the population level and then address the major determinants of health and disease at this level. The question is whether the present state of epidemiology would be reformed to bring back the population perspective or would the present trend continue or both the perspectives would be taken into consideration according to need.

Indeed, epidemiological studies in a population involve individuals who have specific exposure, but important distinction is whether or not the etiologic framework is conceptualized at the population level and whether or not these exposures are placed in their social and historical context. Moreover, the "populations" that epidemiologists study are not just collections of individuals that are conveniently grouped for the purposes of study. They are groups of people having their own history, culture, organization and economic and social divisions, which influence how and why people are exposed to particular factors.

The explanation of disease causation operates at different levels of analysis. Just as occurrence of disease within a population can be studied at many different levels – including population, individuals, organs, tissue, cells and molecules – the causes of disease can also be studied at these different levels, including socio-economic factors, lifestyle, the organ burden and DNA. Although, specific risk factors may appear to operate at the individual level, exposure and susceptibility may occur due to a wide range of political economic and social factors. For example, the factors leading to high child mortality rates in developing countries can be identified in three main tiers. Proximate tier includes the immediate biomedical conditions that result in death (involving interaction of major nutrition and infection), the intermediate tier includes child care practices and other behavior that increases the exposure of children to factors on the proximate tier and the ultimate tier encompasses the broad, social, economic and cultural processes and structures that lead to the differential distribution of basic necessities, especially food, shelter and sanitation [Millard AV 1994].

There are two main approaches to understand the various pathways of disease process i.e. bottom up approach and top down approach. The bottom up approach is inherently reductionist and positivist. This approach focuses an understanding the individual components of a process at the lowest possible level and using this information as the building blocks to gain
knowledge about higher levels of organisation [Neil Pearce 1996]. For example, molecular epidemiology attempts to understand disease at the molecular level and ultimately aims to use this knowledge in public health policy [Loomis D 1991]. This approach originated from clinical approach and is typified by an emphasis on the individual on specific risk factors and on the use of the random used clinical trial as a paradigm. This approach lacks distinctive theory regarding the occurrence of disease at the population level. It is inappropriate in studies that require a consideration of the historical and social context.

On the contrary, a top-down approach originated from the demographic tradition and starts at the population level in order to ascertain the main factors that influence health status within the population. This approach is inherently realist because the causation is seen as resulting from mechanisms that are internal to the population under study and that operate dialectically, rather than involving regular association between external independent objects. [Loomis D 1991] The top-down population approach is implicit in traditional definition of epidemiology i.e. "the study of the distribution and determinants of health related states or events in specified population and the application of this study to control health problem [Last JM 1988].

Thus epidemiology is inevitably entangled with society, and it is not feasible or desirable to study the causes of disease in abstract. One needs to understand the historical and social context and to emphasize the importance of diversity and local knowledge rather than only searching for universal relationship. This requires a greater involvement from the social sciences and a more multidisciplinary approach. Epidemiology is one of the approaches by which the major determinants of health in the population can be addressed and it should be complemented by other quantitative approaches from the social sciences, as well as qualitative and historical studies. The emphasis should be on using appropriate methodology rather than making the problem fit the method. [Firth WJ 1991, McKinley JB 1993, Dean K 1994, Lilienfeld A 1982, Adler NE 1993, Terris M 1979, Mervyn Susser 1996 (a) & Goodman A Richard 1990]

Social Science in Medicine

Discovery of role of social factors in human health began at the dawn of the public health movement. Physician Rudolf Virchow, doyen of public health stated "Medicine is a social science in its very bone & marrow" [Rodney M Coe 1970]. He also said 150 years ago that, "Doctors are the natural advocates of the poor, and social problems are largely within their jurisdiction" [Lee P 1999]. The Hippocratic writing too paid explicit attention to the social environment as an etiological factor and deals specifically with the doctor patient relationship as a therapeutic tool. Indeed, this classical Greek writing provided an orientation towards the sociology of medicine, which is still suggestive [Rodney M Coe 1970]. George Rosen, famous medical philosopher, historian and epidemiologist stated, "Medicine evolved out of a social need", and supported the statement of Hippocrates [Mervyn Susser 1987].
Disease is a universal phenomenon and affects all people everywhere, but not always in the same degree or in the same way. Sociological knowledge and research techniques are applied to study how diseases affect human groups and the ways in which groups react to disease [Rodney M Coe 1970]. The study of the distribution of diseases in society, of cultural perspective on disease, on the way of staying healthy, of the role, attitudes and values emerging from the social organisation of treatment centers and of the relationships of the treatment and support facilities are all subjects within purview of sociology.

Sociologists divided the approaches towards the society in the context of health into its four dimensions:

(i) Economy
(ii) Polity
(iii) Social structure
(iv) Culture.

The economy incorporates the forces and relations of production or relating to the production, distribution and allocation of goods and services. The polity relates to the power equation between different social groups, as well as to the institutions, which regulate power relations, notably the law and the state. Social structure means those social arrangements that are critical to the reproduction of social units, for example, family and kinship (including gender relations), caste and community. Lastly, culture embodies characteristic forms of collective self-expression (ritual, music, art) as well as ideas and ideologies that influence social life, whether religious or otherwise. These four dimensions help the sociologists to analyze the health-related problems but it is noteworthy that society does not divide itself so clearly. As far as the diseases caused by environmental hazards is concerned, a fifth dimension – the ecological infrastructure of human society should be included. It includes soil, water, flora, fauna, climate etc. The ecological infrastructure influences the evolution and direction of human economic life, political relations, social structure and ideology. At the same time human intervention through its different ways reshapes the natural environment as well. Thus a sub discipline “Social Ecology” has been evolved. It is inter dependence of the biophysical and socio-cultural domains. Ecological infrastructure juxtaposed the aforementioned four dimensions – economy, polity, social structure and culture. That gave rise to categories of social ecology.

(i) Ecological Infrastructure (soil, water, forests etc.).
(ii) Economy (forces and relations of production trade).
(iii) Social structure (family and kinship, caste and community).
(iv) Polity (relations of power and law).
(v) Culture (religion, ideology) 

[Bottommore TB 1971, Guha RC 1994]
Cultural perception of health problems, their cultural meanings and the cultural responses to their problems, both in terms of formation of various institutions to deal with various health problems and actual health behaviour of individual or groups, form this sub-cultural complex. Because of its cultural connotation, health culture is subjected to change as a result of cultural innovations, cultural diffusions and purposive interventions from outside to bring about a desired change in health culture. Health culture undergoes change with changes in the overall culture and any change within it has repercussions on the overall culture. Further as health problems of a population are usually a function of the latter's ecological background, cultural, economic and social setting and the political structure, it is possible to once again link the entire spectrum of health culture to these issues because health problems form a key factor in the shaping of the health culture of a population [Banerji D 1972, Sheo Kr Lal 1987].

Although relevance of social science in health has been established and different methodologies have been generated in the purpose of research and professional training, its context specificity should be kept in mind. The developing countries, which are different from developed ones in all aspects, require different methodologies. Inadequacies and irrelevance of methodologies undermined the efforts to perceive the health status, culture, and disease trend of any particular society [Banerji D 1963, 1973]. Indian Council of Medical Research and Indian Council of Medical Research (ICSSR/ICMR) report emphasized on socio-cultural research to enhance the acceptability of useful modern technology to study the relationship of health to society and sociology or economic of health. [ICMR / ICSSR 1980]

Epidemiology and Social Sciences: Inter-linkages at Disciplinary Level

Epidemiology and social sciences have been closely linked since their emergence as disciplines. In fact, both developed during the period when Europe and America witnessed industrial and political revolutions (19th century). The social science which can accordingly be traced to Western Europe in the 14th – 16th centuries, when quantification of phenomena – whether motion of planets, passage of time, pitch of music, or balance of trade – become a potent new mode of describing and predicting events of the heavens and earth. The term, epidemiology is coined and gains currency in 1802, when Don Joaquin Villalba publishes "Epidemiologia Espanola", a chronology of epidemics in Spain. It quickly encompasses the era's new quantitative investigations of mounting outbreaks of deadly diseases, both old (e.g. typhus) and new (e.g. cholera and yellow fever). During this period (industrial revolution) the distinction between epidemiology and social sciences are imposed chiefly by hindsight. More germane is their new and common cause: "application of the numerical method to living beings in all their social relations," as defined by William Guy (in 1839), an early member of both the London statistical Society (founded in 1834) and the London Epidemiological Society (founded in 1850). [Kaufman JS, (a) 1994, Neil Pearce 1996, Mervyn Susser 1989, 1996 (a)]
Vellerme in France, William Farr in England, Virchow in Germany and Quetelet in Belgium, empirically investigated links between societal conditions and health. Seeking to discover “laws of society” as precise and “objective” as those of Newtonian Mechanics, they nevertheless find themselves embroiled in raging battles over classification and causal inference. Moreover, conceptual controversies erupt over the meaning of population data themselves. Is a population’s average value simply an arithmetical contrivance? Is it a tally of discrete individual events? Or as argued by Emile Durkheim a collective trait that is a property of societies, not individuals? But, eruption of these questions and controversies about meaning of population data proves their presence and relevance in epidemiology and social sciences as well. Due to common population focus, drawing upon each other’s methods and ideas were normal practice between epidemiologists and empirical social scientists. Charles Booth in England (1890), followed by Kelley in US (1893) conducted mass social survey and further combined individual interviews, participant observation to provide an unprecedented view of extent, contours, and causes of material and social deprivation, mapping of health hazards etc. Epidemiologists adapted these methodologies and applied in following periods. During this period, a stream of US epidemiological research explicitly began to incorporate social science perspectives, leading to new etiologic insights and data relevant to public policy.

Following this Julia Lathrop (first woman to head a major US Federal Department – US Children’s Bureau) sponsored the first substantial prospective epidemiological analyses in the United States; the health outcome is infant mortality, with studies focusing especially on its socio economic and nutritional determinants. Edger Sydensticker, a trained economist and the first statistician employed by the US Public Health Service studies health consequences of low wages (1916). He suggested that the epidemiology students should be trained not only in the etiology of disease and in human pathology, but also in social sciences. Goldberger, in his work on etiology of pellagra, created new economic scales relating family income to the number, age and gender of persons supported by this income and used this scales along with the study of inter and intra familial patterns of food consumption to demonstrate that pellagra is a dietary deficiency disease whose incidence is driven by social disparities in access to food and determined by wages, access to markets selling fresh produce and ownership of garden plots.

Rosen suggested that public health professionals should familiarize themselves with concepts and methods of the social sciences. Cassel encouraged epidemiologists to draw on “biological, psychological and social theories to define some of the general social processes that could be regarded as potentially deleterious to health. He urged incorporation of social science theory as a source of hypotheses in epidemiological research and investigation of social conditions as out right determinants of health. On the other hand, sociologist E S Rogers encouraged the social scientists to join with epidemiologists and others to elucidate how the

Social Epidemiology

Social epidemiology can be broadly defined as the study of the relations between "social factors" and disease in populations [Kaufman JS 1999 (a, b)]. In other words it is a method and approach, which provides a foundation for researching and for understanding the contributions of social factors and processes to patterns of health and illness in populations. Social epidemiology utilizes the social survey method, including retrospective and prospective designs, to determine the "causal" relationship between social factors as the independent variables and disease states as the dependent variables, examination of the social construction of health and its implications for measuring morbidity, in essence to develop models that explain how the social factors act as a causative agents [Rodney M Coe 1970, Paul F Lazarsfeld 1968]. Social epidemiology deals with the influence of social, behavioral, cultural and demographic factors on disease process and consequences (impairment, disability and handicap) at population level [George W Lowis 1990, Morris JN 1982]. Traditional epidemiology, which arose in the aftermath of the industrial revolution and its consequent social upheavals in Europe in the 19th century did consider these dimensions, the causative factors having been divided into host or human individual variables, agent or disease carrying variables and environment or the surrounding medium within which agent and host interact [Rodney M Coe 1970].

Kaufman and Cooper argued that the modern epidemiological methods are ill suited for considering social risk factors [Kaufman JS 1999 (a, b)]. Moreover in the name of advancement of new statistics, which Guy envisioned, is no more the actual field of 'statistics'; it is now the biometry of Karl Pearson, with its correlation coefficients and Galtonian emphasis on genetic and eugenic theories of disease causation. Thus, modern epidemiology failed to address illness pattern, causes and consequences in the community. However, the growing deviation of modern (or main stream) epidemiology from social perspective has not remained unnoticed. There has been a renewed effort to integrate epidemiological and social sciences and social ferment played a major role. Civil rights movement, protests against Vietnam war and movement in central America, South Africa, Women's and gay liberation movement, environmental activism, movement against globalization and neo colonialism, state repression in different countries are few examples which re-established and strengthened the binding force between epidemiology and social sciences. In this context, there has been a growing debate on legitimacy, ideology and practice of any science – whether "social" or "natural" – that disregards social and economic inequality, discounts environmental degradation, cleaves "facts" from "values" and separates "body" from "mind". Also, the Black Report, published in England in 1980 by a government appointed working group comprised of epidemiologists, physicians and social scientists, highlighted existence of disparities and growing inequalities and their impact on health even in the
world's wealthiest nations. These phenomena provoked another generation of social epidemiologists to rediscover and extend analyses of links between social inequality and population health within and across nations. In their social epidemiology paradigm, environmental aspects mainly deal with social, behavioral, cultural and demographic variables and therefore it can be called social environment [Leonard Syme S 1965, 1966, 1976].

In conceptualization of social epidemiology, Karl Evang a stalwart in public health, social policy and socialism, played an important role and greatly influenced international thinking about concepts of health and about how the welfare state was to approach health protection and medical service delivery. He emphasized decentralized and democratic control of health matters, strong position of social matters in health administration and expanded the concept of the primary health care system. His ardent belief in incorporation of political movement in health matters proved right in different corners of the world [Knut Ringen 1990].

Lack of causal explanation is a common criticism of epidemiology. [Muntaner C 1999] On the other hand social epidemiology provided more deliberate and creative approaches to causal inference. In the era of increasing social inequality valid approaches for the study of social factors and health are needed more urgently than ever [Kaufman JS 1999 (a, b)].

Social epidemiology is essentially the epidemiological study of the social distribution and social determinants of state of health, implying that the aim is to identify social and physical environmental exposure that may be related to a broad range of physical and mental health outcomes, social and physical consequences of disease and prevention. In other words, social epidemiology emphasizes the social contexts in which people live and considers the effects of the social and political system on people's health. The field incorporates the concepts and methods of "disciplines range from sociology, psychology, political science, economics, demography and biology". Social epidemiology embodies a new focus on the community as an entity in itself, an entity more complex than the sum of the individual persons who make it up, but one that acts on and through those people to influence the health status of each. This approach represents a conceptual shift in epidemiological research and theory. It highlights features of the social world to which biomedical studies are ordinarily blind. The recent developments within epidemiological method have enabled us to address new issues in terms of non-experimental studies of mechanistic questions in disease etiology, including studies of the impact of social position of individuals in different social contexts. [Lynch JW 1997, Kaufman JS 1999 (a, b), Diez-Roux AV 1997]

The aim of social epidemiology is to characterize, quantify and analyze social stratification of health and health care, effect of social system on the distribution of disease, focussing on the mal-distribution and social inequality in health. Both quantitative and qualitative methods are used in data collection and in analysis of social, cultural and gender difference in health consequences
for people so as to undertake preventive and curative interventions within the given system. This perspective shifts the vision from the contributions of individual risk factors to the contributions of social factors and roles on the development of health, which is often expressed in terms of life expectancy, morbidity, mortality and so on. Furthermore, the establishment of interlinkages of various social factors is an important contribution of social epidemiological study.

Economic status, gender, ethnicity, cultural practice, social values, education, access to health care and its quality, environmental condition, occupation, social security, sedentary habits, food, addiction, behavioral pattern and stress at micro level and political structure, developmental policy and technological choice at macro level determine the health status at individual level to the citizens of the whole nation. Population exposure to microorganisms or toxic chemicals or stress related ailments are results of acts of these factors. Several studies conducted in various parts of the world show the roles of social factors and dynamics, which acted upon disease causation or prevention. The complex nature of the interaction among various factors is essentially context specific. Therefore any attempt to construct any universal theory on the interlinkages among all the social factors will be inappropriate.

Social epidemiologists seeking to apply techniques in disease research should articulate thoroughly delineated theory of disease transmission based on nature and behaviour of disease agents and physiological / immunologic responses along with comparative body of quantitative work describing more complex social interaction within human population in specific context that might underlie race, gender and social class effects. At this point social epidemiologists must integrate biologic knowledge of the outcomes with sociologic and economic knowledge of the exposure to postulate a “system” that could have operated to configure the data as they were observed [Kaufman JS 1994, 1999 (a, b)]. In the context of chronic arsenicosis, which affected life of thousands of people in West Bengal, there is an urgent need for social epidemiological research. The disease is not merely a biological phenomenon of interaction between arsenic compound and exposed human individuals; rather it should be understood from a social epidemiological perspective.

Consequences of Disease: Another Dimension of Social Epidemiology

Impact of disease does not limit itself only to clinical manifestation of the affected individuals, rather extends further like abnormality of physiological, anatomical & psychological structure or function of body, leading to restriction or lack of ability to perform customarily normal activity and eventually causes disadvantages in fulfilling normal life roles or develop their own ways of coping with their health problems. As the whole consequences are the result of disease; it is logical to incorporate them in the social epidemiological study. This is what gives "social
meaning' to the problem to the affected people in a given socio-cultural and economic setting. [Banerji D 1992]

In biomedical paradigm, disease consequences focus on the physical outcomes and is broadly based upon the concept of natural history of disease in individuals. According to them, natural history of disease signifies the way in which a disease evolves over time from the earliest stage of its pre-pathogenesis phase to its termination as recovery, disability or death, in the absence of treatment or prevention. Whole natural history of disease is divided into two phases (pre-pathogenesis and pathogenesis) – first phase includes the process in the environment and second includes the process in human body. The pathogenesis phase includes clinical symptoms and signs, illness, defect, chronic state or recovery or death. [Park 2002] For instance the natural history of tuberculosis has been described in individuals divided into five phases (i.e. primary TB infection, primary illness, generalized dissemination, localized extra-pulmonary TB and adult type of disease). Based on epidemiological studies it has been worked out that in 3-4 months of the primary infection, about 5-10% of the infected individuals progress to primary TB with clinical evidence of disease (phase II). But most of the primary disease runs a benign course; lesions generally heal without treatment and without complications. Only a very small proportion of primary infection progresses into chronic disease. [Gothi GD 1978] This observed course of the disease has been explained on the basis of the characteristics of the causative organism and its interaction with the person's immune system. If natural resistance increases, virulence of TB bacilli decreases and infection also declines. Poor quality of life, poor housing, overcrowding, malnutrition are interrelated and contribute to the occurrence and spread of tuberculosis. In fact TB began to decline in western world before the advent of chemotherapeutic drugs. This has been attributed to improvement in the quality of life. [Gothi GD 1978, Park 2002]

Social consequences of disease have been studied by social scientists. Taking examples of TB, leprosy and HIV infection, they have studied how social consequences including discrimination, stigmatization, gender bias, economic losses, psychological effects affect the individuals and their families. Apart from human loss TB leads to physical suffering, mental anguish, wage loss and impact on national economy. As TB affects poor people who do not have social security, the disease could cause havoc to whole family. [Dubos Rene] The study of leprosy in Tamil Nadu, India shows how shyness and social isolation restrict the leprosy patients from seeking treatment in government clinics. The disease also restricts participation in religious and cultural program. [Rao KV 1982] HIV infection has terrible impact on household economy as it primarily affects the adults in their economically productive life and the disease is associated with high level of discrimination and stigmatization. Poor health service delivery system further increases the suffering of the people. [Nelkin Willis 1991, Michael Bloor 1995, Peter Godwin 1998, Indrani Gupta 1998, Tony Barnett 1998] Thus it shows that the consequences of disease does not limit up to body and mind of individuals, rather affects quality of life of individuals, their family and society depending upon its nature and extent of spread.
At a macro level, historians and political scientists and sociologists have examined the wider societal consequences of disease. They found how epidemics of communicable diseases in past centuries affected over all economy and social life in the countries. During the colonial period in India, migration, slavery, poor sanitation, population congestion, poverty, malnutrition led to bouts of cholera in endemic and virgin areas, which resulted in death of thousands of poor people. Occurrence of famine aggravated the situation in terms of suffering and death. Plague epidemics during the same period caused loss of innumerable lives. Both plague and cholera had severe impact on revenue in terms of agricultural and industrial production and also affected social stability. In addition to that there was international pressure and threat of trade embargo on British government in India due to fear of spreading the disease in Europe. The British government demolished slums in Bombay, flushed all lanes with seawater, detained and restricted movement of people (particularly Hindu and Muslim pilgrims), to stop spread of plague. Responsibility was given to small European doctors and civil servants from municipal councils to handle the situation. The hospitals were established to treat all suspected plague cases regardless of their caste and religion background. Death of some higher caste people who were kept along with lower caste patients created lot of anger among them and eventually many hospitals were forced to close. Reports said that the death and suffering due to both cholera and plague among Europeans were less as compared to Indians as Europeans lived in much better condition. Epidemics during colonial past not only portrayed how inequality, oppression, racial discrimination and exploitative nature of colonial rulers leading to death of poor Indians but also the coercive measure, which incremented their suffering [Arnold David 1993]. The recent plague epidemic in Surat, Gujarat (1994) mostly affected the people who lived in congested slum and industrial areas lacking basic sanitation and other civic amenities. Panic because of the epidemic led to an exodus of the population and it particularly affected the economy of poor labor class, who had come from rural areas in Gujarat and other states. Many people died due to poor management of epidemic control [Shah Ghanshyam 1997].

Thus, through an interdisciplinary approach, the consequences of disease can be studied for the biological and/or social consequences and at individual or at societal levels. As described earlier that dominant stream of epidemiology deals with 'risk factors' and extent of disease in a linear manner without relating social context and processes. Social epidemiologists take into account biological, environmental and social context in epidemiological studies. Further there are other studies, which add people's perceptions and behaviors into the epidemiological conceptual framework. [Banerji D 1963, Sathyamala C 1997] People's perceptions are highly relevant in public health policy as they are rooted in their socio-historical context, that is responsive to changes in context and that highlights those linkages that they perceive as critical to health. [Ritu Priya 2001] Furthermore, depending upon the perception and meaning of a health problem, communities through their intrinsic mechanism of innovation, develop their own ways of coping with their health problems. [Banerji D 1992] While social epidemiologists argue that social
conditions influence the health outcomes, they generally limit themselves up to the determinants of occurrence of disease and intervention based on that. [Lisa Berkman 2000 (a, b, c), John Lynch 2000, Sally Macintyre 2000, Marmot MG 2000, Ross C Brownson 1998, Staffan E Norell 1995, Thomas Timmerek 1998, PAHO 1988, Terence Ranger 1992] Keeping this limitation in mind, the present study was conceptualized based upon the framework of social epidemiology, but adding to it another dimension – that of studying the social context not only for determinants but also for understanding the consequences of the problem on lives of the affected people.

In order to study the consequences of disease, WHO defined impairment, disability and handicap, which are discussed in greater detail in the next chapter. It was a pioneering effort to measure the consequences of disease and till now it has been the only tool available, despite having several limitations. Nevertheless, the approach could focus on exteriorization of disease, restriction of customarily normal activities and disadvantages in life encountered by the individuals. Although the approach focuses on individuals, it incorporates the roles and obligations required to play respectively in the society by affected persons. [WHO 1980] However, it does not extend to incorporating the societal impact.