Human maladies have been a matter of universal concern in all times of history and have attracted the attention of both the specialists and non-specialists alike. Health and disease having direct influence on man's capacity to work and create cultural environment have always been regarded as a relevant subject of study in the field of geography.

It is, however, accepted that the application of medical knowledge had brought recently more significant changes in the field of health, while the other developments in the field of social and physical sciences have radically altered the conditions of life and the fuller use of medical sciences has systematically affected the maintenance and the quality of life itself. In fact, it is with the available knowledge and acceptance of modern theories of the communicability of disease and thereby the acceptance of the responsibility by the state administration it became possible to eradicate killer diseases and remove the prospects of pre-mature deaths from all such sources that were taking the heaviest tolls of life throughout the region's history. Essentially, these achievements were quite important for controlling the communicable diseases and to ward off susceptible populations, thus the need for the health and disease ecology gained solid ground as an important branch of study in the field of geography.

But the study in between natural and human phenomenon is not very easy to make and often it has been argued that geography makes no such distinction and thus, it bridges the gap between physical and social sciences. As such many fields of learning which encompass many divergent interests and increasingly follow many academic specialisations in overlapping field of study. It is on this
interdisciplinary ground lies the common knowledge and interest between geography and medicine, which is widely known as "Medical Geography".

Consequently, the modern connotation of Medical Geography has basically emerged to express the principal idea of the geography of health and disease (May, 1950) and as such medical geography seeks a rational and systematic analysis of the disease incidence and related etiology of the disease causing factors on the regional and physico-cultural environment of man. The present study is fairly based on the general concept and fundamentals of disease and medical problems as defined by May (1950) and the American Geographical Society. Also it considers some commendable work on the geography of health and disease as have been done by stamp (1964), McGlasham (1972), Learmonth (1958,1961) and Park (1980).

However, the concept in the degree of health makes up a continuum from the deal of an absolute physical, mental and social well being through variations of diseasedness to death. In fact, this study ecologically considers the combined action of the three factors namely, agent, host and environment. Ecologically these factors seem to form definitely an epidemiological triad. The geographical study of disease is, therefore, basically structured on the regional analysis of the role of the characteristics of the host, the contact of the agent and the elements of the physical environment which show some interaction between themselves, so it may show the ranges from single isolated case to epidemics.

In this context the various diseases which are classified basically in the communicable and non-communicable category can be relevant subject for any study, but the direct relevance to this
research work is here concerned with former category for the disease analysis. In this regard the communicable diseases are defined those, which pass from sick person to a healthy person and are carried by tiny living things called micro-organisms. This study from the geographers point of view is initially concerned with the relationship which prefer to adopt ecological approach which encompasses the health as a state of dynamic equilibrium or adjustment between man and his total environment.

For the regional analysis of the communicable diseases the Ganga-Yamuna Doab has been selected. It is one of the poorest and most populous part of India and presents almost all the problems of underdevelopment that faces the country in quite an acute form. And so the high density of the population, variations in socio-cultural cross-sections and historical evidences of repeated outbreaks of certain communicable diseases both endemically and epidemically are salient features of the Doab which have led to the selection of this region. This area fulfills all such requirements for the work of geographic investigation where definite role of social and environmental factors in the incidence of communicable diseases may reasonably be explained. For present study only the major diseases of the communicable category namely, Cholera, Smallpox*, Malaria, Dysentery, Diarrhea and Tuberculosis have been selected.

The principal aim of the present research project is to compute and examine the correlations between the incidence and distribution of

* Smallpox was a dreadly feared disease during fifties and mid-sixties, and also showed a high mortality rate but gradually it was eradicated and no statistical information is available after 1981. So despite all such claims, the disease as such can not be said to have lost its importance, therefore, this study is carried out for the academic interest.
the selected diseases as well as to identify such factors which are intricately related with the physical and socio-cultural environment in the Doab and thereby to examine the regional pattern on the relatively disease-prone and disease-free areas of this region. In order to achieve this objective it was proposed to divide the region into sub-regions on the basis of indices of correlations. In this regard the data were collected for twelve decades of which data of thirtyone (31) years from 1951 to 1981 were studied in details among fourteen districts of the Doab. For each district the data were organized into twentytwo (22) columns represented by the dependent 5 (diseases) and 17 independent (variables) and these factors were employed in the correlation matrix to be suitably used through computer programming packages for correlation analysis. Here the method of principal factoring followed by the varimax rotation was used in the factor analysis indices in order to highlight the regional picture of socio-environmental factors. Also the multiple regression was conducted in order to develop better comprehensions about the relationship between various variables considered in this analysis.

The whole research work comprises three parts. Among the three broad sections of this thesis: the first part consist of five chapters in addition to Introduction which is mainly devoted with the identification of the problem of health and disease conditions. It also describe the relevant determinants which explain dynamics of the affected population due to mortality conditions with probable significance and identification of the problems in its real perspective.
The first chapter deals with the theoretical framework highlighting the relevant concepts, the survey of the literatures, definitions and well-accepted methodologies for bringing out the cause and effect relationships in the geographical phenomenon of particular disease by the use of multifactorial analysis in this field study of Medico-geography. Chapter two is devoted to the introduction of the area of study as it legitimately describes detailed projections of the chief characteristics of the physiographic and climatic conditions for showing the personality of the Ganga-Yamuna Doab. Third chapter embodies the socio-demographic conditions and the principal characteristics of the population which can give a reference to the growth, distribution along with age-sex structures. It is meant to explain the broad background of the demographic scenario and pin-points either directly or indirectly conditions which affect health and mortality situation.

Chapter four is devoted to basic problem of health and hygiene. It defines the general state of the health in the Doab and provides a general discussion of the infant, age, sex-wise and general mortality incidences and brief appraisal of past and present communicable diseases as found in the region. It also explains the conditions of health clinics and of the hospitals as are available to the masses in general. Chapter five is the culminating component of this part of study and principally devoted to the requisite details pertaining to the general intake of calories as are available from the agricultural resource base. It is here food-supply is consequently affected by both poor agricultural economy and also by highly growing population in the Doab. A brief discussion on the circumstances causing poor health and
increasing high fatality rate has also been presented under this chapter.

The second part of the thesis comprises five chapters. It is the core of the thesis and provides the main thrust for the regional analysis of the selected communicable disease in spatio-temporal perspective. Chapter six embodies the brief historical outline of the diffusion and ecology of five selected diseases during one hundred odd years in all fourteen districts of the Doab. Chapter seven is devoted to a comparative assessment of the five diseases. It also explains the main characteristic features and it presents an analysis of the regional pattern of the distribution on the basis of available quartile indices among the districts of the Doab. A requisite analysis of the regional variations through the General, Rural and Urban population is made and the differential position at inter-district and decennial level is presented carefully. In the chapter eight the combined perspective of the prevailing vulnerability from all five diseases is presented through the quartile indices. Both these chapters are apparently highlighting the main characteristic features which have consequently emerged owing to particular type of susceptibility of each five diseases at spatio-temporal perspective across the Doab.

Chapter Nine is devoted to factor analysis. It is based on varimax rotated factor matrix through the packages of the computer programming results. Similarly, the chapter Ten embodies a thorough analysis of the regional causative factors as being studied by a popular method available with linear regression which is suitable for the actual pursuit of the geography of diseases. The multivariate
result in all districts of the Doab provides an explanatory analysis of the five communicable diseases on the basis of indices obtained. The Doab districts have been divided into disease intensity regions and thus a reasonably detailed regional analysis of these diseases has been presented at spatio-temporal perspective. It fulfils the requisite analysis for each diseases and fully explains the behaviour of occurrence of these five diseases in relation to various social and environmental factors which appear to be influencing at the spatio-temporal perspective over the regional pattern of the Doab. Thus, for final relationships with some selected environmental and socio-demographic variables have been shown through the application of adequate statistical techniques in order to test the hypotheses.

The third part embodies the outcome of this research in the form of general synthesis and conclusion. Thus in the light of the foregoing analysis certain conclusions are drawn which could very well serve as a bench mark for initiating many a related study on the regional analysis of the communicability of various diseases with regard to socio-environmental factors. Infact all such factors which create conducive conditions for the occurrence of particular disease and related mortality situations over geographical locations a similar type of investigation from the ecological viewpoint will be useful for further research work in the field of Health and Disease study.
REFERENCES