CHAPTER - I

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" THE HEALTH OF PEOPLE IS WEALTH OF PEOPLE "

Health is one of the important aspects of man's life, which is closely related with geographical factors. Very rarely humanbeing enjoys sound health all through it's life span. The good health or ill health are related in several ways with different environmental situations. Medical Geography deals with various aspects of man and environmental relationship.

Health of the individual is the result of living in accordance with the natural laws pertaining to the body, mind and environment. Geography is one of the several disciplines which study the health of the individual and that of the community. There are many geographical factors which influence and determine the health of the individual and of community. Recently the new branch of Geography known as Medical Geography has come up which is also called as Geography of Health and Diseases because health and diseases are undoubtedly vital aspects of human life.

1.1 IMPORTANCE OF STUDY OF MEDICAL GEOGRAPHY :

Medical geography is the scientific discipline, combining medicine and geography. Many a times this branch is known as geography of health, geography of diseases, geography of life and death, geographical pathology, medical ecology, geo-medicine, disease ecology and so on.

Medical Geography is concerned with a study of those local variations of environmental conditions which are causatively related

to the human health and disease. The world health organisation has defined health as a " state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," (WHO 1965). The completeness of health is a relative term and is dependant on individual's physiological characteristics and the pressure exerted by the environmental in which he settled.

The study of medical geography deals with the relationship between the pathological factors which cause disease and the geographical factors which give rise to these pathological factors (Misra,R.P. 1970). Medical geography studies the pathological factors (pathogens) with their respective geographical environment (Geogens). The pathological factors are causative agents, vectors, intermidiate hosts, and reservoirs; while geographical factors are physical, biological, human and social factors. Hence, the main aim of medical geography is to find out the geographical factors which are responsible for the areal distribution of disease and of health conditions.

Disease has been defined as 'A state which limits life in it's power, duration or enjoyment. Disease is a departure from the state of health. It is mainly the change in the living tissues which are essential for the living organism in the environment, and hence disease is a temporary maladjustment between man and his environment' (Pandurkar,R.G. 1981).

Thus, the systematic study of the spatial distribution of diseases with reference to the environment in which the affected persons live, forms the main concept of the study of Medical Geography.

1.2 REVIEW OF WORK DONE IN MEDICAL GEOGRAPHY :

The Medical Geography is as old as 'Hippocrates' who has explained the relationship of environment and spread of diseases during the 4th century. Then realising the importance of study of medical geography as of interdisciplinary nature, many foreign geographers like Learmonth, A.T.A.; Light,R.U.; May,J.M.; Howe,G.M.; McGlashan,N.D.; Hunter,J.M.; Audy,J.R.; Brownlea,A.A.; Murry,A.M.; Pyle,G.F.; Stamp,L.D.; Hyma,B. and few others have shown deep interest in developing this branch of geography.

In India, the work on medical geography still remains practically in its infancy stage. Hesterlow, A.M.V. (1929) has studied the possible relationship of environmental factors and spread of diseases in Southern India. Mcclelland (1859) attempted to identify the regional factors associated with the prevalence of diseases in India. Prof.A.T.A.Learmonth has provided a scientific base to the researchers in medical geography in India and todate almost all the work done by various scholars in this country has been mainly inspired by his pioneering studies (Learmonth, 1959, 1958, 1965). Besides,

Joseph Fayrer's 'Climate and Fevers in India' (Fayrer, 1882), 'The diseases of India' (Chevars, 1886) by Chevars and Moore's 'Tropical climate and Indian diseases' (Moore, 1890) are also major studies in this field.

Arthur Geddes made a very important contribution when he studied the relationship between the general condition of health and population growth in India (Geddes,1942). The 21st International Geographical Congress held at New Delhi in 1968 provided the good opportunity to Indian Geographers to contribute and present papers on medical geography. Prof.R.P. Misra (1970) has published a book entitled, " Medical Geography of India," which helped Indian geographers in understanding the general theme of medical geography. Prof. Indrapal and A.K. Tiwari presented paper on " Trachoma and Guineaworm Diseases in Rajastan."

Dr.B.Banerjee and J.Hazra (1974) have worked on " Geo-ecology of cholera in West Bengal." R.Akhtar and A.T.A. Learmonth have published 'Malaria Annual Parasite Index Maps for India', Malaria control unit areas 1965-1976 (1970). Dr.A. Ramesh and Dr.Hyma (1977) worked on the 'Geographical distribution and trends in malaria incidence in Tamilnadu.' Kailas Choube (1971) worked on ' Environmental factors and diseases in Sagar city.' Dr.R.G.Pandurkar's (1981) study on the " Spatial distribution of some diseases in Maharashtra," is a detailed study of different diseases in a state at district level.

1.3 WATER-BORNE DISEASES :

Water is very important aspect for human life. Without water, there would not have been life. For this reason in early times, habitation used to be near rivers, wells, lakes and springs. Human body consists nearly two-third of water. Water is a great cleaning agent, both external and internal. It is the main constituent of body cells and fluids. All types of food contains water. It acts as a diluent and solvent of food, chemicals and gases and carries then to different parts of body. It regulates body temperature, replaces the water that is lost by respiration, urination, sweating etc.

Much of the ill health in the underdeveloped countries is largely due to lack of safe drinking water. There can be no state of positive community health and well-being without safe water supply. Water is composed of dissolved gases (hydrogen sulfide, carbon dioxide, ammonia, nitrogen etc.), dissolved minerals (salts of calcium, magnesium sodium), suspended impurities (clay, silt, sand, mud) and microscopic plants and animal residues.

Water pollution is mainly caused by human activities - urbanization and industrialization leads to water pollution. Sewage, industrial and trade waste, agricultural pollutants and physical pollutants are different sources of water pollution. Man's health may be affected by the contaminated water either directly or indirectly. The various waterborne diseases may be listed as follows which are caused by different organisms :-

(a) Viral - Viral hepatitis, Poliomyelitis

(b) Bacterial - Cholera, Typhoid and Para-typhoid, Bacillary dysentery, Gastro enteritis, Diarrhoea

(c) Protozoal - Amoebiasis, Giardiasis

(d) Helminthic - Roundworm, Whipworm

(e) Leptospiral - Weil's disease

(f) Cyclops - Guinea worm

(g) Snail - Schistosomiasis

The above listed waterborne diseases are found to be distributed in different parts of Maharashtra and in different intensities. The type of water pollution depends upon the water sources, handled defectively by man and by his different activities. The man made environmental factors are mainly responsible to pollute the water, hence systematic spatio-temporal study of waterborne diseases may be of much use to the health planning in any community.

1.4 CHOICE OF REGION AND TOPIC :

The author in this dissertation proposes to work on " Geo-medical analysis of some waterborne diseases in Maharashtra." The author has selected the 'Maharashtra State' with specific purpose. As medical geography is concerned with the study of areal distribution of diseases and its relationship to the existing environment, physico-sociocultural factors are the major aspects which serve to

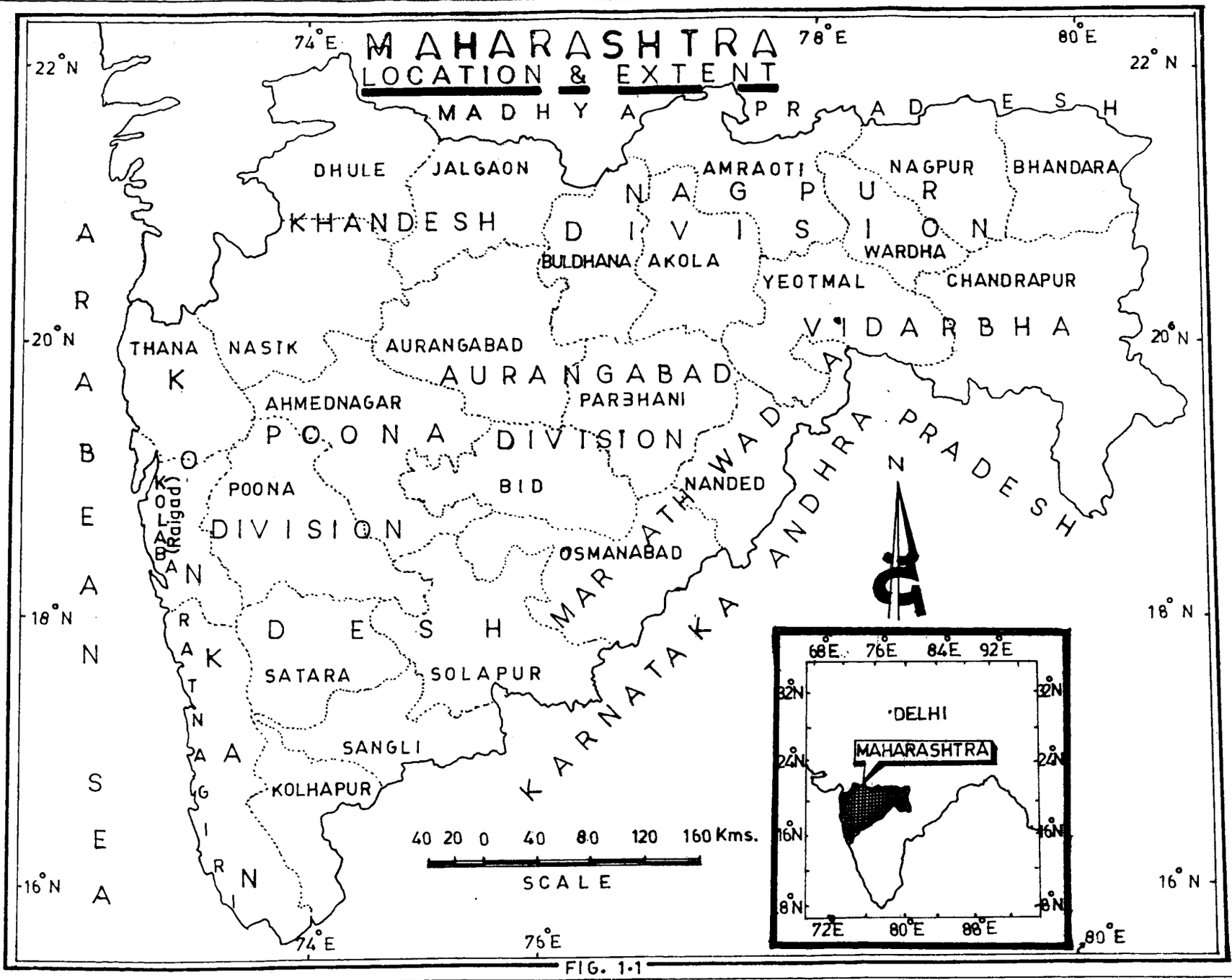
MAHARASHTRA
LOCATION & EXTENT
MADHYA PRADESH
KARNATAKA
ANDHRA PRADESH
ARABEAN SEA
DHULE
JALGAON
AMRAOTI
NAGPUR
BHANDARA
KHANDESH
NAGPUR DIVISION
BULDHANA
AKOLA
WARDHA
YEOTMAL
CHANDRAPUR
VIDARBHA
THANA
NASIK
AURANGABAD
AURANGABAD
PARBHANI
AHMEDNAGAR
POONA DIVISION
POONA
BID
NANDED
DIVISION
OSMANABAD
MARATHWADA
DESH
SATARA
SOLAPUR
SANGLI
KOLHAPUR
DELHI
MAHARASHTRA
40 20 0 40 80 120 160 Kms.
SCALE
22°N
20°N
18°N
16°N
74°E
76°E
78°E
80°E
68°E
84°E
92°E
72°E
88°E
32°N
24°N
8°N
N

FIG. 1-1

explain the spatial distribution and spread of certain diseases and other conditions of health.

Maharashtra, the author's home state, is located in peninsular parts of India. This is the third largest state in area and population and came into existance on 1st May 1960. The state has latitudinal extent of 15°45' N to 22°00' N and longitudinal extent of 72°45' E to 80°45' E, with an area of 306,345 sq.kms and a population of 62,784,171 as per 1981 census.

The state has been divided into 5 natural regions as i) Konkan region ii) Khandesh region iii) Marathwada region iv) Vidarbha region and v) Desh / Central Maharashtra region or Maharashtra plateau region. The state comprises of six (6) political divisions and 30 districts therein (Fig.1.1).

(1) Konkan Division - 1) Greater Bombay 2) Thane 3) Raigad 4) Ratnagiri 5) Sindhudurg.

(2) Nasik Division - 6) Nasik 7) Jalgaon 8) Dhulia 9) Ahmednagar

(3) Pune Division - 10) Pune 11) Satara 12) Sangli 13) Kolhapur 14) Solapur

(4) Amraoti Division - 15) Buldhana 16) Akola 17) Amraoti 18) Yeotmal

(5) Aurangabad Division - 19) Aurangabad 20) Jalna 21) Parbhani 22) Beed 23) Nanded 24) Osmanabad 25) Latur

(6) Nagpur Division - 26) Wardha 27) Nagpur 28) Bhandara 29) Chandrapur 30) Gadchiroli.

While selecting the region of whole Maharashtra State, the author has fixed certain purposes. Maharashtra covers the major part of the Deccan plateau and the river basins as well. The NW-SE flowing rivers have formed the major river basin on the Deccan plateau. The rivers like Godavari, Krishna, Bhima, Wardha, Wainganga and Tapi have reached in their second stage in most of the areas with moderate to gentle slope due to which the speed of the water flow is moderate. Hence in much of the course of the river, the water became sluggish and stagnant due to which their is easy possibility of contamination by disease organisms. Again, due to surface out wash of the soil in the river water, their is high possibility of water being contaminated by disease organisms. The possibility of waterborne diseases increases in the areas of stagnant water and hence major river basins might be victimised by waterborne diseases.

The following waterborne diseases have been selected for the study; whose morbidity and mortality data are collected for nineteen years periods (1965-1983).

(a) Cholera (b) Dysentery (c) Diarrhoea (d) Typhoid and Paratyphoid (e) Infectious hepatitis. The whole study will be done i) at district level and ii) at city level.

1.5 A) OBJECTIVES OF THE STUDY :

The specific objectives of the present study are as follows :-

i) To study the relationship of related environmental factors responsible for the spread of waterborne diseases in district and in major cities.

ii) To study the spatio-temporal distribution of aforesaid waterborne diseases in different districts and in major cities of Maharashtra State.

1.5 B) HYPOTHESIS :

While studying the 'Geo-medical analysis of some waterborne diseases in Maharashtra State', the following hypothesis need to be tested :-

i) The percentage of waterborne diseases is more in the plain areas and in the river basins of Maharashtra thereby increasing the mortality and morbidity rates of these regions.

ii) In Konkan region, the percentage of prevelence of waterborne diseases is less as compared to other river basins of Maharashtra.

1.5 C) METHODOLOGY :

The author proposes to analyse the available data at various stages. The collected data will be correlated with different physical and socio-cultural variables. The data will be collected for 19 years. It will be divided into three periods of time (i.e. 1965-70, 1971-76, and 1977-83). The data so collected districtwise and for the selected cities, will be processed by calculating the different rates i.e. death rate and cause specific

death rate and these rates will be classified and will be shown by various cartographic techniques like choropleth technique, disease ranking technique and by line graphs.

1.6 DATA SOURCES :

The major task of a medical geographer is to portray the information which is related to space and he has to prepare the distribution maps of mortality and morbidity. These maps are to be correlated with the environmental setup. The researcher has collected the data from various primary and secondary sources.

The author has selected the entire state of Maharashtra and thus the region is very vast. It is not possible to collect the data from primary sources, hence data are collected from secondary sources. Vital statastics is the most important source of data for this work. The collected data from vital statastics is districtwise and of major cities. Annual public health reports of Government of Maharashtra are of immense use to the researcher. For collecting districtwise mortality and morbidity data, the District Statastical Abstracts of Maharashtra State for the year 1965 to 1983 are also used.

1.7 PROPOSED OUTLINE OF WORK :

The entire text is divided into five chapters. Chapter I, deals with importance of study of medical geography; review of work done in medical geography; organisation of work; choice of

region and topic; objectives of problem; hypothesis; data sources; methodology and limitation of study.

Chapter II, entitled "Factors affecting the spread of waterborne diseases" comprises of major physical and socio-cultural factors which are responsible for the incidence and spread of waterborne diseases in the Maharashtra State. Certain physical factors like physiography, drainage, climate and soil have been co-related with the mortality rates, and the major socio-cultural factors like density of population, water supply, fairs and festivals, movement of people, social customs etc. are also co-related to study distribution and diffusion of certain waterborne diseases and other conditions of health in the State of Maharashtra.

Chapter III, deals with study of spatio-temporal distribution of 'Cholera' and it is arranged in following sequence. Disease, its etiological features, spread of cholera in world and India in brief. While spatio-temporal distribution of cholera in Maharashtra is studied at district level and at city level.

Chapter IV, deals with study of spatio-temporal analysis of dysentery and diarrhoea and the chapter is sequenced in the same manner as of Chapter III.

Chapter V, deals with the study of spatio-temporal analysis of infectious hepatitis and typhoid and paratyphoid and it is also sequenced as above. At the end of chapter five the overall spatio-temporal distribution of all waterborne

diseases is discussed in detail with summary and conclusion at the end.

Data, being very vast, it is rather difficult to include the whole. Hence, only relevant and necessary data are represented. The tables have been used at proper places. The author may be excused for the errors and repetition through oversight.

1.8 LIMITATION OF STUDY :

In the present work, the data availability was the major task, because data were collected from vital statastics. The reliability of vital statastical data is rather doubtful. As the region under study is broad, primary data collection was not possible for researcher, hence secondary data were collected accepting as it is without testing it's reliability.

The conclusion drawn and views expressed in this study are of the author's only.

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