

MEDICAL GEOGRAPHY OF WEST BENGAL

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ABSTRACT : The paper analyses the spread of various diseases in West Bengal. The analysis is based on the collection of mortality data for different diseases for all the *thanas* of West Bengal covering a period of 20 years. The mortality data have been correlated with environmental conditions and the zones of concentration of different ailments have been identified.

Introduction

Medical geography is an inter-disciplinary subject covering the sciences of geography and medicine. It deals with the spatial distribution of diseases and their correlation with the natural, biotic and cultural environment.

With 14 per cent of the world population concentrated within 2.4 per cent of its land area, India presents a highly intricate health pattern. This study, though related to West Bengal, identifies some of the overall geo-medical problems of the Indian sub-continent. In West Bengal, the subject has become aggravated due to the present population explosion, caused partly by natural increase and partly by the influx of immigrants from Bangladesh. This factor weighs heavily on the already over-saturated health and civic amenities, thereby creating an imbalance in the eco-system. Thus the medical morphogeny of West Bengal presents some unique characteristics not common to other areas of the country.

Methodology

The analysis is based on the collection of

mortality data for different diseases for all the *thanas* of West Bengal, covering a period of 20 years. Maps have been drawn to show the distribution of mortality from different diseases on an average period of 10 years. Comparison and analysis of the maps thus drawn and their correlation with the existing environment help in identifying the zones of concentration of different human ailments and the determination of priorities in the health and environmental programmes.

Environmental Complex

Due to its location in the tropical environment, West Bengal suffers from a large number of tropical diseases. The deltaic lowlands of the south are most susceptible to disease and as such record a higher mortality rate than other parts of the State. The Himalaya and the sub-Himalayan zones are noted for a high percentage of temperate diseases. The following table gives the correlation between the physiographic regions and the deaths for West Bengal. (Vide Table 1).

Table 1

Correlation between Physiographic regions and Mortality in West Bengal, 1961-71 (aver.)

Physiographic regions	The region as a percentage of total area	Percent of deaths to total deaths	Death rate / 1000 persons
1. Plateau, high hills and mountains	3.3	3.1	5.06
2. Hills and piedmont plains	20.8	9.4	8.39
3. High plains	21.5	22.8	8.73
4. Plains	54.4	64.7	7.42

The drainage pattern of West Bengal plays an interesting role in the distribution pattern of diseases. The Himalayan rivers form the endemic goitre zone. The rivers of the Damodar-Rupnarayan-Hooghly Delta get polluted from industrial and urban effluents, thereby forming the nucleus for water-borne diseases. The moribund rivers of the delta-face are the susceptible zones of malaria.

The influence of climate on disease is remarkably pronounced. It affects the micro-flora and fauna. It may be related to the propagation of germs and vectors. The

physiological and macro-cosmic effect of climate on man is much more complex. Temperature and rainfall with the resultant humidity may inhibit or accelerate the growth and propagation of germs and vectors leading to a seasonal variation of disease pattern and the efficacy of human bodies to resist them.

In West Bengal, the death rate is highest in areas with an average annual rainfall of 135-175 cm. The following table gives the correlation between the amount of rainfall and the number of deaths in West Bengal.

Table 2

Correlation between the amount of rainfall and the number of deaths in West Bengal

Rainfall (in cms)	% of total land area covered within this rainfall zone	% of deaths to total deaths	Death rate / 1000 persons
Less than 125	9.6	6.2	6.71
125-135	20.1	17.4	7.77
135-150	30.7	36.4	6.79
150-175	17.7	26.3	8.64
175-250	7.5	6.0	5.41
250-375	10.6	6.4	6.40
Over 375	3.8	1.3	4.85

Likewise, there are certain correlations with disease mortality and soil types. Lateritic soils, red loams, red earths and sands record a higher death rate than other areas. Soil texture, chemical components, soil micro-organisms and ground water play a distinct role in the transmission and propagation of specified diseases. These natural factors form the geomedical infrastructure which can only be slightly

modified or improved.

Man, organisms and vectors form the biotic environment. While organisms are the principal causative factors of diseases, vectors help their transmission and spread. Incidentally, man is the principal biotic component since this study is composed mainly of human diseases. The human factor is important because of its ability to influence the environment.

Table 3

Classification of Diseases in West Bengal

Hierarchical order	Causes of Death	Present Classification	International Code No.	% of mortality to total	Mortality rate / mille
1.	a. Cholera b. Dysentery (all forms) c. Food poisoning d. Typhoid fever e. Paratyphoid & other salmonella infections	Water borne	040-049	5.7	0.2
2.	a. Influenza b. Pneumonia c. Bronchitis d. Other forms of respiratory diseases	Diseases of Respiratory system	468-527	3.9	0.2
3.	a. Pulmonary T. B. without mention of occupational diseases of lungs b. T. B. of Resp. Sys. other than pulmonary T. B. without mention of occupational diseases of lungs c. T. B. of meninges & central nervous system d. T. B. of bones & joints active or unspecified e. T. B. other forms	Tuberculosis	002-016	2.3	0.1

Table 3 (contd.)

Hierarchical order	Causes of Death	Present Classification	International Code No.	% of mortality to total	Mortality rate / mille
4.	a. Ulcer of stomach & duodenum b. Appenndicitis c. Intestinal obstruction & hernia d. Gastritis, deudenitis, enteritis & colitis, except diarrhoea of the new born e. Cirrhosis of liver f. Other diseases of digestive system	Diseases of Digestive system	536--587	2.1	0.1
5.	a. Vascular lesion affecting central nervous system b. Non-meningococcal meningitis c. Other diseases of nervous system & sense organs d. Mental Psychoneurotic & personality disorder	Diseases of Nervous system	330-393	1.7	0.09
6.	a. Rheumatic fever b. Chronic rheumatic heart disease c. Arterio--Sclerotic & degenerative heart disease d. Other diseases of heart e. Hypertension with heart disease f. Hypertension without mention of heart g. Diseases of arteries & veins and other diseases of circulatory system	Diseases of heart	400-468	1.3	0.08

Table 3 (contd.)

Hierarchical order	Causes of Death	Present Classification	Inter-national Code No.	% of mortality to total	Mortality rate / mille
7.	a. Tetanus	Tetanus	061	1.3	0.08
8.	a. Complications of pregnancy, Child birth & puerperium	Maternal mortality	633-688	0.9	0.04
9.	a. Smallpox b. Measles c. Chickenpox d. Mumps	Air-borne diseases (1)	084-089	0.9	0.04
10.	a. Malignant Neoplasm including neoplasms of lymphotic & haemato-poietic tissues b. Benign and unspecified neoplasm	Cancer	141--239	0.8	0.04
11.	a. Leprosy	Leprosy	060	0.3	0.02
12.	a. Malaria b. Blackwater fever c. Kalazar d. Other infective & Parasitic diseases	Vector--borne diseases	112--138	0.2	0.01
13.	a. Diptheria b. Whooping Cough c. Meningococcal Meningitis	Airborne diseases (2)	055--057	0.2	0.01

(Source : Prepared by the authors)

Demographic factors like the growth of population, its density, sex ratio, rural-urban ratio, migration, literacy and socio-economic conditions of the people, all contribute to the distributional pattern of diseases. Environmental sanitation, water-supply, garbage disposal and housing are the products of human ingenuity. These in turn help to bring about urban catastrophies. Since these are created by and centred around man, efficient scientific program-

ming of resources can easily eradicate these man-made shortcomings thereby improving the general health pattern. On the other hand, religion, fairs, festivals and rituals, social customs and cultural traits are the integral part of human life. Modification and improvements of these are far more intricate and can only be implemented by a higher social education and scientific reasoning.

Classification of Diseases

West Bengal harbours most of the tropical diseases, like cholera, dysentery, diarrhoea, malaria and other vector-borne diseases, leprosy, air-borne diseases like smallpox, chickenpox, mumps, measles, whooping cough, diphtheria, tuberculosis, pneumonia, bronchitis etc. The State, with 25 per cent of its population living in urban areas, compares well with the more advanced countries of the world in the diseases of the heart, cancer, cardio-vascular digestive and mental disorders.

For the purpose of simplicity, these diseases have been grouped under broad headings, viz., water-borne diseases, diseases of the respiratory system, tuberculosis, diseases of the digestive system, diseases of the heart, air-borne diseases, vector-borne diseases etc. Other diseases like tetanus, cancer, leprosy and cholera have been dealt with separately. Maternal and infant mortality also form an interesting part of the study.

Spatial Distribution

The distributional pattern of births and deaths manifests certain spatial characteristics. The high intensity zone tends to extend from the south-west to the north-east between the two low intensity zones of Purulia in the west and the Sunderban and the Calcutta Metropolitan District in the south-east.

Water-borne Diseases : These rank first amongst all these diseases categories, accounting for 6 per cent of the total deaths. The mortality rate from this disease group has been estimated at 0.2 person per mille. Cholera, dysentery, food-poisoning, typhoid, para-typhoid etc. belong to this group. Dysentery alone accounts for 75 per cent of the total number of deaths from water-borne diseases, typhoid (22%), cholera (2%), and the others (only 1%), come in order of importance. Of late, cholera mortality and those from other water-borne diseases have been substan-

tially reduced. Dysentery still remains important though its incidence and mortality rate have substantially declined.

Water-borne diseases have a close affinity to the well-watered plains of Rupnarayan-Damodar-Hooghly Delta and the plains of Cooch Behar and Jalpaiguri. Terrain, drainage and seasonal climatic conditions are the natural environmental controls of the diseases. But human habitation and man's mode of life control their propagation and spreading.

Respiratory Diseases : These rank second in importance, accounting for about 4 per cent of the total mortality. The mortality rate of this group is almost identical to water-borne diseases. Pneumonia accounts for about 73 per cent of the total mortality figures from this group. Next in order of importance are bronchitis (18%), other respiratory diseases (7%) and influenza (2%). Respiratory diseases occur practically in all areas throughout the world, and specially in areas of cool damp climate. Their prevalence in the central plains is well marked, apart from their concentration in the sub-Himalayan region. In the developed countries it has been over-ridden by other degenerative diseases, while in the developing countries it still forms a very important cause of death.

Tuberculosis: Tuberculosis may be of 5 types depending on the organs affected. This disease accounts for only 2.3 per cent of the total mortality having a mortality rate of 0.1 person per mille. The common type is tuberculosis of the respiratory system. This type accounts for about 64 per cent of the total number of deaths from tuberculosis. Pulmonary tuberculosis accounts for about 35 per cent while the other forms account for only 1% of the total mortality figures. Tuberculosis is practically ubiquitous in West Bengal and its concentration in urban areas is particularly marked. Though preventive and curative measures for controlling this disease are well-known, it has not yet been possible to check this

disease to an appreciable extent. Malnutrition and overcrowded living conditions are contributory factors for its incidence. So unless the nutritional and living standards of the population are improved it is really difficult to eradicate the disease.

Diseases of the Digestive System : These are prevalent in the south-central plains of Burdwan, Bankura, Howrah Midnapur, and in parts of Malda, Jalpaiguri and Darjeeling districts. These diseases have resulted principally from malnutrition. In the developing countries this disease is quite common specially in the urban areas where the mortality is much higher. In the developed countries, it is fairly widespread amongst the poorer classes of the population. This group occupies the 4th ranking position amongst the various diseases prevalent in West Bengal. This type accounts for 2 per cent of the total mortality figure. The mortality rate has been recorded as 0.1 person per mille. Within the sub-types, the mortality rate and percentage to total mortality vary widely, gastritis contributing about 60%, ulcer of stomach and duodenum 11%, cirrhosis of liver 9%, intestinal obstruction and hernia 6%, and other digestive diseases 14%. Deaths from appendicitis have now become practically negligible.

Diseases of the Nervous System : The distributional pattern of these diseases is similar to the digestive system, and account for about 2% of the total number of deaths with a mortality rate of 0.09 per mille. Of the diseases of this group, diseases of the nervous system and sense organs account for 59%, vascular lesion affecting the central nervous system 24%, non-meningococcal meningitis 14% and mental psychoneurotic and personality disorder 4% of the total number of deaths recorded in this group. The incidence of these diseases is particularly high in the urban areas due to social and maladjustment to confined space, lack of adequate urban amenities and the fast mode of urban living.

Diseases of the heart and circulatory system come next and account for about 1.3% of the mortality with a mortality rate of 0.08% per mille. These diseases are mostly related to the upper social class, but principally within the white-collar employees and businessmen. About 7 sub-types are recognized within this group, of which hypertensional diseases are most common accounting for 36% of the total mortality within this group. Other sub-types include cardiac disorder (23%), arteriosclerotic and degenerative heart diseases (20%). Cardiac diseases were much less prevalent in the past decades, but they are gradually becoming important and may occupy an important position in the coming decades, specially in view of the high expectancy of life. The distributional pattern, though somewhat similar to the other urban diseases like diseases of the nervous system and digestive system, has the higher mortality rates concentrated in pockets. The mortality rates of urban centres too are well marked, probably due to the greater stress and strain of urban living.

Tetanus : It ranks 7th in importance and accounts for about 1.3% of the total mortality figures with a mortality rate of 0.08 person per mille. Tetanus ranks high in the causes of infant mortality in West Bengal. It is fairly widespread in the rich agricultural plains and in their service centres. It is particularly common in the lateritic soils, red loams and on the coastal sands. The reasons for such distribution are difficult to ascertain.

Maternal mortality : It ranks next in importance, accounting for about 0.9% of the total number of deaths with a mortality rate of 0.04 person per mille. The widespread distribution of maternal deaths has been somewhat controlled in recent years with better medical facilities. But in the remote rural areas where medical facilities are lacking, maternal mortality rate still remains high.

Air-borne diseases : The general trend in the

distributional pattern of mortality is followed by most air-borne diseases. These have broadly been classified into two groups depending on their mode of transmission.

1. Diphtheria, whooping cough and cerebrospinal fever are transmitted principally by droplet infection. They account for 0.2% of the total mortality, with a mortality rate of 0.01 person per mille. Diphtheria is the principal disease of this group and accounts for 90% of the total mortality. These diseases are typical to the temperate latitudes and their prevalence in the tropical plains of West Bengal is rather poor.

2. The second group comprising smallpox (54%), measles (39%), chickenpox (6%) and mumps (1%), accounts for about 1% of the total mortality figures and has a mortality rate of 0.04 person per mille. Though these diseases are typical in tropical countries, it is of little importance in the present decade.

Cancer: It ranks 10th in importance with a mortality rate of 0.04 person per mille, and accounts for 0.8% of the total mortality figures. Cancer has been grouped into two categories, benign and malignant neoplasm. Malignant neoplasm is of far more importance and accounts for more than 95% of the total cancer mortality. The zonal distribution of cancer has greatly increased in recent years perhaps due to better diagnostic facilities or due to the deterioration of urban environment. The number of urban centres recording cancer has also substantially increased.

Leprosy: It ranks 11th in importance with a mortality rate of 0.02 person per mille. It accounts for 0.3% of the total mortality of the State. It tends to be concentrated in Bankura, Birbhum Midnapur and parts of Purulia district for over several centuries. The incidence of leprosy is particularly high in the lateritic and red soil areas. But in the present decade, there has been a tendency for the affected area

to expand towards the Calcutta Metropolitan District, probably due to population migration.

Vector-borne diseases account for 0.2% of the total number of deaths with a mortality rate of 0.01 person per mille. This group includes malaria, blackwater fever, kalazar and other infective and parasitic diseases. At present, other infective and parasitic diseases account for about 80% of the vector-borne diseases. Malaria comes next in importance.

The Medical Morphology of Calcutta Metropolis

Calcutta metropolis offers an interesting area for case study. Calcutta, the centre of economic activity and the focal point of various industries, lies in the midst of an otherwise predominantly rural State. But it represents a dismal catalogue of deficiencies. Calcutta's manifold problems are centred principally around its high population density, thereby creating acute housing problems, proliferation of slums, shortage of water-supply, unhealthy and choked up sewers and heaps of accumulated garbage on public thoroughfares. In addition, noise, polluted air and lack of open space create acute health hazards.

The inability of the metropolitan authorities to cope with the problem has resulted in a deterioration in the living standard on the one hand, but on the other, it is adversely affecting the metropolitan life matrix, bringing about a social disorganization and chaos. The impact of these constraints on the health of the Calcuttans has far-reaching effects, particularly, on the physical and mental well-being of the people.

The largest metropolis is thus facing an enormous health problem. The city suffers from the problems of environmental sanitation and water-supply, malfunctioning of sewage disposal system and acute congestion typical of other under-developed countries. These encourage the propagation

and spread of infective and epidemic diseases like enteric fever, cholera, small-pox, measles etc. Similarly, tuberculosis and respiratory diseases resulting from combustion fumes, accidents resulting from heavy traffic, the unplanned growth of industries with associated air pollution, anxiety neurosis and heart diseases resulting from stress and strain, and of late, cancer—a replica of modern civilisation, have become increasingly prevalent in Calcutta.

Though the significance and magnitude of the health problems of Calcutta have long been realized, no earnest effort for its improvement or research has been undertaken. Furthermore, the methods adopted were more curative or remedial than preventive in nature. In addition, medical and public health facilities have almost become over-saturated. The annual picture is a phase of urban degeneration. Regeneration of the metropolitan landscape, however, would depend largely on the immediate adoption of comprehensive planning and a

programme for urban renewal.

Conclusion

The present analysis reveals that the existing conditions of health in West Bengal are far from satisfactory. The decline in communicable diseases may not be considered as a sign of improvement in the general health of the people. A still more complicated aspect of urban pathogeny is in its way of developing. The impact of urbanization and industrialization of a rural and semi-rural society have far-reaching effects on the people. Maladjustment to the new mental and physical pressures has its impact on the society leading to the degeneration of human value systems, mental health and stability. It is, therefore, necessary to take immediate measures to improve the social and cultural life patterns of the community, and by doing so the environment, with which we are so closely associated, need a thorough improvement.

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