CHAPTER III

MAN AS A FACTOR IN DISEASE INCIDENCE
Air, water and soil are essential for the survival of man as well as our society. The environment of man is the combination of various circumstances in which he lives, and the resultant diseases have a close relation with the environment. In modern times air and water pollution is the most alarming aspect of the life of human beings, by which each and every person is affected directly and indirectly. The environment of the place, where he seeks for opportunities for intellectual, moral, social and spiritual growth and also where he lives, works, and seeks his biological well-being, is thus a very powerful factor. Poverty, ignorance, prevalent social customs, superstitions and prejudices are important factors in the study area.

Generally the internal part of the body is directly influenced by diet, whereas the external part is directly affected by the environment. The most essential things of life, like air, water, food and space, are being gradually polluted. Disposal of solid-waste is also one of today's main problems.

In our country millions of people suffer from various infectious diseases mostly due to unprotected water-supply,
inadequate facilities of waste-disposal, food-sanitation and vector control, and are exacerbated by widespread malnutrition. Every year millions are stricken by malaria and other insect-borne diseases. On the other hand, trachoma, skin diseases, worms etc. fostered by insanitary conditions, affect the entire population; in terms of reduced work capacity and lowered resistance to other diseases.

The continuous natural growth of population has become a problem for the preservation of the environment. Now it is a given fact that man with his pollutants has started a process of destroying life on earth.

The protection and improvement of the human environment has thus now become very essential.

THE MAN-MADE ENVIRONMENT AND DISEASES

Many environmental factors make the atmosphere favourable for the survival of the causative agents of diseases. Epidemiological research in communicable and other diseases usually starts with environmental studies on diseases and their causative agents. For instance, chronic bronchitis and other respiratory troubles are directly related to air pollution, while water pollution is mainly responsible for digestive disorders as also for skin diseases. In view of the existing disease pattern, it is very essential to take immediate action in providing adequate water-supply, sanitary disposal of excreta and wastes and proper
housing and community sanitation. Millions of people fall victim every year to a wide variety of communicable diseases due to an ill-kept environment.

On the basis of situation, various particles like oxides of sulphure, ozone, carbon monoxide, lead, asbestos, carbon dioxide etc. are found in air. Respiratory diseases, sensory irritation, eye irritation, lung diseases etc. are due to these agents. On the other hand, human excreta, sewage, industrial and radio-active waste, pesticides etc. are found on the land surface; hook worm, schistosomiasis, infections, rodent-borne diseases, skin diseases etc. are reported due to these agents. Influenza, cardio-vascular diseases, cancer etc. are also directly related to the environment.

Further, community wastes are allowed to reach the sources of drinking water, where biological pollution takes place and whole communities could fall victim to a wide variety of communicable diseases. So that adequate water-supply and essential facilities for waste disposal should form top environmental priority, and this will not only reduce the burden of suffering and sickness, but also release the able-bodied people from the bondage of diseases.

Lastly, the economic elements like per capita income, standard of living, family size, dietary intake etc. are determined by economic conditions and these affect both the host as well as the agent factor of diseases.
WATER-SUPPLY

Adequate uncontaminated water-supply is an indispensable requirement for life and health and nearly all the activities of the human society. It is also essential for improving health and the socio-economic well-being of the communities. Both the quality and quantity of water-supply are equally important. Besides this, continuity in water-supply is also essential. If water available in the system is insufficient to maintain continuous pressure, an intermittent supply will result. Not only will people seek water from other sources or store reserve water often in insanitary containers, but the reduction of pressure in mains (pipes) will most likely result in seepage of contaminated ground water into the system. If the mains run near a sewer line, the danger of contamination is obviously increased.

Diseases like cholera and typhoid are transmitted to man directly through water. Diseases including the amoebic-dysentery and schistosomiasis are transmitted by parasites. Other diseases such as malaria are associated with the water resource development, while on the other hand diseases like scabies, and trachoma are due to filth and lack of water. The prevalence of guineaworm infection in Madhya Pradesh is due to the water containing cyclops. A high concentration of fluoride in water results in endemic fluorosis in the country. Similarly,

the deficiency of iodine in water causes endemicity of goitre. It has also been reported by the National Institute of Communi-
cable Diseases, Delhi, that nearly 30 per cent of the deaths
and 50 to 60 per cent of the morbidity in the country is due to
water-borne diseases, and according to the World Health Organi-
sation, 75 to 90 per cent of the people in developing countries
is exposed to unsafe water, giving rise to gastro-intestinal
disorders.¹

The majority of our population lives in villages and
only 70 per cent of the urban population is being served with
piped water-supply. This constitutes about 14 per cent of the
total population which means that 86 per cent of the population
does not have piped water-supply.²

Human waste is the most important source of water
pollutants in our country, which can carry disease-producing
organisms and produce diseases through water. In rural areas,
wells are the main source of water, but leaves, dust etc. always
enter into them, and they not only create a foul smell but also
give rise to organisms which produce various diseases.

According to the public health department of Madhya
Pradesh, only nine out of the 21 urban centres in the study
region have piped water-supply. The capacity of water was

¹ Martin Kaplan: Environmental Hazards for Human Health,
World Health, 1972, p. 5.
² G. J. Mohanrao: "The air we breath and the water we drink".
Everyman's Science, VIII, 3, pp. 115-17.
reported highest in Bhopal, but the per capita availability is
highest in Bairagarh, viz. 211.5 liters per caput per day. The
lowest availability was found in Guna, i.e. 43.6 liters. The
capacity of other towns and per capita availability are shown
in the table 2.9.

As far as rural places of the study region are concerned,
villagers generally depend upon wells, at least for drinking water.
Besides wells, tanks, rivers and other sources of water are also
available, but water of these places is more polluted than well
water, because generally these sources are also used for domestic
purposes.

Table 3.1

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Town</th>
<th>Capacity in ,000 litres</th>
<th>Per caput, per day Availability in litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bhopal</td>
<td>1563</td>
<td>90.9</td>
</tr>
<tr>
<td>2</td>
<td>Sagar</td>
<td>1125</td>
<td>107.5</td>
</tr>
<tr>
<td>3</td>
<td>Bairagarh</td>
<td>0360</td>
<td>211.5</td>
</tr>
<tr>
<td>4</td>
<td>Ashoknagar</td>
<td>0225</td>
<td>157.5</td>
</tr>
<tr>
<td>5</td>
<td>Shyamnagar</td>
<td>0216</td>
<td>075.1</td>
</tr>
<tr>
<td>6</td>
<td>Vidisha</td>
<td>180</td>
<td>64.6</td>
</tr>
<tr>
<td>7</td>
<td>Sehore</td>
<td>171</td>
<td>60.7</td>
</tr>
<tr>
<td>8</td>
<td>Guna</td>
<td>135</td>
<td>43.6</td>
</tr>
<tr>
<td>9</td>
<td>Mungaoli</td>
<td>108</td>
<td>157.5</td>
</tr>
</tbody>
</table>

Source: Health Atlas of Madhya Pradesh, Directorate of Health
Services, Bhopal, 1970.
The total number of wells, from which drinking water is obtained or used in the study region is 18,829. The highest number of wells under use is in Jehore district, viz. 3751, the lowest is in Sagar district, but here 273 tube-wells are also available for the above purpose.

POLLUTION

Pollution is that which contributes to the deterioration of the environment. When material and energy introduced by human activities themselves become harmful to man's health and his well-being, they are termed as pollutants. It is not an exaggeration to say that man himself with his pollutants has started a process almost capable of destroying life on earth. Widespread forms of pollution originate from the contamination of food, water-supply, waste-disposal, pathogenic organisms, noise, air etc.

Every year millions of people fall victim to a variety of communicable diseases, due to the combined effects of a polluted environment in which people live. Social factors may also make the environment favourable for the emergence of many disorders, and all these can be prevented through efficient environmental control, i.e. adequate water-supply, maintenance of community sanitation and provision of adequate waste-disposal facilities.

As far as the study region is concerned, many people suffer from the combined effects of ignorance, poverty, poor
food and diseases. The majority of the people use contaminated water for drinking and washing and also have no proper facilities for disposal of waste materials. At some places facilities are not provided even for the disposal of night soil, while poor drainage has been reported throughout the study region and plays an important role in the prevalence of many diseases.

The towns of the region are particularly exposed to the combined effects of slums, insanitation, air and water pollution, stress and strain etc.; it is no wonder that diseases like cancer, heart troubles, hypertension, typhoid, influenza and digestive disorders are often reported in the area in question, these being due largely to a polluted environment.

AIR POLLUTION

Excessive concentration of foreign matter in the air (atmosphere) which adversely affects human health and his well-being, is known as "air pollution". Odours or odorousiferous substances and fumes of volatiles and hydrocarbons in the atmosphere are the main agents, which cause pollution in the air. Urbanization, industrialization and motorization are the main causes of this pollution.

Effects of air pollution can be seen more clearly in Bhopal than in other places in the region due to its industrialization and due to its being the capital of the State. Diseases which have been reported in various hospitals of the city have
some relation with the polluted air of the town. Sulphur oxides, hydrocarbons, nitrogen oxides, carbon monoxide etc. which are being continuously added to the atmosphere from industrial chimneys and also from motor vehicles cause serious ill-effects on the human being. These particles cause gastric troubles, cancer, lung damage etc., while the sulphur oxides are responsible for troubles of the respiratory tract; they also cause breathing troubles. Hydrocarbons are generally responsible for eye irritations while carbon monoxide damages the heart.

Air pollution in the rural area of the study unit is comparatively negligible, since usually the atmosphere here is open. Generally in rural areas there are no fume-producing industries, nor are motor vehicles found in large numbers, so that the air does not get polluted. As far as urban places of the area are concerned, carbon monoxide and the volatile hydrocarbons, are the main polluting agents of the atmosphere. Incomplete combustion of carbonaceous material (from vehicles) and odours play an important role here. The degree of pollution is increasing day by day so that it is now desirable to control the pollution from this source.

Motor vehicles give rise to local pollution in which the concentration of primary exhaust products decreases with increasing distance, so that air pollution in the towns of the study area has been found mainly in the more important streets and shopping centres. In Bhapal on the main streets of city,
polluted air can be commonly experienced. Smoking is also one of the factors, but the amount of pollution due to this factor has been found to be negligible, and is only experienced in picture halls, motors or in trains, further it generally affects the individual, rather than the community. The smoker himself suffers much worse than the others. Besides this, in Guna-proper and Bina the public as well as hotels usually use coal as fuel, and this adds harmful gases in the surrounding areas; these in turn produce ill-effects on health and cause troubles. Sometimes visibility is also affected by air pollution when the concentration of foreign material in the air become considerable.

Sometimes bad odours exhumed by motor vehicles become another obnoxious element of the urban atmosphere, especially along the main roads.

WATER POLLUTION

Water occupies a very important position in our daily life and it is the main constituent of all living organisms. The social and economic well-being of the communities and the improvement of their health entirely depend on the supply of uncontaminated water, in adequate quantity and of good quality.

In our country, nearly 30 per cent of the deaths and 50 to 60 per cent of total morbidity have been due to water-borne diseases. The majority of the population of our country
as well as of the study region lives in villages, and mostly use water from unprotected wells or polluted lakes and streams.

Cholera and typhoid are transmitted to man directly through water-supply. Amoebic dysentery, malaria, scabies, trachoma and various skin diseases are also caused by water pollution. Human waste is the main source of water pollution which can carry various types of disease-producing organisms, and which gives out foul odours and can deplete the dissolved oxygen in the streams where the excreta are discharged.

The majority of the population of the study area does not take adequate piped water-supply, so that drinking water is the main problem for the people throughout the region. Even where the supply is available, it is not sufficient and is generally from rivers or tanks, which usually cannot be protected from the indiscriminate domestic and industrial waste. Wells and tanks are the other main sources of drinking water, where pollution takes place through washing of clothes, bathing of animals and peoples etc. Waste material can be easily seen near and around the sources, which create a favourable environment for the survival of disease-producing agents.

Only nine urban centres (out of 21 in Eastern Malwa) have piped water-supply (Table 3.1), but mostly, in insufficient quantity, so that the town-dwellers also seek water from unprotected sources and even store the water in insanitary containers. At quite many places, the author had found the main
pipe-line near the sewer line, which increases the possibilities of contamination.

The majority of the rural inhabitants of the region get their drinking water from wells or a nearby river, where biological pollution from community wastes is allowed to reach and because of this, a number of people of the area become victims of various communicable diseases. All the activities connected with water take place at the same spot, mainly due to ignorance of the ill-effects of such activities and people also collect drinking water from the same place, so usually they get only contaminated water, and this creates very favourable conditions for the transmission of various diseases through water from one person to another.

Among the towns of the study area, Ashoknagar has its own water-supply, but since it is not sufficient the people also get their drinking water from wells which are usually polluted. The residents of Isagarh (Esargarh) also get their drinking water from wells, one tank is also used but usually it is also used for animals and for other domestic purposes, so that the water is not potable. But it is generally used for bathing and washing and people become victim to various diseases. Vidisha and Khurai have all the three facilities and people get water from all the three sources, because piped water-supply alone cannot fulfill their full requirements.

In the case of the Bhopal water-works connected with the Bhopal tank, bathing, washing etc. are restricted. But here
also the people do not all get water from a pipe, so that many of them seek other sources and often store water in insanitary containers, and are easy victims of different diseases. The Sagar water-works is connected with the river Bewar, but this water-works is also not able to supply adequate water for all the people. So that well water has been used, which has been polluted from different sources. A big lake is also situated in the city, but usually people have been using its water only for washing, bathing and for animals. All the wastes of the hospital are also allowed to reach into the lake, so that due to biological pollution, there are consequent ill-effects. Bairagarh water-supply mostly fulfills the requirements of the people of that town.

Diseases like typhoid fever, paratyphoid, amoebic and bacillary dysentery, cholera, diarrhea, infective hepatitis and jaundice, etc. usually occur in the study region, due to the use of polluted water and can be prevented through the supply of safe water in adequate quantities.

WASTE DISPOSAL

Sanitary sewage and waste disposal are today's main problems. Refuse of all kinds, including human excreta, helps flies, mosquitoes, rodents and other disease agents to thrive, passing on illness to man. Major health hazards have been introduced into many communities due to inadequate waste-disposal facilities. Improvement in disposal facilities is thus very
essential to safeguard community health. It is also desirable to educate the local population and to enact suitable legislation.

Adequate water supply is also essential for the disposal of all kinds of wastes. People are also not quite aware of the importance of the disposal of wastes, because of the fact that the common man does not normally come in direct contact with this problem and does not known its ill-effects. There are three basic ways, by which wastes have ill-effects on health. Firstly, many wastes are concentrates of substances, which are harmful for the human being; secondly, their improper disposal also creates the risk of some more human contact as well as new growth and multiplication of pests. Thirdly, the human contact is the medium of its transportation and handling. Sanitary sewer services are not common even in urban places. People normally throw their refuse anywhere and this unhealthy habit results in very serious effects on the health of the people. It is also true that as the standard of living goes up, the refuse quantity always increases. For instance, packing material becomes an important refuse matter.

In the entire study region, the facilities for the disposal of all kinds of wastes are not sufficient. Even in urban places, not only are facilities of waste-disposal inadequate, but people are also not worried about the ill-effects of wastes, due to ignorance. Any one can easily notice even on the main streets, waste materials including human excreta
and cow-dung. The habit of throwing the waste material can be seen even among the well-to-do and educated families in the study unit. Even Delhi, the Capital City, suffers from such woefully frequent lapses of ordinary good taste, and civic sense.

The problem of solid waste disposal is even more serious in rural areas, where facilities for the disposal of even human excreta are not available. All kinds of wastes accumulate near the house or source of water, which thus form an unhealthy environment. Various respiratory troubles, skin diseases, and various communicable diseases which are usually reported by the peoples of the region are, in fact, due to faulty practices of disposal of waste material.

NOISE POLLUTION

Noise is also one of the aspects of the surrounding environment, and it is also much harder to identify. All organisms as a whole are adversely affected by excessive noise. Sleep is very much and the first to suffer, while the immediate memory is adversely affected and ability of concentration is directly influenced. Modern development including industrialisation and motorisation are the main cause of excessive noise, so that this is usually experienced only in towns.

Troubles of the digestive and cardio-vascular systems may arise due to excessive noise. Intestines become sluggish and secretion of hormones is also disturbed. Excessive noise

1 Ashok Mitra: Delhi Capital City. Thomson, New Delhi, 1970, p. 51
is also harmful for the pituitary gland, the adrenal cortex, the thyroid and the gonads. Noise also affects the sight and reduces the field of vision, while headache is a direct result. Violent tiredness and fatigue of uncertain origin are also due to excessive noise and it is the most offensive of interruptions.

Noise pollution in the study unit is not particularly important, so far as rural areas are concerned. In urban areas, and mainly in Bhopal, excessive noise can be experienced and has been found increasingly so now.

PERSONAL POLLUTION

Personal pollution means the harmful effect on health, due to certain personal habits. It varies from person to person and from place to place. Smoking habits, drinking habits, certain unnatural habits, personal likings, and faith in old traditions and religious concepts are some of the causes and people could be directly externally or mentally disturbed through personal pollution.

Smoking and tobacco habits have been reported throughout the study unit and are responsible for troubles of the respiratory tract. On the other hand, drinking habits are also now being found increasingly in the entire area and people usually take to this habit as a sign of modernity. People are also found engaged in certain unnatural habits, this is found in the
developing stage in the entire region. In the interest of the well-being of the society, it is desirable to take immediate steps for control of all these habits.

Respect for and faith in old traditions as well as in religious concepts have been reported throughout the unit, which sometimes could have certain ill-effects on the human being. For instance, fast taken by an old woman, due to religious faith, could cause her health to deteriorate as well as reduce the resistance power of the body so that many diseases take place. On the other hand, treatment of some diseases has also been done, on the basis of such concepts. Usually all the marriages take place, according to old traditions in the entire unit.

Ignorance and lack of education are the main cause as far as this type of pollution problem in the region is concerned and can be largely prevented through advancement of education.

DRAINAGE

Most of the human activities are directly or indirectly connected with water and the accumulation of water which has been used for domestic purposes is the problem for every village and town. Adequate drainage facilities are very essential for the flow of water; often it has been used for domestic purposes. An efficient drainage system can also solve to a certain extent, the problem of solid waste disposal. Accumulation of refuse water creates a favourable environment for disease-producing
agents as well as increases the possibility of contamination. The surrounding environment, particularly its cleanliness, entirely depends upon the drainage facilities of the respective area. There are many disease-producing micro-organisms which themselves originate and grow in a particular habitat.

Drainage facilities in the rural places of the study region, according to the author's own observation, are poor. In rural areas there are no systematic or planned drainage facilities. All the houses in the rural area have a pit outside, in which all the daily domestic used water is allowed to accumulate, which may make the conditions favourable for the many disease-producing agents, they also produce nauseating odours in the surroundings. Besides water, all the other material is also stored in or outside the house in the absence of proper drainage facilities.

Even in urban areas the problem of drainage has not been entirely solved. When water stagnates outside, it always increases the possibilities of contamination.

Epidemic diseases such as cholera, typhoid, dysentery and various skin diseases are usually reported in urban as well as rural areas within the study unit, mainly due to lack of drainage facilities in the region.
IGNORANCE AND POVERTY

Ignorance and poverty are both inter-connected with each other, but often ignorance is mainly responsible for the poverty of the region. In the Eastern Malwa Plateau people usually suffer from the combined effects of poverty and ignorance. Use of contaminated water, poor dietary habits and unhygienic environment can be easily noticed in the study region and basically ignorance is responsible for all these defects.

Literacy is poor in the entire region, particularly female literacy. Even among well-to-do families, due to old traditions, girls are usually not allowed to take to education. Women do not get equal social status as men, and girls are not given the same attention as boys and the position of the bride is also not independent. Internal arrangements in the family entirely depend on ladies and in the absence of education, they cannot manage properly. Due to lack of awareness, much loss of nutrients takes place in the kitchen itself and this is the most favourable factor for the occurrence of deficiency diseases.

The literacy percentage of the study unit as a whole is only 24.2, and prevalence of poverty and ignorance are largely due to this low percentage. Many cheaply available

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* Table 2.5
foods and nutritious fruits such as 'amla', soyabean, lemon etc., are usually not used due to lack of knowledge. Cheap non-vegetarian foods are also not used by the people of the region due to the prevalent traditions. The environment can be converted into pleasant surroundings at no great expense, but ignorance is all-surmounting hindrance in all such cases.

In urban places also the majority of the population suffers from the combined effects of poverty and ignorance. But here, poverty is now decreasing, due to general advancement, but since people have mostly migrated from rural areas, the general civic sense is not found amongst many of them; they continue to follow all their negative rules. Children of the low and even medium-standard families are found engaged in smoking and drinking habits.

The living environment is also not found to be good in its many aspects. Use of contaminated water and throwing of all kinds of refuse material on streets and even at the front side of the house have been noticed by the author in many towns of the region. Food preparation methods are also found to be defective, because of which much loss of vitamins and minerals occurs at the time of preparation. Usually the other layers of the fruits and vegetables, which have large amounts of nutrients, are thrown out.
SOCIAL AND CULTURAL ASPECTS

Man's social and cultural conditions are very much influenced by the process of learning and are responsible for individual health, character and responses and their progress is directly related to the social and cultural structure of the region.

Many of the mental and physical functions of the body are self-regulating and mostly in a state of equilibrium, but this equilibrium may be disturbed due to stress and this is directly related to the structure of the family. Serious mental illness, suicide, alcoholism, drug dependence, all are due to excess of stress on mind and also excess of the pressure of modern life.

All the cultural and social activities found in the study unit are closely bounded with the old faiths and traditions, which never provide a conducive environment for people. The daily routine of life, marriages, food habits, dresses, methods of cultivation etc. are all mostly based on the prevalent faiths. The urban areas of the study region are, however, slowly escaping from all these fetters and their societies may create the environment favourable for development. For instance, here girls are accorded the same facilities as boys and but even such conditions are being found only in the developing stage. The larger towns of the study region have more progressive societies and well-equipped modern facilities; they therefore have bright prospects for further development.
OCCUPATION

Occupation determines the housing, sanitation, medical attention and general care of the family; it is also the main determining factor for status, purchasing power, quality and quantity of diet, living condition etc. In rural places, people are usually engaged in cultivation and related activities and their diet, clothing, capacity and efficiency of work have been found to vary according to their work. In these places, consumption of milk and fruits entirely depends on local availability. In rural areas people are not habituated to purchase these articles or one could say they purchase to a very limited extent only, while on the other hand in urban places people are bound to purchase each and every article of daily life.

Activity and efficiency of the people generally vary according to nature of work. Factory jobs impart a general alertness and quick efficiency in the people, compared to desk work.

Low and medium-class families are usually found engaged in bidi-making, which reduces the alertness and efficiency of work. Tuberculosis is found in such an environment, where bidi-making is in progress. Females of the Muslim community and scheduled castes are usually found engaged in bidi-making, due to poverty.
In urban areas of the region, the routine of life entirely depends upon the type and nature of the occupation. General habits, dietary pattern, nutrition status etc., are directly controlled by the occupation and different structures have been seen in one town, but in the rural places the routine of life from family to family does not greatly vary because people are mostly engaged in cultivation and related activities.

OTHER FACTORS

Venereal diseases are reported more in the towns than in rural areas in the entire region of study. Usually in industrial and other towns, labourers do not live with their families, so that they satisfy their sexual hunger in brothels. These diseases are of communicable and infectious nature, so that infection results from sexual intercourse with a person having a venereal infection. Besides this, in urban areas, diseases have also migrated from the native places of the workers, so that various types of infections and diseases of their native place are now found in the towns.

Living conditions also play an important role in the prevalence of diseases. In comparison to rural areas, urban places are often cleaner and cleanliness would explain the general absence of skin and infectious diseases, while these occur more largely in rural places.
In rural places all the family members cooperate in their work, while in the urban areas the entire family depends upon the income of one member. Usually people of the region are found frustrated mainly due to poverty and internal family problems. Marriages of girls also become a problem due to the prevalence of the dowry system, so that they also become frustrated, because in our traditional society the life of a girl actually begins only after her marriage.

Vaccination facilities are available in towns, by which spread of infection can be retarded, but in rural areas, only after a disease has spread over the entire region, the preventative aspects would be started. Besides this, due to ignorance, villagers also do not take proper precautions which are very essential for checking several diseases.

The crowded atmosphere of the urban areas also gives ill-effects and density of population is also usually found higher in urban places only. So that particular diseases like tuberculosis, and other respiratory troubles will always get a favourable environment in urban areas.