# SPATIOTEMPORAL DISTRIBUTION OF DISEASES

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#### 3.1 Introduction :

The spatial distribution of diseases in any region is multifactoral phenomenon and it depends mainly on physical, biological and socio-cultural conditions of a particular region. It is mainly because of this, the certain diseases are found to be concentrated in certain specific regions and hence the study of spatiotemporal distribution in relation to changing environmental factors become the important study of medical geography.

While considering this, the researcher proposes to study the distributional pattern of diseases in relation to the environmental factors in the rural areas of Kolhapur district. The author proposes to collect the data about mortality of certain diseases occuring at different P.H.Cs, distributed throughout the district. The data so collected for the period of 12 years (1972-1983) is studied P.H.C. wise. The study of distributional pattern of diseases in this text will be followed by a short history and clinical features of the disease. An attempt is also made to corelate the dependant factors wherever possible. In the later part, the mortality pattern of particular village where the P.H.C. is located is discussed in detail.

# 3.2 Disease wise distribution :

The data for the twelve years (1972-1983) have been collected and are shown with the help of line graphs in Fig.3.1 to 3.7. The diseases selected for the study are eleven in numbers whose mortality data was available from the P.H.C. and village Grampanchayat office. The year wise cause specific mortality rates per one thousand estimated population have been calculated and the dotted lines on each graph show the average mortality rate of a particular disease for the last 12 years (1972-1983).

The eleven diseases selected are grouped in four categories as per international classification of diseases as shown in first chapter.

#### Group I : Infectious and parasitic diseases

# 3.2.1 Dysentery :

Dysentery is the most common disease found all over the Maharashtra. It consists of passage of frequent stools with mucus and blood accompanied by diarrhoea, abdominal pain, fever and tenesmus. Dysentery is mainly of two types :-1) Bacillary dysentery and 2) Amoebic dysentery (Vakil, 1973).

# 1) Bacillary dysentery :

It is an infectious disease caused by the dysentery bacilli. It is common in the early summer and in the rainy season. All races, both sexes and almost all age groups are susceptible. Overcrowding, insanitary surroundings and chronic intestinal affections predispose to the infection. It may be found in epidemic form especially when large groups of people are gathered together and the sanitation is defective. The infection is conveyed through contaminated milk, water and other food stuffs. The work of the carrier of the organism is generally done by house flies or the fomoites. The bacillary dysentery is caused by the organism Shiga bacillus, S.flexneri, S.boydi, S.sonnei, S.schmitz (Vakil, 1973).

# 2) Amoebic dysentery :

Amoebic dysentery results from the invasion of human intestines by an organism known as Entemoeba hystolytica, Entamoeba coli, Iddamoeba butschli, Endolimaxnana and Dientamoeba fragilis. Amongst which Entamoe hystolytica is important member of the group responsible for Amoebic dysentery. It enters the human intestine in the form of a cyst by ingestion. After reaching the intestine, the cyst ruptures to release young motile trophozoites which enters the wall of the intestines (Mishra, 1970).

Due to the lack of water closet facilities in villages, human excreta (containing cysts) is contaminated in the soil, vegetables and drinking water. Flies, by ingesting and then excreting the cysts, disseminate the infection. Water borne epidemics may result from the contamination of drinking water by a sewer.

The data collected P.H.C. wise for the span of 12 years in this district show that mortality rate is much smaller in villages of Kolhapur district. This rate varies from 0.06 to 0.41 per 1,000 estimated population in the villages. Eventhough mortality rate is much smaller, its proliferation and incidence is much higher because of contaminated water. Eventhough the mortality trend shows the declining order, the notice of this disease has to be taken very seriously. It has been observed that the drinking water is much more effective on its spread. The P.H.Cs which are located on river sides show much mortality rate than the P.H.Cs where drinking water is used by any other sources. It has been found that the P.H.Cs like Kadgaon, Mudshingi, Herle and Kowad, where nearness of rivers has become major factors behind high mortality rate. While deaths of dysentery are much smaller in the P.H.Cs like Dattawad, Pargaon, Uttur and Kale.

The line graph drawn for dysentery mortality shows fluctuating trend at alternate year. The purification of river

water which is used for drinking purpose and sanitation may be able to lesser the gravity of this disease. In some of the P.H.Cs, this disease is not continuously found but occurs with a gap of three or four years. The reasons for such intermittent occurance need to be investigated separately.

# 3.2.2 Diarrhoea :

Diarrhoea is a common disease of children. Probably, no child escapes suffering from it at one stage or the other. Because of poverty, ignorance and insanitary living, diarrhoea is more common in Maharashtra. Children of all ages suffer from diarrhoea, but it is more common amongst infants especially those who are artificially fed than in those who are breast fed. This disease may be broadly divided into two groups :-1) Non-infective diarrhoea and 2) Infective diarrhoea.

## 1) Non-infective diarrhoea :

It occurs due to digestive distrubance caused by certain milk, food or allergy to children. It may also be due to the insufficient digestive juice such as saliva, gastric juice and intestinal juices.

#### 2) Infective diarrhoea :

The commonest cause of infective diarrhoea is a bacterium called E.Coli which normally inhabits the intestinal tract. Acute



diarrhoea is set by irritating the intestine by these germs (Bhave and Deodhar, 1967).

It is generally said that effect of climate is less obvious in the non-infectious diarrhoea, but in the case of infectious one, the climatic factors do effect largely.Use of water is directly related with its spread. Water from river and streams is in general potentially dangerous. Indirectly, the influence of climate on dietary needs and habits provides varying opportunities for infection in different areas through a variety of agencies in which the important role of the vectors is played by house flies. These flies do spread diarrhoea infection through faeces and the food of the infected person.

Diarrhoea, the another water borne disease like dysentery is also of much prevalence in the villages of Kolhapur district. It's mortality rate varies from 0.10 to 0.50 per 1,000 estimated population. The polluted water which is used for many purposes such as for drinking, cleaning the clothes and animals might be one of the reasons for it's spread in the rural areas. Here also, like dysentery, the P.H.Cs which are located on banks of the rivers show higher mortality than in the other areas. The higher mortality is noticed at Dattawad, Kowad, Mudshingi and Kadgaon villages, while less mortality is noticed at Herle, Pimpalgaon, Kale and Solunkar.

This disease also shows the decreasing tendency like dysentery at P.H.Cs like Herle, Kowad and Pargaon. Except Kowad, this disease is not found continuously in the span of twelve years. It also emerges out with the interval of 2 to 3 years. The use of safe and unpolluted drinking water may decrease its prevalence in this district.

# 3.2.3 <u>Tuberculosis</u>:

Tuberculosis, commonly known as 'Raj rog', or 'Kshaya rog' is caused by the Tubercle bacillus. T.B. can be defined as a set of symptoms in a man or in animals whose tissues have been invaded by mycobacterium tuberculosis. The three types of agents namely human, bovine and avian can cause tuberculosis. The first two types can infest human and animal hosts reciprocally. The infection of human being by the avian type is relatively rare (Misra, 1970). The human type of tuberculosis is more frequently found in lungs and bovine type in intestines, lymph nodes and bones. The real causes behind the spread of T.B. are not fully understood but it is said that physical factors such as climate play a minor role but the socio-cultural factors like housing, diet, economic conditions and attitude towards the communicable disease and its particular impact can be demarcated on men and women of working and reproductive ages.

In Maharashtra, the tuberculosis is a major killer. The average tuberculosis death rate was 0.46 per 1,000 estimated population during 1970-74, while the average annual death rate of rural area was 0.23 per 1,000 estimated population in same year in Maharashtra state (Pandurkar, 1981).

Like other villages of Maharashtra in Kolhapur district also this disease shows higher incidence. This disease either ranks first or second in its ranking order in all most all P.H.Cs. Secondly, the line graph shows that every year its rate is rapidly increasing. In these villages, the average tuberculosis death rate varies between 0.25 to 0.63 per thousand estimated population. These rates are much higher as compared to other rural areas of Maharashtra. The villages which are in the vicinity of the urban centres, show its higher prevalence. Tuberculosis is also found in the villages which are located in remote areas and are far away from the industrial centres. The prompt and proper means of communication in between the villages and urban centres might be one of the reason for its spread. It has noted that these remote villages have direct communication links with Bombay and other major urban centres and because of this, the disease may be called as the transported disease. Amongst the twelve P.H.Cs under study, it is found out that the highest mortality is noticed at Dattawad, Pattan Kodoli and Solankur, while its low mortality is noticed at Kale, Rashiwade, Herle and Mudahingi.

#### 3.2.4 Tetanus :

Tetanus, a major tropical infectious disease is caused by the specific infective agent, clostridium tetani. This disease mainly spreads through soil and excreta of various animals. The common mode of entry of tetani bacilli is through a wound resulting from an injury, hence the percentage of dust in the atmosphere acts as aetiological factor. Tetanus infection is very rapid hence quick medical aid is necessary otherwise the possibility of deaths is more in the infected cases (Vakil, 1973).

The occurance of the tetanus is common in India.Being an agrarian country in India the incidence is much higher in rural areas. Use of non sterilized hospital theatres and the rusty instruments cause the tetanus infection in the new born child and to the mother. Tetanus infection may be caused by self infection or may be acquired from the environment. The different types of injuries in the agricultural fields, in industries, road accidents, bare foot walking and in the vicinity of animals especially in the villages are responsible for the occurrence of the infection. The use of animal excreta in the agricultural work, the use of horses for the transportation in the cities add in spreading the bacterium in the environment.

The death rate of tetanus as noticed during twelve years period varies in between 0.36 and 0.03 per thousand estimated population in the villages of Kolhapur district. This rate is much higher than the Maharashtra's rural death rate (0.17 per 1,000 population). Almost all villages located in this district are having more agriculturalist due to which the use of agricultural impliments, animal excreta and bare foot working in the fields are some of causes behind its higher intensity in these villages. This disease is not found continuously during twelve years period, but noted intermittently. The zones of higher mortality are noticed along the western hilly region, located generally above 600 metres above mean sea level. The P.H.Cs like Kadgaon (Bhudargad tahsil), Rashiwade and Solankur (Radhanagari tahsil) and Kowad (Chandgad tahsil) are located in the hilly offshutts of Sahyadri show higher prevalence while P.H.Cs located in the river basins below 450 metres above mean sea level like Pargaon (Warna basin), Kale (Kasari basin) and Mudshingi (Panchganga basin) show lowest mortality. Hence it may be stated that physiography determines the distribution of tetanus infection in this area. Of course, this is one of the reasons for its higher occurence. At some of the P.H.Cs mortality rate is increasing in the progress of years as the use of manuals in the agricultural field is increasing every year.

#### 3.2.5 Measle :

Measle, a typical infectious disease is caused by a virus transmitted by droplet infection due to close association. It affects children below the age of five years. The disease is of universal nature. It is sporadic, epidemic and relatively more severe in rural areas. It is true that mortality rate is high amongst the poor, overcrowded and under nourished population. All races and both sexes are susceptible to this disease. Measle is more prevelent in winter and in spring season and infrequent during summer. If the measle infection is severe, sometimes it develops complications like pneumonia, running of the ear and tuberculosis (Datta, 1967). In such complicated cases and in well developed measle infection, the patients generally die.

In Maharashtra, the epidemic broke severely at alternate years and average death rate is 0.07 per 1,000 population in 1970-74. While average death rate of rural area is 0.08 per 1,000 population.

The rural death rate of Kolhapur district tallies with the rural death rate of Maharashtra. In this district, measle is negligible disease which does not occur continuously or with certain gaps. In some of the villages this disease is not noticed during the last six years and wherever it is found is of low intensity. In the P.H.Cs like Nesari (Gadhinglaj tahsil)

not a single deaths have occured during study period. The disease shows much declining trend in the rural area. The higher measle mortality has been noticed at Herle followed by Solankur, Kowad, Kadgaon and Kale while low mortality has been noticed at Dattawad, Pargaon and Rashiwade. As the data of dependent environmental factors is not available it is highly difficult to arrive at perfect conclusion regarding the dominent socio-cultural factors.

# 3.2.6 Jaundice (Viral Hepatitis) :

The term 'viral hepatitis' referred by common usage to hepatitis caused by two viruses 1) Viral hepatitis A (Infections) and 2) Viral hepatitis B (Serum hepatitis).

# 1) Viral hepatitis A :

Viral hepatitis which was formerly known as infective hepatitis or epidemic jaundice is caused by type A virus. Man is the only known reservoir of infection. Sub clinical cases are common and they are responsible for the spread of infection in the community. The infective agent is found in the faces, blood and serum.

Viral hepatitis is most common among children and young adults. Both sexes are equally susceptible. Cases occur throughout the year and are more common in the lower socio-economic groups

because of over-crowding, poor sanitation and poor personal hygiene. People living in the same house are at greater risk. Infection spreads usually from person to person by faecal contamination of water and food.

#### 2) Viral hepatitis B :

It is otherwise known as serum hepatitis and is a serious and common disease. Man is the only source of infection and the virus is present in blood during the incubation period and at the acute phase of the disease. Studies have shown the existence of carriers. The incubation period ranges from 50 to 160 days. In all regions, the antigen is detected more frequently in males than in females and in urban than in rural communities (Park & Park, 1979).

The data related to infectious hepatitis A & B were made available only for seven years i.e.1977 to 1983. The data shows that this disease takes a major toll from the villages and the rate varies between 0.02 to 0.23 per thousand estimated population. The researcher has observed that morbidity rate of jaundice is much higher as compared to its mortality rate. It is true that this disease is mainly found amongst the children of low economic standards and who are living in unhygienic conditions. As stated earlier the over crowding is the single most important social factor for it's wide spread. The higher mortality is found in villages like Kadgaon, Solankur, Pimpalgaon and Pargaon; where more than seven persons are residing in a single house while the mortality rate is much lower in villages like Bhedsgaon, Dattawad, Pattan Kadoli and Uttur, where less than six persons reside in a house. Besides over crowding, poor sanitration and inadequate personal hygines are the major factors behind prevalence of jaundice in rural areas of Kolhapur district.

#### Group II : Malignant Neoplasm

#### 3.2.7 Cancer :

Cancer ranks fourth amongst diseases which kills Indians living in cities. It is neither preventive nor curable. The study of treatment of this disease has crossed all boundries in the medical and scientific fields. It is always stated that, bother yourself about your cancer when and only when it really bothers you, because medical professionals have regretfully stated 'what is cancer, we can't treat, what we treat is not cancer' (Kothari, 1978).

It affects all types of living beings. There is no organ in the body in which cancer can not develope. The most obvious features of many cancers is the development of a new growth, a nodule or a tumour in the tissues of thir orgin. Malignant neoplasm attributes the tendency of a tumour to

spread and to invade surrounding tissues. Cancer's late detection is not effective eradication but it is a highly curable disease if it is treated at early and adequately before it's spread to distant areas of the body.

Cancer makes no distinction of sex, caste, age or social standing. It is indiscriminate in its selection of victims. When cancer starts, there is a process of cell multiplication and partial or complete differentiation, but the newly developed cancer cells are unresponsive to the cell restraining mechanism. The tumour cells keep on multiplying until they form a fleshy mass or a new growth, which invades the surrounding normal tissues. This abnormal uncontrolled autonomous proliferation constitutes the distinctive features of a cancereous growth and only such tumours which show this character designed as cancer (Bhave, 1967).

It is obvious that tobacco chewing, cigarette or bidi smoking degenerates more cancer of cheeks, tongue, mouth and of lungs amongst the male in Maharashtra, while cancer of uterus and breast is prevalent in female due to repeated and unsafe deliveries by untrained surgical staff in the rural areas.

It is true that in the villages of Kolhapur district mortality of cancer is increasing every year and the death rate is also much higher than the Maharashtra's average. Amongst the P.H.C's understudy it has been found out that the cancer death

rate varies between 0.13 to 0.59 per thousand estimated population. Amongst all important diseases cancer ranks either second or third in its order of importance and always shows increasing trend. The P.H.C. wise study of cancer shows that mortality rates are much higher in the villages located in the southern part of the district viz. Kadgaon, Solankur, Nesari, Pimpalgaon and Kowad, while the lower mortality rates have been found in villages located in the northern part of district viz. Pargaon, Herle, Kale, Mudshingi and Pattan Kadoli. It is interesting to note that the villages located to the north of district show lower mortality rate. These villages are located in the vicinity of the major urban centres like Kolhapur, Ichalkaranji and Hatkangle, while Kadgaon, Solankur, Nesari and Kowad which show high mortality rates are the villages situated fer away from the urban centres and where industrilization and urbanization have not reached. It may be stated that these mofussil villages are directly linked with Gr.Bombay from where this disease might have been transported. It has been found out that natives of these villages are working in the different industries and manufacturing mills of Bombay where these persons have become the carrier of the germs. The spread of cancer in the villages will be a serious problem in the future and unless this rural urban migration is not checked; the disease will show the higher and higher incidence in these villages in future.

# Group IX : Disease of circulatory system

# 3.2.8 Anaemia :

Anaemia is a relatively rare variety of primary anaemia and now known to be associated with certain other signs of toxaemia and of haemolysis chiefly affecting men in the second half of life and running a chronic and generally fatal course. Anaemia chiefly attacks males from twenty five to forty five while occasionally women of the same age. It is very rare in the young people. Disease occurs due to a gastro intestinal infection, with absorption of toxins, which destroy the red corpuscles, thus giving rise to deposition of iron in the liver. Anaemia is the most important symptoms of hookworm syndrome. The result from the bite of the worm is the loss of iron in the blood. The hookworm complex is common in hot and humid climatic conditions and sandy soils are favourable factors for the growth of the larvae which are found in the top half inch of the soil. It may also occur if the food consumed is poor in iron content. It is found amongst the economically poor people. It is also responsible for many abnormal prematures, still births and one fifth of all maternity deaths (Mishra, 1970).

Anaemia is one of the major diseases of villages of Kolhapur district, as it ranks second or third following tuberculosis in almost all P.H.Cs. The average death rate of

anaemia is much higher in these villages as it varies from 0.38 to 1.01 per thousand estimated population, which reveals that it's death rate supersedes the death rate of tuberculosis. Anaemia eventhough is not a major cause of death; it is a major cause of disease and illness. The deficiency of iron contents in the blood of individual, occurance of hookworm, blood discharge during menstrual period and repeated delivaries of women are some of the causes for the occurance of anaemia. It must be seriously noted that occurances of anaemia amongst the children of low economic standard and under nutrition and malnutriton are the principal reasons behind its high prevalence in the young population.

The disease ranking techniques show that anaemia is a leading disease of villages as it's intensity increases from north towards south. The P.H.Cs located in the southern tahsils namely Kadgaon, Solankur, Kowad and Pimpalgaon show higher death rate of anaemia, while low death rate is observed in the P.H.Cs like Bhedsgaon, Dattawad and Herle which are located in the northern side. It is true that as compared to south, northern areas are much prosperous, as they are located in the river basins, while southern tahsils are economically backward. The improved medical facilities and standard of nutrition may lead this disease to decrease its intensity in future.

# Group VII : Diseases of circulatory system

# 3.2.9 Heart disease :

The phrase "circulatory or cardiovascular disease" includes diseases of arteries, arteries and capillaries rheumatic fever, chronic rheumatic heart disease, hypertension, ischaemic heart disease, cerebrovascular disease and related diseases of circulatory system. Taken together, this disease has world wide distribution in the major developed countries. They constitute the major cause of death and disability. At present, cardiovascular disease has assumed epidemic propositions and it is one of the greatest threats to modern urbanized and industrialized society (Howe, 1977).

Amongst major forms, ischaemic heart disease occurs when there is major reduction of supply of blood to all parts of the hearts. This may results in the occurance of various diseases to the body. Hypertension or high blood pressure is rise in both maximum or systolic arterial pressure ( when the heart contrasts ) and minimum or diastolic arterial pressure (when heart relaxes above the normal), since coronary thrombosis and strokes are more common inpeople with high blood pressure. Rheumatic heart disease results usually from the rheumatic fever which is recognized as a social disease.

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The number of socio-economic factors such as body strain, cigarate smoking, adiction of drugs and narcotics are some of the social causes for the coardiovascular diseases occuring in any area.

The different types of diseases related to circulatory systems are generally due to the ingnorance of medical professionals termed as Heart attacks and hence data related to different types of heart diseases are grouped in one term 'hear attacks'. The data related to heart attacks became available to the researcher of 13 years, which show that it is ever increasing disease in the rural areas. Generally the deaths due to pain in the chest or any other unknown reasons is called as heart attack and included in this group. Due to this, the death rate by heart disease shows its higher prevalence in the rural areas of Kolhapur district. Here, death rate varies from 0.12 to 0.57 per thousand population. Disease is found at all most all P.H.Cs with increasing intensity and higher deaths have been recorded at Nesari, Pimpalgaon, Rashiwade and Kale, while the rate is low in the P.H.Cs like Mudshingi, Solankur, Pargaon and Dattawad. It is rather difficult to corelate the environmental factors and its spread as the related data are not available.

#### Group VIII : Diseases of respiratory system

# 3.2.10 Pneumonia

This disease is associated with the pain in the chest and severe breathlessness. The disease occurs at all stages but most frequently in early and middle adult life. The highest incidence is in winter. It is usually sporadic disease as the mode of spread being by droplet infection. The clinical diagnosis are more related to environmental disorder especially related to the atmospheric pollution (Vakil, 1973). Disorders commonly associated with atmospheric pollutants and thought to be aggravated by them include chronic bronchitis, pneumonia, lung cancer and asbestosis. In Maharashtra, during 1962-74 the average rural death rate was 0.06 while in the same period the urban mortality rate has reached upto 0.77 per 1,000 estimated population. The districts with high urbanisation show the higher mortality rates (Pandurkar, 1981).

As refered earlier, this disease being a major urban killer, shows its low prevalence in the rural areas. It is true that its prevalence is due to atmospheric disorder and hence it is rarely found in the rural areas. The average rural death rate of Kolhapur district varies from 0.07 to 0.35, which is higher than the state rural average. Eventhough the local environmental

disorder is not responsible for its spread in the villages, the migration of the people from the urban areas might be responsible for its proliferation in these villages. It is interesting to note that higher mortality is at south and it decreases towards the north. The P.H.CS like Kowad (Chandgad), Nesari (Gadhinglaj), Kadgaon (Bhudargad) and Pimpalgaon (Kagal) show higher mortality rates, while the P.H.Cs located to the north especially Dattawad, Pargaon, Kale and Herle show less occurance. It might be because of number of mill workers residing in industrial cities like Bombay and other, might be more from the southern rural areas of the district from which they might have brought the disease to the villages.

The line graph shows that the trend of mortality is decreasing every year which can be further decreased, if the rural urban migration is checked at its maximum level.

#### 3.2.11 Asthma :

An attack of Asthma often commences in the early morning when the patient awakes with a feeling of tightness of the chest. Some regards the asthmatic attack as a series of spasmodic attempts on the part of the respiratory muscles to overcome some obstructions to the entry of air. But central fact is a narrowing of the bronchial bubes, probably due to spasm of the involuntary branchial muscles, with hyperxmia of the submucosa and swelling of the mucose membrane. Recent investigation points to asthma as a foreign protein enterance, perhaps in the food, from some infective focus in the nasopharengeal passages. Asthma may occur at any age, but always makes its first appearance soon after the age of puberty. Any previous lung disease especially chronic bronchitis may predispose to asthma. Among the existing causes of an attacks, certain atmospheric conditions such as dust, moisture etc. cause the prevalence of asthma.

Asthma, a major respiratory disease, is one of the most important diseases of the region under study. The highest number of deaths are occuring in all the villages. Asthma always ranks at top in the ranking order of diseases in the study region. In all the P.H.Cs under study in every year the deaths are occuring due to asthma and mortality rate shows the increasing trend in the rural areas. The rate of increase of mortality is very sharp in this region and hence the careful investigation is needed for controlling this disease in this region. The average death rate is very high and some times even reaches up to 3.0 per thousand estimated population, as observed at Solankur P.H.C. in 1978. The reason behind this high and continuous occurance of deaths needs to be corelated to atmosphere disorders. It is interesting to note that Asthma is found in southern part of Kolhapur district

in higher amount specially at Solankur, Nesari, Kadgaon, Rashiwade, Uttur and Kowad i.e. the P.H.Cs located at the height of 600 metres from mean sea level and above, while P.H.Cs located to the north of the district in the river basins mainly Pargaon, Mudshingi, Herle and Pattan Kodoli which are below the height of 450 metres from mean sea level show its low prevalence. It may be stated that asthma is a disease of higher altitude. The breathlessness due to low oxygen contents, atmospheric disorders and physical incapacity with the advancement of age might be some of the causes of the occurance of asthma in this region. The scientific survey needs to be conducted for controlling this disease in this region.

# 3.3 Spatial distribution of disease (P.H.C. wise) :

In the earlier section, the study was made by selecting each disease occuring at fourteen P.H.Cs of this district. Here the researcher attempts to study the distribution of diseases in the order of importance at each P.H.C. for the eleven diseases and mortality trend has been studied at each village where P.H.C. is located. The disease wise data have been collected and are shown in the figures 3.1 to 3.7 with calculating the death rates per 1,000 estimated population.

# 3.3.1 Bhedasgaon (Shahuwadi tahsil) :

The village Bhedasgaon is located in the offshuts of Sahyadri at a height of 500 metres above mean sea level and on



the right bank of Varna river. The village is situated in the area of 618 hectares with 621 habitated houses consisting of population 3,307 per 1971 census.

The graph number 3.1(a) shows the mortality patterns of 11 diseases selected for study. In this village the tuberculosis and asthma are the two major diseases which are constantly occuring with increasing trend, with the average annual mortality more than 0.45 per thousand estimated population. Cancer ranks third in the order of importance followed by anaemia, dysentery, diarrhoea, pneumonia, heart disease, tetanus, measle and jaundice. This ranking order suggests that the diseases of respiratory systems are of high prevalence in this village. The villagers generally use river water for the drinking purpose due to which occurance of dysentery and diarrhoea are remarkable. The diseases like measle, tetanus and jaundice are sporadic and of less magnitude as the death rates are below 0.07 per thousand population.

#### 3.3.2 Kale (Panhala tahsil) :

The village Kale is located on the right bank of Kasari river at a height of 600 metres from mean sea level. The village is situated in 592 hectares and 477 habited houses. The population is 4,079 per 1971 census.

Graph 3.1(b) shows the year wise distribution of eleven selected diseases for a span of 12 years. From the graph it reveals

that asthma is the major disease of this village whose average death rate is 0.52 per 1,000 population. It is followed by anaemia, heart diseases, tuberculosis, cancer, pneumonia, diarrhoea, jaundice, measel, dysentery and tetanus. The first four diseases namely asthma, anaemia, heart disease and T.B. together take much toll while in the case of remaining diseases, the death rate is as low as 0.20 per 1,000 population. Like Bhedasgaon, here also diseases related to atmospheric disorders are of much importance. Eventhough, village is located on right bank of Kasari river and people use river water for drinking purpose, the occurance of water borne diseases like dysentery and diarrhoea are less as they lie on the seventh and tenth ranks respectively. It might be because the river Kasari is not polluted upto the village Kale.

## 3.3.3 Pargaon (Hatkanagle tahsil) :

The village Pargaon is located on the right bank of Varna river above 500 metres from mean sea level. Area of this village is 1,874 hectares. The householders are 925 and total population is 6,756 per 1971 census.

Graph 3.2(a) shows that the occurances of tuberculosis, asthma and cancer are more as the death rate lie above 0.25 per 1,000 population. The list of diseases show that diseases due to respiratory systems are more predominent in this village. The



people of Pargaon use water of Varna river for drinking purpose, hence diseases like diarrhoea and dysentery eventhough they rank fifth and six the death rate due to these diseases is increasing every year. The Varna sugar factory lies to the west of the village Pargaon some 6 kms. away due to which the pollution may be possible. The atmospheric pollution as made by industries like sugar may add more and more respiratory disorders in this village. Eventhough occurance of pneumonia at present is less at this village, there is fear of increasing this disease in future. The control on diseases of respiratory systems and diseases due to water pollution is needed in this village.

# 3.3.4 Herle (Hatkanagle tahsil) :

The village Herle is located on the left bank of Panchganga and above 500 metres from mean sea level. The village has covered 1,601 hectares of land and total householders are 1,117. The population of this village is 7,081 per 1971 census.

Fig.3.2(b) reveals that some of the diseases under study show the increasing tendency. The diseases like tuberculosis, cancer, asthma, diarrhoea, dysentery and anaemia shows increasing mortality per year. In this village, highest number of deaths are occuring due to heart diseases and are followed by asthma, dysentery, tuberculosis and cancer while diarrhoea, tetanus, jaundice and measle take less toll. The list indicates that diseases due to respiratory disorders are more. The village Herle is located near Kolhapur city at a distance of 12 kms. and is connected with Kolhapur city by Municipal Corporation Buses. Nearness of industrial city like Kolhapur is one of the reasons for increasing number of deaths due to pollution. The increasing trend suggests that these respiratory diseases will show their high prevalence in future.

#### 3.3.5 Pattan Kodoli (Hatkanagle tahsil) :

It is located on the right bank of Panchganga river at a height of 500 metres from mean sea level. The area acquired by this village is 2,112 hectares and population according to 1971 census was 10,990. There are 694 householders.

Figure 3.3(a) shows that deaths due to tuberculosis and asthma ranks top in the death list of village whose death rates are 0.58 and 0.36 per 1,000 population respectively. Both the diseases are followed by anaemia, heart disease, diarrhoea, pneumonia, dysentery, cancer and tetanus. The occurances of tuberculosis and asthma prove that nearness of industrial centres like Ichalkarngi and Kolhapur add number of victims by these diseases. The village eventhough located on the right bank of Panchganga river, enjoys the facility of filtered water hence water borne diseases viz. diarrhoea and dysentery show less deaths



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as both diseases rank fifth and seventh respectively. Daily rural-urban migration might be adding more diseases in this village. The continuous occurance of deaths by tuberculosis, asthma, anaemia and pnumonia should be seriously checked.

#### 3.3.6 Mudshingi (Karvir tahsil) :

The village Mudshingi is located on the right bank of Panchganga and above 500 metres from mean sea level. The village is situated in the area of 1,411 hectares with 783 habited houses. The population of this village is 5,301 per 1971 census.

Fig.3.3(b) reveals that as the village Mudshingi is located on the bank of Panchganga the highest prevalence of diarrhoea is seen (0.49 per 1,000 population) which is a major disease of this village. It is followed by anaemia, asthma, dysentery, tuberculosis, pneumonia and heart disease. Rest of the diseases like tetanus, jaundice and measle are negligible in proportion. The effect of nearness of Kolhapur city and polluted Panchganga water might be the causes for the higher prevalence of respiratory diseases and the diseases related to water.

# 3.3.7 Dattawad (Shirol tahsil) :

The village is located on the left bank of Dudhganga river at a height of 500 metres above mean sea level. Occupied



area by this village is 1,585 hectares and householders are 835. Population of this village is 5,501 according to 1971 census.

Fig.3.4(a) shows that occurance of tuberculosis, cancer, asthma and diarrhoea is more in this village. The death rate of each of these diseases is above 0.48 per 1,000 population. While diseases like anaemia, tetanus, dysentery, heart diseases and pneumonia are of lesser magnitude. The list proves that the diseases of respiratory disorders and digestive systems are more common in this village. The nearness of Ichalkaranji the industrial city mightbe the reason for this. As the village is located on left bank of Dudhganga, occurance of diarrhoea and dysentery might be more.

#### 3.3.8 Pimpalgaon (Kagal tahsil) :

It is located in the Vedganga basin and is above 700 metres from mean sea level. The occupied area of this village is 468 hectares. The total population is 1,391 and householders are 283.

Fig.3.4(b) shows the average mortality rate of eleven diseases selected for the study. The graph shows that the diseases like asthma and tuberculosis have higher mortality rates i.e. 0.90 and 0.43 per 1,000 population respectively. They are followed by anaemia, heart disease and cancer whose death rate lie in between 0.35 and 0.43 per 1,000 estimated population. While the diseases of low occurances are dysentery, tetanus, jaundice and diarrhoea. The ranking list prooves that diseases due to respiratory disorders and circulatory systems are more in this willage.

#### 3.3.9 Rashiwade (Radhanagri tahsil) :

It is located in the Bhogavati basin and above 600 metres from mean sea level and acquired area is 537 hectares. The population is 5,622 and house holders are 715.

From the Fig.3.5(a), it reveals that village Rashiwade has maximum deaths by asthma in the span of 12 years period. It is followed by heart disease, anaemia, tetanus and tuberculosis while water borne diseases like dysentry, diarrhoea and jaundice take minimum toll. The diseases like T.B. and asthma are increasing every year. It is very surprising to note that deaths due to tetanus are also increasing in higher proportion.

3.3.10 Solankur (Radhanagri tahsil) :

The village Solankur is located on the left bank of Vedganga river in the offshutts of Sahyadri at a height of 700 metres above mean sea level. Area of the village is 573 hectares with 241 householders. The population is 1,814 according to 1971 census.



Fig.3.5(b) shows that deaths due to asthma are highest as it's death rate is above 1.40 which is double than that of anaemia. The anemia is followed by cancer, tuberculosis, jaundice, heart disease, tetanus and pneumonia. Eventhough the village is located on the left bank of Dudhganga river and villagers are using river water for drinking purpose, the deaths due to dysentery and diarrhoea are very less. The death rate by these two diseases is even less than 0.1 per 1,000 population. It might be because river Dudhganga is not polluted upto the Solankur village. Deaths due to respiratory disorders are more as these diseases might have been transported from Bombay where natives of Solankur are be working as mill labourers.

3.3.11 Kadgaon (Bhudargad tahsil) :

The village Kadgaon is located on the left bank of Vedganga river at a height of 500 metres from mean sea level. Area of this village is 796 hectares and population is 1,877 according to 1971 census. The householders are 257.

Fig.3.6(a) shows that in the village Kadgaon asthma and anaemia are the major diseases whose death rates are above 1.0 per 1,000 population. They are followed by cancer, tuberculosis, dysentery, tetanus, heart diseases, pneumonia and diarrhoea. The ranking list shows that the diseases due to respiratory diseases are more in number than the diseases due to drinking water.



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Eventhough the village Kadgaon is located on left bank of Vedganga river, the diseases like dysentery and diarrhoea show their less effect. Pneumonia is also a major disease of this village. It might be because of its migration from surrounding urban centres.

# 3.3.12 Uttur (Ajara tahsil) :

The village Uttur is located in the offshuts of Sahyadri at a height of 700 metres above mean sea level. The village is located in the area of 1,746 hectares with 975 habited houses and population of 5,957 per 1971 census.

Fig.3.6(b) shows that the village Uttar experiences the constant increase in the number of deaths by cancer and asthma, while the maximum deaths have occured due to tuberculosis followed by diarrhoea, heart disease, anaemia and tetanus. Average death rate of asthma is 0.76, followed by tuberculosis (0.48), diarrhoea (0.29) and heart disease (0.22). The ranking order of these disease shows that diseases of respiratory disorders are more in number and they are of increasing tendency.

3.3.13 Nesari (Gadhinglaj tahsil) :

The village Nesari is located on the left bank of Ghataprabha river and at a height of 900 metres above mean sea level. The area covered is 530 hectares with 537 house



holders and population is 3,413 per 1971 census.

Fig.3.7(a) shows that the village Nesari is having highest numbers of deaths by asthma which are double than the deaths by heart disease which rank second in the list. It is followed by tuberculosis, cancer, pneumonia, anaemia, diarrhoea and tetanus. Occurence of asthma and tuberculosis is increasing every year and constant occurance of deaths by cancer show that the percentage of deaths by environmental disorders are more. This might be again because of direct linkage of this village with industrial city like Bombay by state transport buses.

#### 3.3.14 Kowad (Chandgad tahsil) :

The village Kowad is located in the offshuts of Sahyadri at a height of 700 metres above mean sea level and on the left bank of Tamraparni river. The village is situated in the area of 910 hectares with 338 habited houses and population of 2,638 per 1971 census.

Fig.3.7(b) depicts that this village shows highest number of deaths by asthma and is followed by tuberculosis, anaemia, diarrhoea, cancer, pneumonia and dysentery. The deaths due to T.B., asthma, anaemia and cancer are occuring constantly in each year which show that the diseases due to environmental pollution are more in numbers. As the village is located on the left bank of Tamraparni river, the diarrhoea acquires it's

fourth rank in the order of importance. Effect of rural urban migration might be responsible for the high increase in some diseases which have been transported from the neighbouring major industrial cities like Belgaum and others.

#### 3.4 Interview schedule general :

For understanding the existing condition of the health status of the people residing in these villages of Kolhapur district, the researcher has undertaken the extensive field work of this area. This field work has arranged with the help of interview schedules with the patients visiting the different P.H.Cs located in this district. These interviews were conducted personally by the researcher with visiting each P.H.C. frequently with help of questionnaire as shown in appendix A & B. The questionnaire No.1 was used for the patients visiting a particular P.H.C. and are the residents of a village other the village where a P.H.C. is located (out siders). The questionnaire No.2 was used for the patients visiting the P.H.C. and who are the residents of the same village where a particular P.H.C. is located (indoors).

The different questionnaires related to No.1 which deals with the outsiders were rearranged, tabulated and analysed under the following sub heads :-

- General information about a patient, his occupation, sex age and economic status.
- II) Location of P.H.C. and mode of transport to visit the P.H.C.
- III) Types of diseases occuring to the patient and type of availability of the medical aids.
  - IV) Diet of the patient
  - V) Social habits and
- VI) Availability of drinking water

The researcher has interviewed 133 patients visiting the P.H.Cs and who are the residents of nearby villages. The P.H.C. wise number of interviews conducted are as follows :-

1)	Bh <b>edas</b> gaon		10	8)	Pimpalgaon	-	8
2)	Kale		9	9)	Rashiwade	-	11
3)	Pargaon	-	9	10)	Solankur	-	12
4)	Herle		8	11)	Kadgaon	-	10
5 <b>)</b>	Dattawad		10	12)	Uttur	-	10
6)	Pattan Kodoli	-	8	13)	Nesari	-	10
7)	Mudshingi		7	14)	Kowad	-	11

The questionnaire number 2 deals with the indoor patients and is tabulated and analysed under the following six heads :-

 I) General information about patient, his occupation, sex, age, economic status etc.

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- II) Types of diseases and number of deaths in each family
- III) Type of availability of the medical aids
  - IV) Diet of the patient
  - V) Social habits and
- VI) Availability of drinking water

The researcher has interviewed 240 patients visiting the P.H.C. and are the residents of same village where a P.H.C. is located. The P.H.C. wise number of interviews conducted are as follows :-

1)	Bhedasgaon	-	20	8)	<b>Pimpal</b> ga <b>on</b>	-	18
2)	Herle	-	14	9)	Rashiwade	-	16
3)	Dattawad	-	18	10)	Solankur	-	19
4)	Pattan Kodoli	-	17	11)	Kadgaon	-	20
5)	Mudshingi	-	16	12)	Uttur	-	17
6)	Pargaon	-	15	13)	Nesari	-	17
7)	Kale	_	16	14)	Kowad	_	17

The general findings are noted under each sub-head.

3.5 <u>Sample cases I</u> : (Sample cases of the patients visiting the P.H.C. and are residing outside) :-

Questionnaire No.1 :- The researcher has interviewed 133 patients from this district as shown above.

## 3.5.1 General information about the patients :

Out of 133 respondents, 71 were male and remaining 62 were female. More than 90% (123 respondents) are the agriculturalist while remaining 10% are engaged in secondary and tertiary activities. The researcher has found out that some 100 respondents are of age below 40 years while only 4 respondents are above the age of 60 and above. It clearly indicates that the distance in between P.H.C. and village is the important factor, why the old people could not visit the P.H.C.. While studying the monthly income of the respondents, it has been found out that 44 respondents were of low economic group i.e. below Ks.300/- per month while 51 were in between Rs.301/- and Rs.400/-. Even if majority of the respondents are of low economic group, their family size is very big. It is found out that on an average 5.8 persons are residing in each family. This family size is as low as 5 persons in the case of villages like Kale, Herle, Pimpalgaon and Rashiwade, while in the village of Pargaon and Mudshingi it is of 7 persons per family. To feed 7 persons of a family for a month in the meagre income of Rs.400/- indicates that less amount

is available for spending on the health of the family. It is the only reason why these patients come to the P.H.C. for getting the free treatment.

#### 3.5.2 Location of public health centre & mode of transport :

It is surprising to note that for getting a simple curing treatment the patients have to travel upto a distance of 10 kms. Out of 133 patients, some 92 have to travelled a distance of 5 kms. and 38 have to travel a distance of 10 kms. from their residence to P.H.C. Being a large distance in between, more than 50% patients travel it by S.T.; while remaining either use carts or bicycles or they use to walk up to P.H.C. Eventhough the people are of low economic group, they have to spend the money on travel to get a free treatment at the P.H.C. It clearly indicates that the provision of getting a free treatment must be made within the sphere of 5 sq.kms. from their residence. This factor must be taken into consideration while planning the new P.H.Cs in the future. Out of 133 respondents, 117 have mentioned that they do not have any type of medical facility provided at their village of residence, while only 16 respondents have stated that they do have some type of medical facility available at their village, but as they do not offer to spend money, they do need the free treatment from the P.H.C. eventhough it is located some 10 kms. away.

#### 3.5.3 Disease occurance and medical aids :

The researcher has collected the information from the patients about the cause of disease from which they are suffering and have come to P.H.C. for getting a treatment. It has been found that majority of patients are suffering from either the diseases of digestive system or from respiratory systems (These findings tallies with the findings noted in section No.3.2 and 3.3). Out of 133 patients, 36 were suffering from respiratory disorders followed by 29 of digestive system and 26 by skin disease like scabies, ringworms and some others. Because of the respiratory and digestive diseases, these patients have to visit the P.H.C. frequently to get the treatment. More than 100 patients do visit the P.H.C. once in every 15 days, while 29 patients visit the P.H.C. once in every 10 days. This duration seems to be very big as the distance is more. To get the prompt and effective treatment a patient has to visit the P.H.C. at least every 3 to 5 days, but because of long distance and money required to spend on travel they could not visit the P.H.C. frequently. This problem could be solved if the distance in between is less.

# 3.5.4 <u>Diet</u>:

The questions related to type of food consumed during lunch and dinner were asked by the researcher. While analysing

the type of diet, the author has found out three combinations of food intake.

- 1) Rice, Jawar cake (Bhakari) & curry
- 2) Jawar cake and curry
- 3) Rice and curry

Generally the villagers consume the same type of food for dinner which they take for lunch. The above combinations show that they consume carbohydrates in more quantity than proteins in that proportion. The use of minerals and vitamins in the form of leafy and other vegetables is very meager. It has been found out that no respondent take balance diet, due to which malnutrition is a major ailment and the deficiency diseases might be occuring in more amount. It has been found out that out of 133 respondents, 113 consume nonyegetarian food especially fish and mutton but the intake of nonvegetarian dishes is in less proportion i.e. generally twice a month. Eventhough, the researcher has not collected the data about quantity of intake of each food item, the general statements made by respondents proove that the available food is far below the requirements. To feed a family of 7 persons in the monthly income of Rs.400/- or less, itself indicates that the diet is lacking in the case of quality and quantity also. This undernourishment might be affecting the health of children also.

The separate study on the nutritional deficiency diseases may throw more light on this aspect.

# 3.5.5 . <u>Habits</u> :

Eventhough the respondents have mentioned about different habits for which they are acustomed to, the four major habits have been found out namely consumption of alcohol (wine), bidi, cigarette and tobacco chewing. 119 respondents have one of the four habits or in combination of one or two. More than 40% of respondents consume alcohol while cigarette smokers are very less i.e. only 10. The daily consumption of alcohol invites different types of diseases associated to.

# 3.5.6 Availability of drinking water :

Amongst the major sources of water supply, well water and river water are the important sources. Only 29 respondents has stated about the supply of water by tap. In few cases the supply of water is by tube-wells. But this drinking water supply is not filtered one. 103 respondents use unfiltered water without using any means for purification and filteration. Even in rainy season they consume water as it is available from the natural sources. This might be leading towards increase in number of water borne diseases and diseases associated with digestive system. The cause specific death rate also shows that the percentage of water borne diseases is more in villages of Kolhapur district.

# 3.5.7 <u>General findings</u>:

Being the persons of low economic group and the members of large size family, these villagers could not offer to opt any other medical aid than the primary health centre where it is given at free cost. Due to this, they offer to walk even 10 to 15 kms. to get this free medical service. The time and distance factor is important hinderence behind the checking morbidity rate of diseases in this district. Due to the shortage of money, these villagers could not offer to take the medicines from any other sources. The digestive and respiratory diseases are more prevalent in this region and consumption of unpurified and unfiltered water might be one of reasons. The undernutrition and malnutrition are the two factors associated with number of deficiency diseases amongst these people. The availability of medical aid at the free cost in the village of their residence or in the periphery of 5 kms. may solve some of the problems associated with the health of villagers of this district.

3.6 <u>Sample cases II</u> (Sample cases of the patients visiting the P.H.C. & residing in the same village (Questionnaire 2):

The researcher has interviewed 240 patients residing in the same village where the P.H.C. is located. These interviews were either conducted at P.H.C. where the patient come for treatment or by visiting their houses. The P.H.C. wise number of sample cases interviewed are mentioned above in section 3.4

#### 3.6.1 General information about the patients :

The average size of the family interviewed is 7 persons consisting of average 2 male, 2 female and 3 children below the age of 15 years. The people generally are of low economic group i.e. below Rs.400/- per month.

# 3.6.2 Type of diseases and cause of death :

The researcher has found out that the diseases due to respiratory systems are of highest rank amongst the villagers. These are followed by dysentery, skin diseases and anaemia. More than 60% of respondents are suffering from diseases related to respiratory and digestive systems. The major noteable disease by which other persons of their family were suffering in the previous year of interview were T.B., asthma, dysentery, cancer, bronchitis, jaundice and some skin diseases. The children below the age of 15 were suffering from common cold, dysentery, whooping cough, measles, pneumonia and some others. It has been found out that common cold is a disease which occurs through out the year in any season, while dysentery and gastroenteritis are associated with rainy season. Jaundice is also found to be the major cause of disease which occurs either in summer or in winter season. Out of 240 respondents, 53 have stated that during the last 5 years the death has occured at least of one of the family members and major causes of the deaths were anemia, asthma, cancer, heart disease, paralysis and some others.

## 3.6.3 Availability of medical aids :

As the P.H.C. is located in the same village of residence, some 200 respondents have stated that during common sundry illneses they use to take medical aid. Eventhough in some of the villages, private medical aids (by private doctors) are available; 152 have stated that they do not take medicines from private doctors. It might be because of nonavailability of money at the time of illness. Out of 240; fifty two have stated that medicines prescribed by private doctors are of heavy price and doctor's fees are also heavy, some 58 respondents use to take medicines from witch doctors (Vaidu doctors). Majority of respondents do not trust on the Ayurvedic medicines as they do prefer the allopathic treatment. In most of the villages the medical shops have been established due to which medicines prescribe by doctors are readily available in the same village.

# 3.6.4 Diet :

Findings are more or less the same as stated in section 3.5.4 . Here also, three combinations of diet are preferred as

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observed above and the diet is unbalanced and deficient in quality and quantity. Consumption of nonvegetarian dishes in the form of mutton and fish is more.

3.6.5 <u>Habits</u>:

The consumption of alcohol and bidi and cigarette smoking and tobacco chewing are the major habits noted amongst the villagers. The daily consumption of alcohol invites the different types of diseases associated with.

# 3.6.6 Availability of drinking water :

Well and river water are the major sources for drinking purpose. Eventhough in some of the villages, tap water is available, it is supplied from the river itself by constructing tanks and water is lifted by electric motors. In the villages where tap water is available, no specific measures have been taken to purify the water. Due to non availability of safe water, number of water borne diseases are obvious.

# 3.7 <u>Conclusion</u>:

While studying the spatiotemporal distribution of diseases in the rural areas of Kolhapur district, it is observed that the prevalence of respiratory diseases is more in the southern parts of the district which are directly connected with major urban centres like Bombay and others. The villages which are in the vicinity of these urban centres show more prevalence of respiratory disorders. Rural urban migration is the chief factor for the occurance of the diseases of atmospheric disorder in these villages. The anaemia, cancer and tuberculosis are the notable diseases of these rural areas.

The villages which are located in the river basins show higher occurance of water borne diseases like diarrhoea and dysentery. The unsafe polluted water is mainly responsible for its spread in the villages. The water pollution due to molasses by sugar factories is also one of the factors behind this high incidence.

The primary health centre wise distribution of diseases show that the P.H.Cs located in the remote areas but which are directly linked by S.T.Buses with major urban centres, show higher prevalence of diseases associated with industrial pollution.

For understanding the existing health status, some interviews were conducted which show that majority of the patients are from big families and are of low economic group and hence they could not offer any other treatment than which is available at P.H.Cs. For getting this free medical treatment

they are prepared to walk even a distance up to 15 kms. The prompt and proper medical aid should be made available to them in their nearby villages. The diet of these villagers is unbalanced and lacking both in quality and quantity. Due to this, they suffer from various nutritional deficiency diseases. Undernutrition and malnutrition are the two major problems associated with these villagers and unsafe and unpurified drinking water invite number of digestive diseases.

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