CHAPTER - III

SPATIO-TEMPORAL ANALYSIS OF DISEASES (DISTRICTWISE)

Conti..

3.1 INTRODUCTION :

Spatio-temporal analysis of diseases is multi-functional phenomenon. The spatial distribution of a diseases depends mainly on the physical, biological, social and economic conditions of a particular region. The certain diseases are found to be concentrated in certain specific regions and occur intermittently in that region, and hence the study of spatio-temporal analysis in relation to the aforesaid factors become the important study of medical geography.

The researcher proposed to study the spatio-temporal distribution of major diseases in relation to the environmental factors in Pune division. The researcher has collected the data about mortality of certain diseases occuring at different districts and cities of Pune division. The data so collected for the period of sixteen (16) years (1972-87) are studied districtwise. The study of major diseases in this text will be followed by a short history and clinical features of the disease. An attempt is also made to correlate the dependent factors wherever possible.

The collected data have been shown with the help of choropleth maps. The data of 16 years have been classified into four groups, these are 1) 1972-75 2) 1976-79 3) 1980-83

4) 1984-87. These are shown in figures 3.1 to 3.10. The diseases selected for the study are ten in numbers whose mortality data was made available from Annual Vital Statistical Reports of Maharashtra State. The following major diseases are discussed at district level - 1) Cholera 2) Dysentery 3) Diarrhoea 4) Tuberculosis 5) Leprosy 6) Tetanus 7) Measle 8) Malaria 9) Cancer and 10) Pneumonia.

3.2 CHOLERA :

Cholera occupies the top place in classification list (as per WHO classification) with code number 000 and in short list number A_1 . Cholera is the acute, waterborne infectious disease. India is responsible for donating spreading this disease into the world. It is disease which manifests itself in an acute diarrhoea condition. It is characterised by watery nonfaecal stool, causing loss of salt from the body. Deaths are common and they mainly result from dehydration. An attack of cholera is associated with uncomfortableness, fatigue and diarrhoea. The rice watery stool soon becomes colourless. A little later profuse vomitting of the same rice water variety appears with excuciating cramps in the abdomen and in the calf muscles of the legs. The victim soon collapses. Patients pulse rate comes down (weaker) and becomes erratic. His body becomes cold, temperature sinks below the normal but rises in the rectum to 105°F.

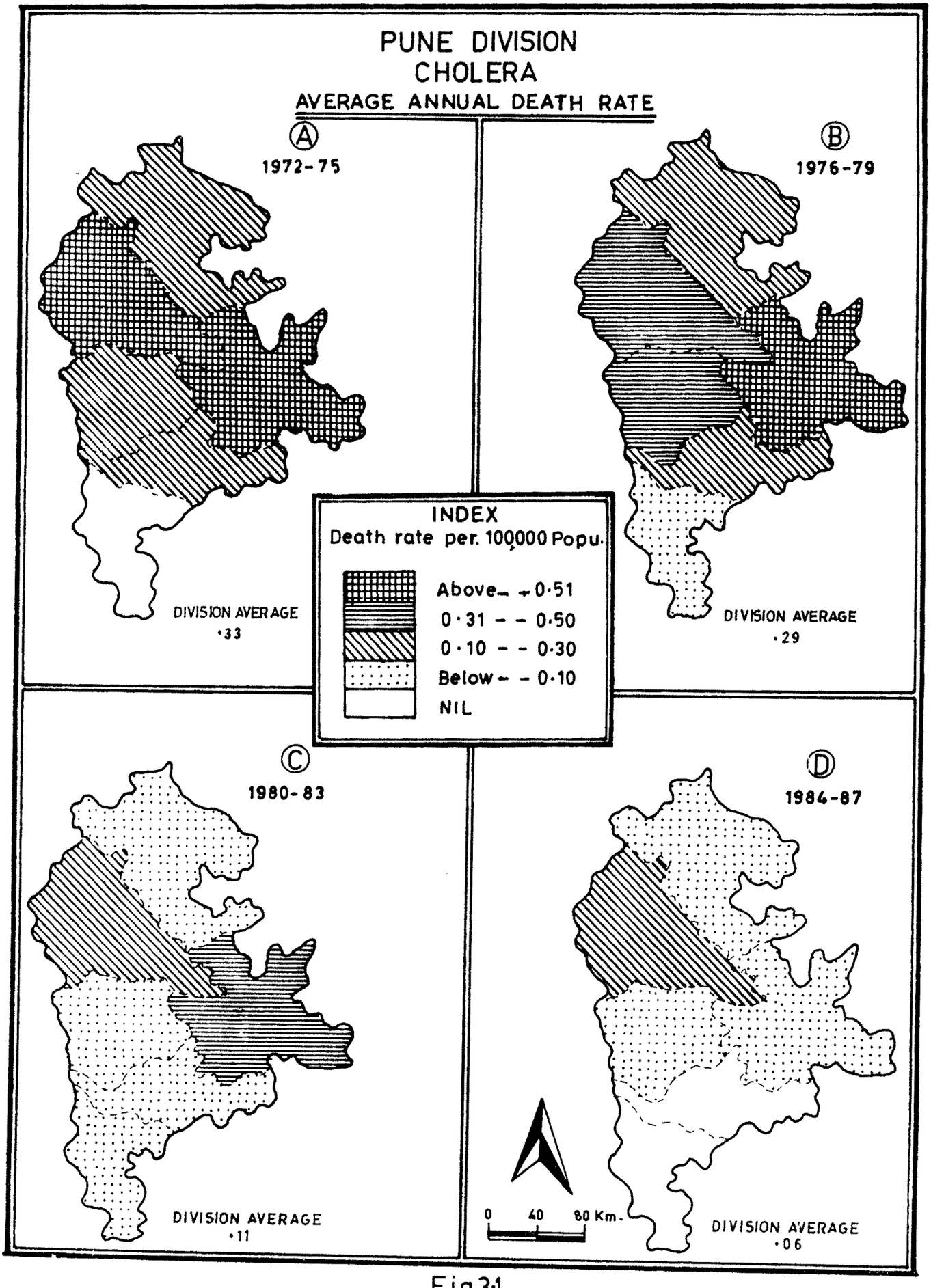
PUNE DIVISION
CHOLERA
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
·33
B
1976-79
DIVISION AVERAGE
·29
INDEX
Death rate per. 100000 Popu.
Above - ·0·51
0·31 - - 0·50
0·10 - - 0·30
Below - - 0·10
NIL
C
1980-83
DIVISION AVERAGE
·11
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
·06

Fig.3·1

The victim is unable to pass his urine, feels thirsty and the thirst is never quenched. The causative agent of cholera is vibrio-cholerae. Many deaths occur within a few hours on onset of cholera.

Generally cholera out breaks in it's epidemic form within the rainy season, because of rainfall and temperature but alone temperature and rainfall are not responsible for its epidemicity. They have to be considered in relation to the local relief, types of soil and socio-cultural factors like type of water, drainage, sewage disposal and malnutrition arising from poor socio-economic group of the people. Physiography plays vital role in distributing the disease.

3.2.1 Analysis of Cholera mortality in Pune division (1972-87) :

The data so collected districtwise for the span of 16 years of the Pune division has been shown in the four successive periods of 1) 1972-75 2) 1976-79 3) 1980-83 and 4) 1984-87 (Fig.3.1). The choropleth map depicts that cholera in the first period (1972-75) was of high intensity in Pune and Solapur districts. The divisional average during the said period was 0.33/100,000 estimated population. Average annual death rate was very high in Pune and Solapur districts (higher than the divisional average) i.e. 0.54 and 0.60/100,000

population respectively. Average annual death rate was moderate in Ahmednagar, Satara and Sangli districts. The cholera deaths were not noticed in Kolhapur district.

The cholera mortality rate has been decreased in the second period (1976-79) as it has gone down from 0.33 to 0.29. The mortality rate was very high in Solapur district than the other districts. The mortality rate is higher in Pune and Satara districts (0.34 and 0.32 respectively). The mortality rate is moderate in Ahmednagar and Sangli districts (0.26 and 0.23 respectively), and in the Kolhapur district it is the lowest i.e. 0.05/100,000 est. population.

In the third period the rates have still decreased compared to the previous period. The high incidence of cholera deaths have observed in Pune and Solapur districts, while in the remaining four districts the rate are considerably low even below 0.1/100,000 est. population.

In the last period (1984-87) the mortality rates have decreased rapidly throughout the whole Pune division. The cholera deaths seem to be persistent in Pune district. In the districts like Ahmednagar, Solapur and Satara, the intensity cholera mortality is very less which is less than 0.03. The cholera deaths have not occurred in Sangli and Kolhapur districts during this period.

The overall cholera mortality is found to be concentrated in two districts 1) Pune and 2) Solapur. This is the region of Bhima river basin. The low lying areas of Bhima river basin seem to be infected by cholera. It is certainly proved that distribution of cholera is related with the water. The water pollution in these districts might be one of the reasons for the spread of cholera in Pune division.

3.3 DYSENTERY :

Dysentery is the waterborne chronic disease. Dysentery is the most common disease all over India. It is more frequent and in violent form in the tropical areas. 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 i) Bacillary dysentery and ii) Amoebic dysentery.

i) Bacillary dysentery :

It is an infectious disease caused by the dysentery bacilli. It is common in the early summer and in the rainy season. Overcrowding, insanitary surrounding and chronic intestinal affectious predispose to the infection. The infection is conveyed through contaminated milk, water and other food stuffs. The work of the carrier of the organism is generally done by the organism S.flexneri, S.boydi, S.sonnei, S.schmitz (Vakil, 1973).

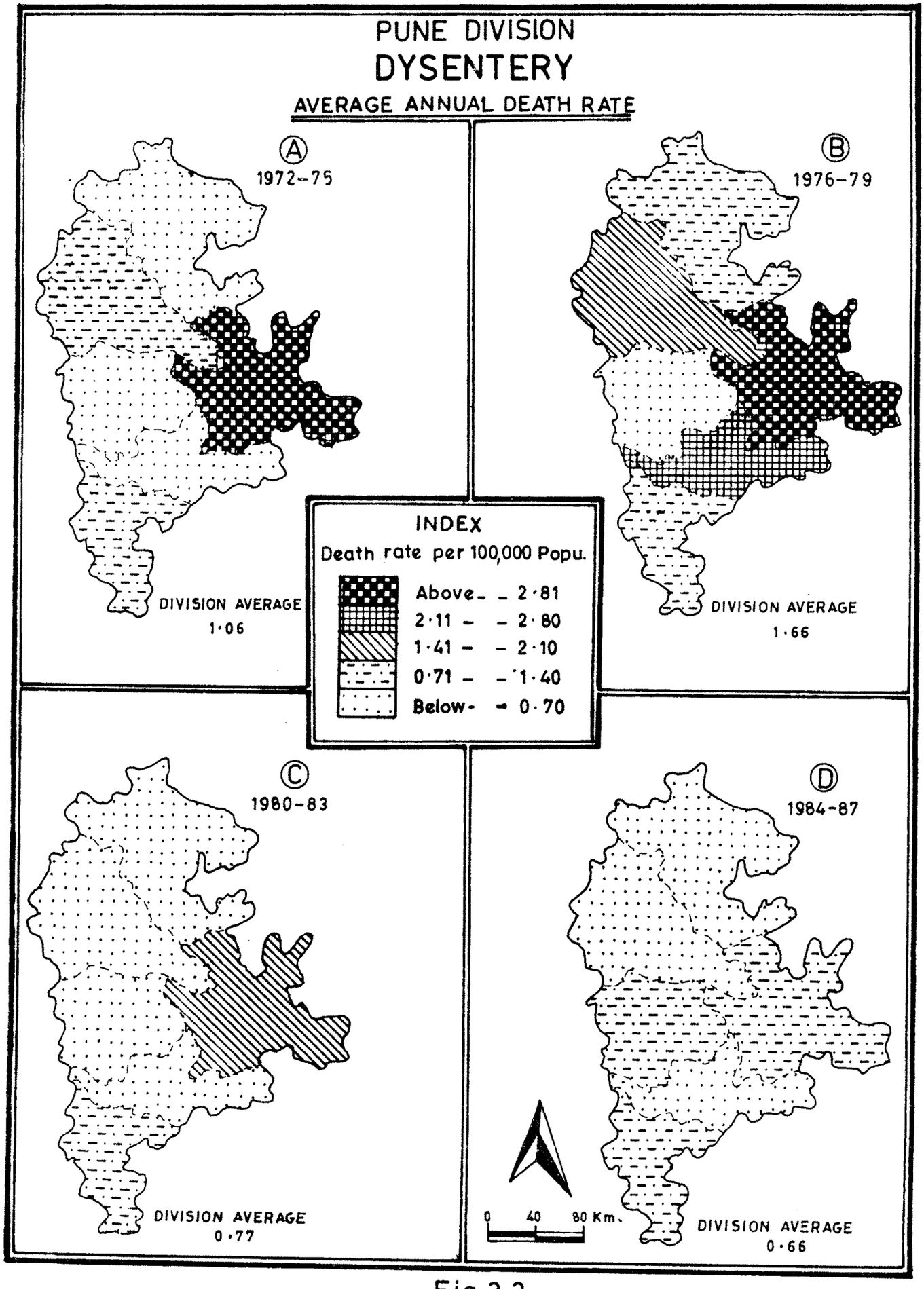
PUNE DIVISION
DYSENTERY
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
1·06
B
1976-79
DIVISION AVERAGE
1·66
INDEX
Death rate per 100,000 Popu.
Above - - 2·81
2·11 - - 2·80
1·41 - - 2·10
0·71 - - 1·40
Below - - 0·70
C
1980-83
DIVISION AVERAGE
0·77
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
0·66

Fig 3·2

All races, both sexes and almost all age groups are susceptible to dysentery.

ii) Amoebic dysentery/Protozoal :

Amoebic dysentery results from the invasion of human intenstines by an organism known as Entemoeba hystolytica, Entamoeba coli, Idoamoeba butschli, Endolimaxnana and Dietamoeba fragilis. Motions are not frequent as compared to Bacillary dysentery. No frequent stool in the case of amoebic dysentery but stool is accompanied with blood and mucus.

Due to polluted water, lack of water facilities in villages, poor sanitation, improper disposal of human excreta and house flies are responsible for the disease spread in the area (Misra R.P., 1970).

3.3.1 Analysis of Dysentery mortality in Pune division (1972-87) :

In Pune division, mortality rate of dysentery varies unevenly districtwise. The choropleth map (Fig.3.2) shows the variation in the death rate through the span of 16 years. The average death rates of dysentery of Pune division was 1.06/100,000 est. population in first period (1972-75). In Solapur district, the mortality rate was higher than the divisional average (2.9/100,000 est. population). Mortality rate is less

than the divisional averages and found in the districts of Ahmednagar, Satara and Sangli. In Pune and Kolhapur districts, the mortality rates were moderate.

In second period of time (1976-79), mortality rate of Solapur district remained same. Satara is the only district where mortality rate of dysentery is below 0.70. In Pune district, the mortality rate of dysentery is moderate, but high mortality rate of dysentery is found in Sangli as compared to Pune district. In Ahmednagar and Kolhapur districts the mortality rates are less than the Sangli district.

In the third and fourth period the overall death rate has been declined substantially except Solapur district. The death rate of Solapur district has not declined rapidly. The rate has decreased very rapidly in Ahmednagar, Pune, Satara and Sangli districts and varies between 0.4 and 0.6. In the fourth period the mortality rate of dysentery of Satara, Solapur and Kolhapur districts have gone down as compared to the other districts of Pune division. Contaminated water might be the major cause behind the spread of disease. It might be due to low standard of living and high density of population. Like cholera, the dysentery spread remained concentreted in Solapur district.

3.4 DIARRHOEA :

Diarrhoea is a common disease of infants and children of all ages suffer from diarrhoea but it is more common amongst

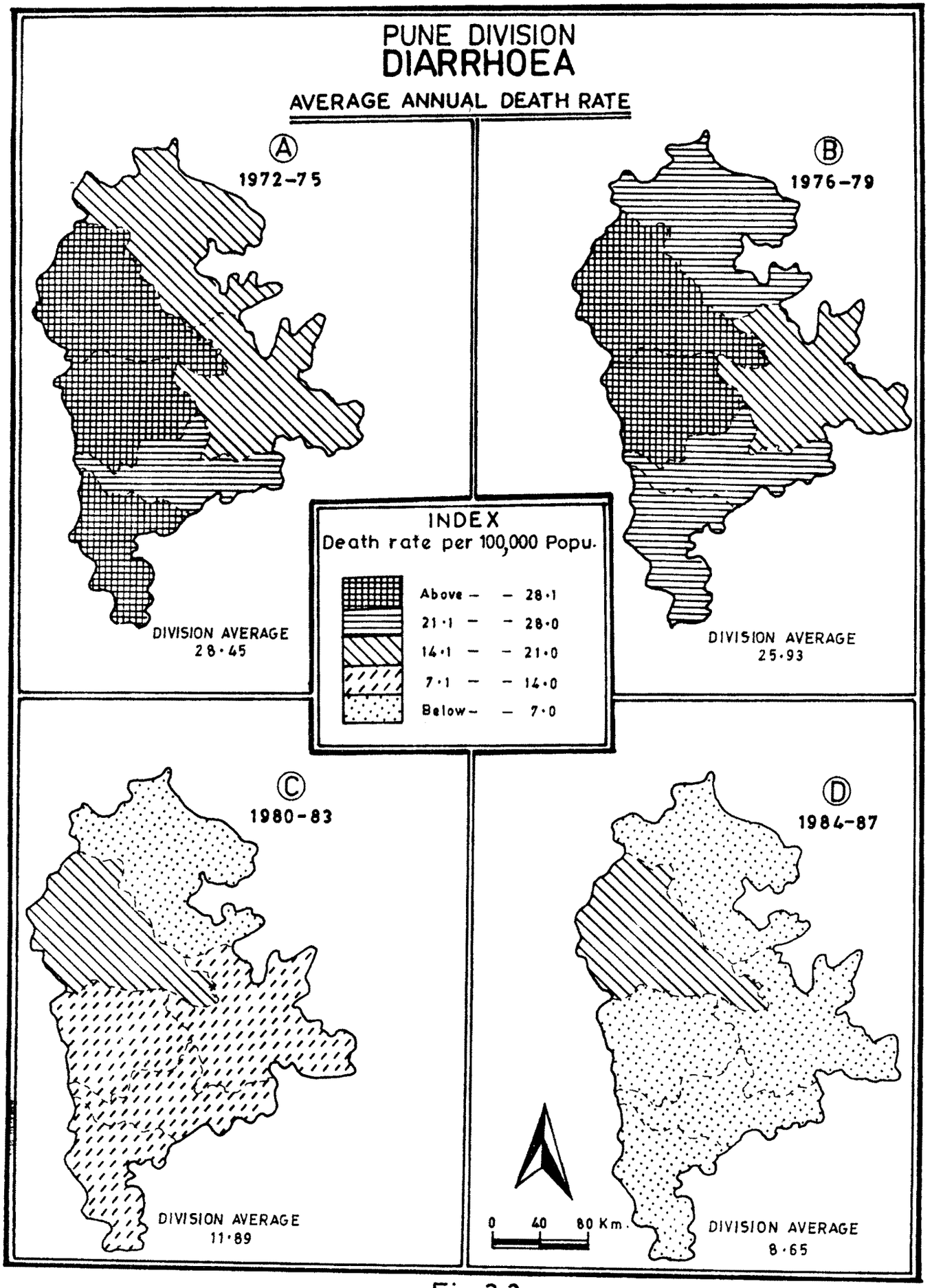
PUNE DIVISION
DIARRHOEA
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
28·45
B
1976-79
DIVISION AVERAGE
25·93
INDEX
Death rate per 100,000 Popu.
Above — — 28·1
21·1 — — 28·0
14·1 — — 21·0
7·1 — — 14·0
Below — — 7·0
C
1980-83
DIVISION AVERAGE
11·89
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
8·65

Fig. 3·3

infants, who are artificially fed than in those who are breast fed. This is also divided into two groups 1) Non-infective diarrhoea and 2) Infective diarrhoea.

1) Non-infective diarrhoea :

It occurs due to digestive disturbances caused by milk, food or allergy to children. It can occur due to insufficient digestive juice such as salive, gastric juice and intenstinal juices.

2) Infective diarrhoea :

Infection occurs through contaminated water and food with bacteria such as B.coli, Shigella bacilli and Salmonella group (Mahajan B.K.,1972). Acute diarrhoea is set by irritating the intestine by these germs.

It is generally stated that the effect of climate is less obvious in the non-infectious diarrhoea, but in the case of infectious one, the climatic factors do effect. Use of contaminated water is directly related with its spread. Water from rivers and streams is in general potentially dangerous.

3.4.1 Analysis of Diarrhoea mortality in Pune division (1972-87) :

Diarrhoea mortality rate in Pune division varies inconsistantly in the districts. The choropleth map No.3.3

shows the successive variations through the span of 16 years. In the first period, mortality rate of diarrhoea is high in the districts of Pune, Satara, Kolhapur and Sangli. Contaminated water which is used for drinking, cleaning the clothes and animals might be the major reason for its spread in the areas. Moderate mortality rate is found in Solapur and Ahmednagar districts of Pune Division.

In the second period, mortality rate of the division has decreased from 28.45 to 25.93/100,000 est. population. Mortality rate of Pune, Satara, Sangli and Solapur districts remained same. Ahmednagar is the only district where mortality rate of diarrhoea has increased, while the rate has decreased in the Kolhapur district.

In third period (1980-83) the average mortality rate of division and of all districts has declined sharply. It has decreased from 25.93 to 11.89. The Pune district shows higher death rate than the other districts. During fourth period (1984-87), in Pune district diarrhoea mortality rate was high. The other five districts show negligible death rate as it varies between 3.0 to 7.0. Generally Pune is the only district where mortality rate was higher than other districts.

3.5 TUBERCULOSIS :

Tuberculosis generally known as 'Rajrog' or 'Kshayarog' is a specific communicable disease caused by mycobacterium tuberculosis. Tuberculosis is of considerable social and economic importance in countries where it is common, because of its particular impact on men and women of working and reproductive ages. The disease may be acute or chronic, general or local. Tuberculosis is as much prevalent in the rural as in urban population (Park and Park,1979).

This disease has become the important cause of death in many parts of the world. Primary infection usually goes unnoticed. There are three types of causative agents namely i) human, ii) bovine and iii) avian. The human type is more frequently found in lungs and bovine type in intestines lymph, nodes and bones. It is not caused rapidly. It makes man disable to work. Morbidity and mortality rates are higher, so it is called as 'white plague' or captain of man's death.

3.5.1 Analysis of Tuberculosis mortality in pune division (1972-87) :

Tuberculosis is one of the major killer in the state of Maharashtra. In the ranking list, it generally occupies 1st or 2nd position in almost all districts of Pune division.

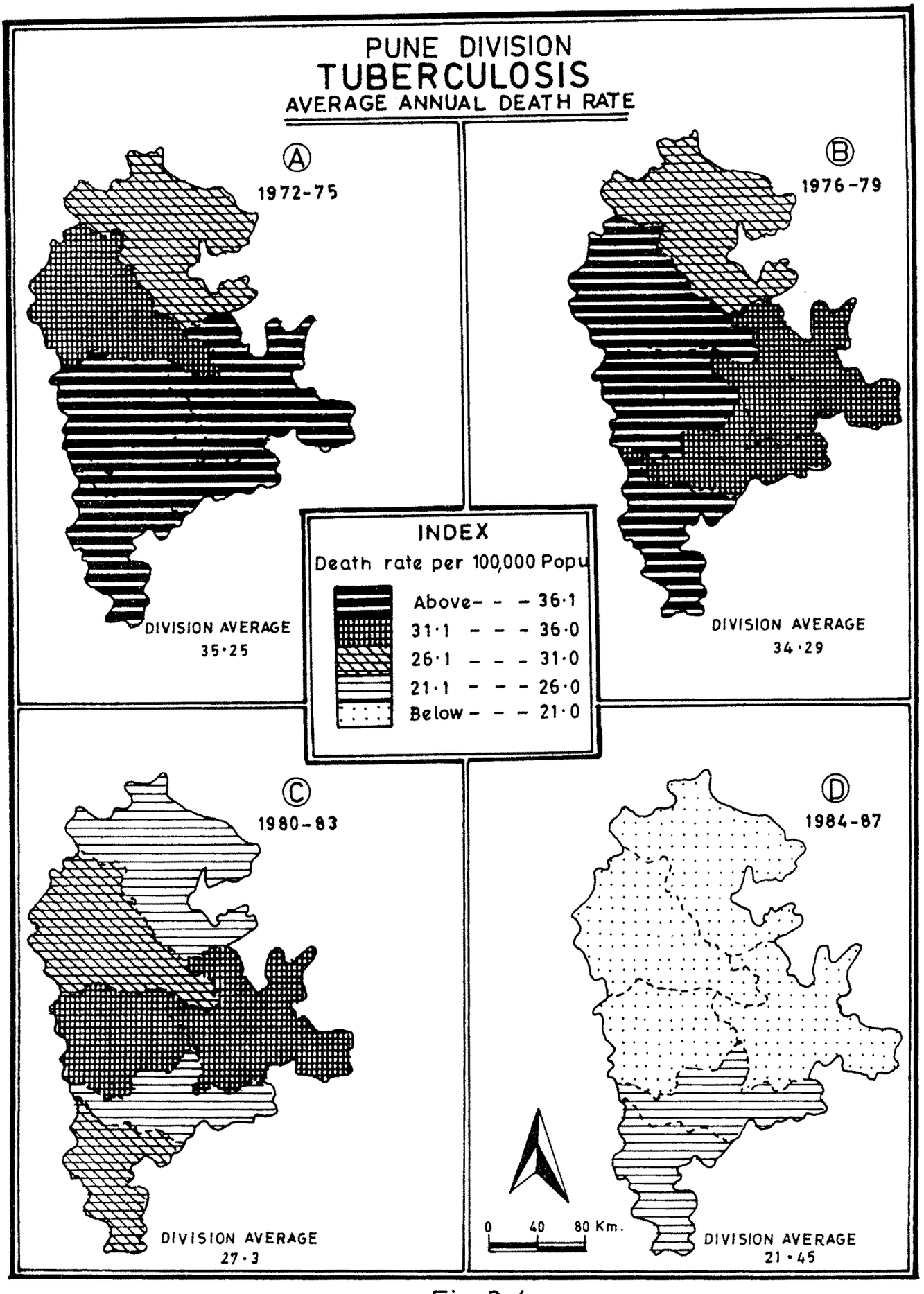
PUNE DIVISION
TUBERCULOSIS
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
35·25
B
1976-79
DIVISION AVERAGE
34·29
INDEX
Death rate per 100,000 Popu
Above - - - 36·1
31·1 - - - 36·0
26·1 - - - 31·0
21·1 - - - 26·0
Below - - - 21·0
C
1980-83
DIVISION AVERAGE
27·3
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
21·45

Fig. 3·4

The average tuberculosis death rate of Maharashtra was 46.0 per 100,000 estimated population during 1970-74, while in the villages, the rate was 23.00 per 100,000 est. population (Pandurkar,1981). In the study region during first period (1972-75), T.B. mortality rate was very high in Satara, Solapur, Sangli and Kolhapur districts (Fig.3.4). In Kolhapur and Solapur districts the rates have higher than the divisional averages (38.1 and 37.2 respectively). The death rate was higher in Pune district (35.5). In Ahmednagar district, the mortality rate was moderate i.e. 28.7.

In the second period (1976-79) Pune, Satara and Kolhapur districts have suffered more than other districts of Pune division. Mortality rate of Ahmednagar district was moderate. In the second period, the mortality has decreased in Solapur and Sangli districts as compared to the earlier period.

In the third period (1980-83) Satara and Solapur districts shows higher mortality rates. In Pune and Kolhapur districts, mortality rate was moderate. Ahmednagar and Sangli districts mortality rate were low in Pune division. In the fourth period the mortality rate has decreased very rapidly in all districts of Pune division. The mortality rate was very low in Ahmednagar, Pune, Satara and Solapur districts. In Sangli and Kolhapur districts the mortality rate was below 21/100,000 estimated population. Mortality

rate of T.B. has increased in the district like Pune during second period than the first period. Air pollution, over-crowding may be the contributing factors for the high intensity of T.B. mortality in Pune district. The special attention be paid to the southern four districts (Satara, Sangli, Kolhapur and Solapur) to control the high incidences of deaths by Tuberculosis.

3.6 LEPROSY :

Leprosy is a significant public health problem of Maharashtra. It is a chronic and contagious disease caused by micro-bactrium Laprae. It primary affects the skin, mucous, membrane and peripheral nerves. It also affects muscles, the eyes and certain internal organs such as the kidney, liver and in the male testicle. The common factors in epidemiology of this disease are direct or indirect contacts and low hygienic standards. Direct contacts means skin, mucous membrane or sex contacts of healthy person with the sufferer, i.e. rubbing with each other etc. Indirect contact is brought about through fomites like clothes, shaving brushes, towels and kajal sticks (Mahajan B.K. 1972).

It is still a great social as well as public health problem of Maharashtra. It is very chronic and contagious. It's morbidity in India is second only to tuberculosis. The disease remains in the hidden form for number of years. It has originated from Africa and then spreaded in India and all over the world.

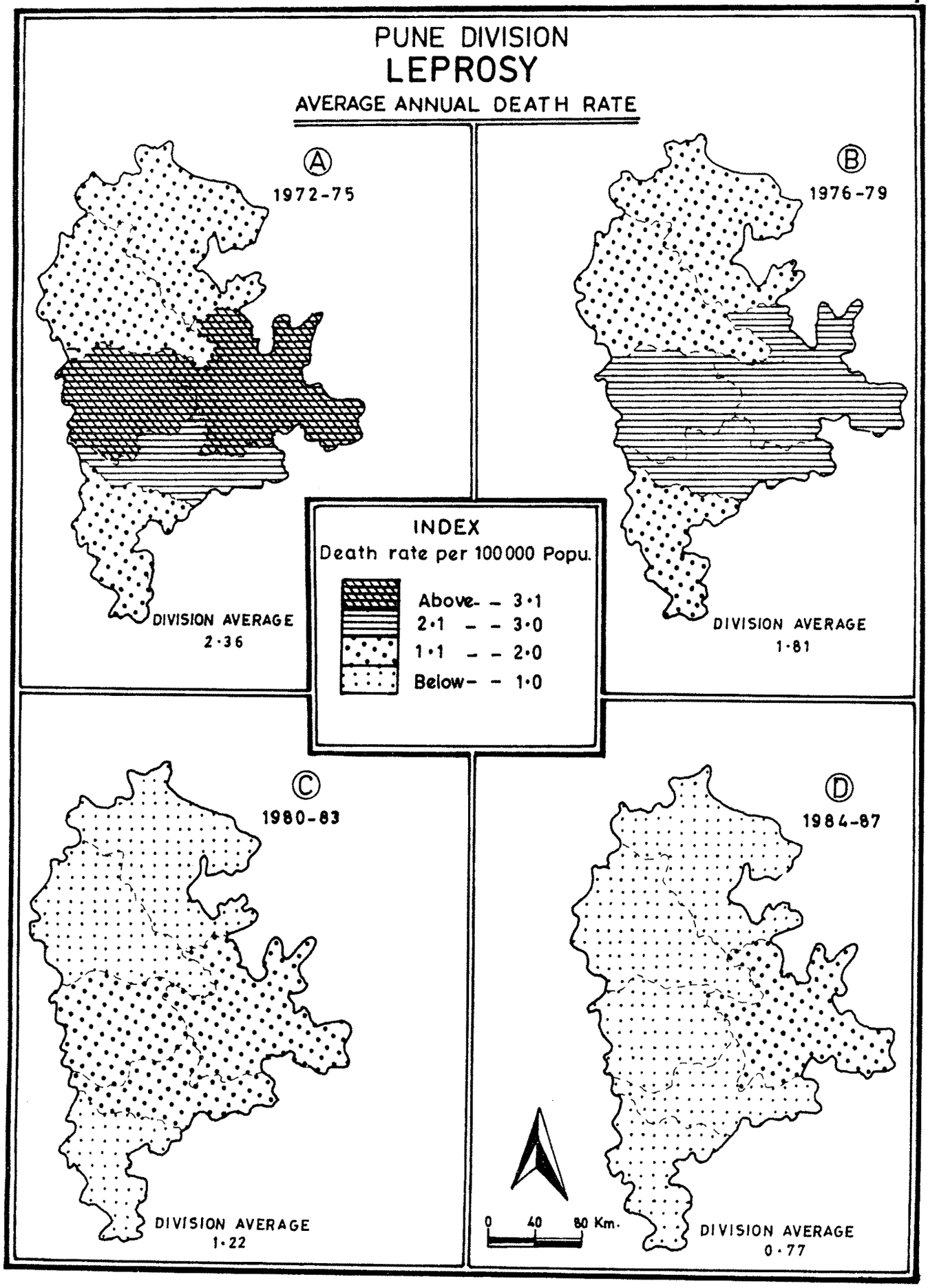
PUNE DIVISION
LEPROSY
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
2·36
B
1976-79
DIVISION AVERAGE
1·81
INDEX
Death rate per 100000 Popu.
Above- - 3·1
2·1 - - 3·0
1·1 - - 2·0
Below- - 1·0
C
1980-83
DIVISION AVERAGE
1·22
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
0·77

Fig. 3·5

3.6.1 Analysis of Leprosy mortality in Pune division (1972-87) :

The death rate of Leprosy as noticed during 1972-87 varies between 0.7 and 2.3 per 100,000 estimated population in various districts of Pune division. Choropleth map (Fig. 3.5) shows that the mortality rate was very high in the first period (1972-75). High death rate was recorded in Solapur, Satara and Sangli districts. Ahmednagar, Pune and Kolhapur districts show moderate mortality rate. Satara and Solapur district's high mortality rate might be due to poverty, undernutrition, illeteracy and workers in cotton mills, spinning and weaving mills which are more in percentage in Solapur district.

In the second period (1976-79), the rate has substantially reduced in Solapur and Satara districts. In Sangli, it has remained almost the same. In the second period mortality rate has remained of moderate intensity in Ahmednagar, Pune and Kolhapur districts.

In the third period (1980-83), divisional average death rate has decreased upto 1.22. But in the fourth period it remained the same as it was in the third period namely in the districts of Ahmednagar, Pune and Kolhapur. Leprosy death rate of Solapur district has remained highest amongst all other districts of Pune division. The notable feature

observed while studying the choropleth map was that Satara and Solapur districts death rate has always remained higher than other districts during 16 years period. Large attention be paid to control the Leprosy of Solapur district whose the working population of lower class engaged in cotton textile business is more.

3.7 TETANUS :

Tetanus is a major tropical infectious disease induced by the specific infective agent, Clastridium tetani. This disease mainly spreads through soil and excreta of animals. The bacilli of tetani enter the man's body through cuts, wounds and injuries, hence the dust in the atmosphere acts as actiological factor for its spread. It's infection is very rapid, hence quick medical relief is necessary otherwise there is every possibility of death of the infected cases (Vakil,1973).

India is a country of villages and agriculture is the soul of Indian economy. Most of the Indian's are engaged in agricultural activities and hence the occurance of tetanus is common. In the agrarian regions, the incidences are higher in rural areas. Use of nonsterilized hospital theatres and the rusty instruments at the time of operation may cause the tetanus infection in the new born children and in the mothers. Tetanus infection may be caused by self

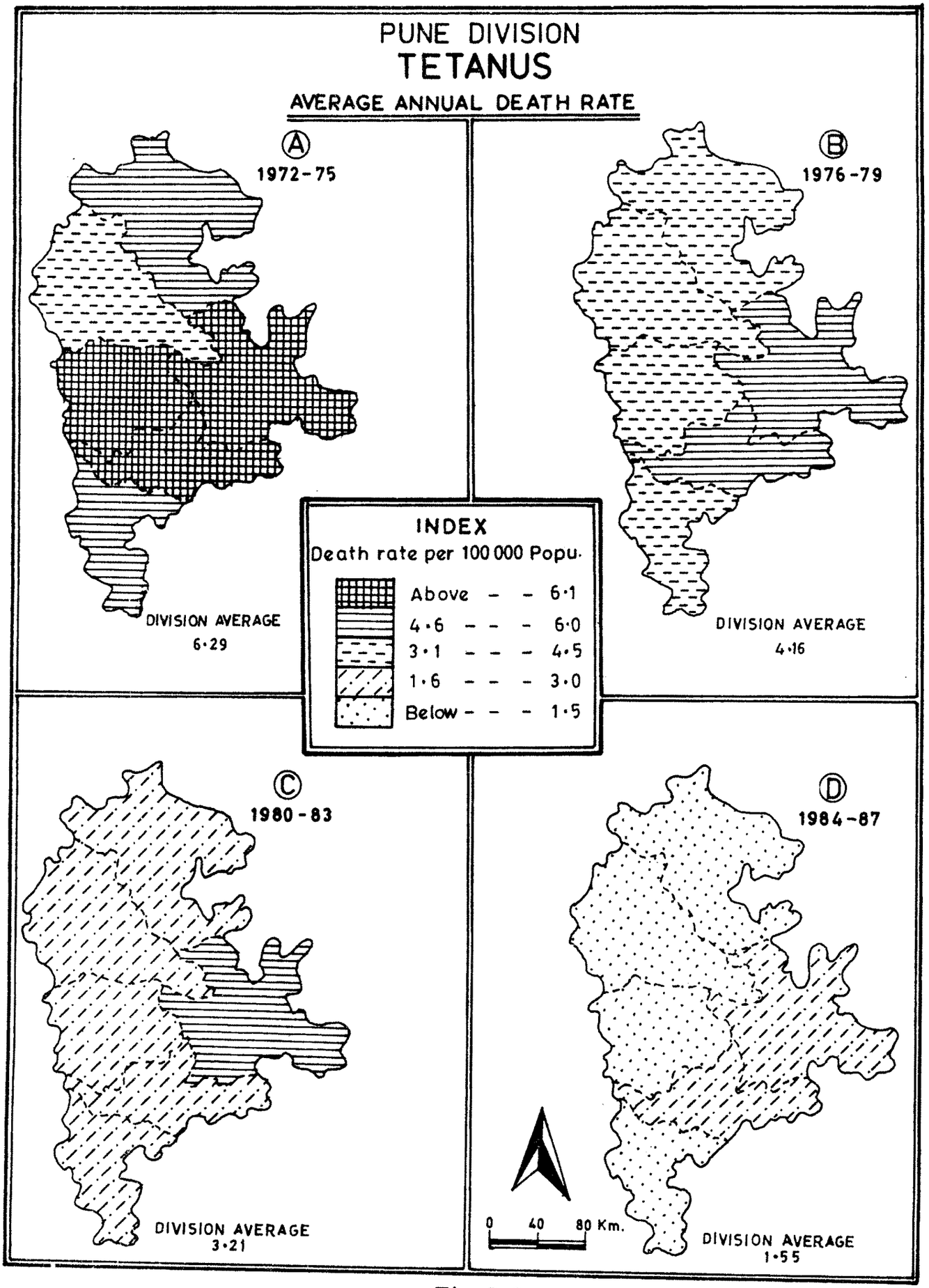
PUNE DIVISION
TETANUS
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
6·29
B
1976-79
DIVISION AVERAGE
4·16
INDEX
Death rate per 100 000 Popu.
Above - - 6·1
4·6 - - - 6·0
3·1 - - - 4·5
1·6 - - - 3·0
Below - - - 1·5
C
1980-83
DIVISION AVERAGE
3·21
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
1·55

Fig. 3·6

infection or may be acquired from the environment. Different types of injuries in the agricultural fields, in factories, road and rail accidents, bare foot walking and in the animals proximity especially in the villages are the factors responsible for the occurance of tetanus infections.

3.7.1 Analysis of Tetanus mortality in Pune division (1972-87) :

The death rate of tetanus during study period has varied between 0.96 and 8.8/100,000 estimated population. The divisional average death rate of the first period (1972-75) was 6.29 then it has decreased substantially in the next period. During the first period (1972-75) in Sangli, Solapur and Satara districts the death rate was very high. Kolhapur and Ahmednagar districts death rate was moderate while the low death rate was observed in Pune district only.

In the second period, death rate has gone down in Pune, Kolhapur, Ahmednagar and Satara districts, while higher rates of mortality were observed in Sangli and Solapur districts. But in Sangli and Solapur districts, the death rate has decreased as compared to the first period. In the third period (1980-83) the death rate was highest in Solapur district (D.R. 5.07), while low death rates were noticed in Ahmednagar, Pune, Satara, Sangli and Kolhapur

districts. The death rate of tetanus has decreased considerably in Pune division except in Solapur district in third period.

The death rate has decreased even below 1.5 during the fourth period (1984-87) in Ahmednagar, Pune, Satara and Kolhapur districts. In this period the death rate of Sangli district was almost same as that of third period. But in the Solapur district death rate has decreased upto 2.8. Generally, it is observed that the mortality rate of this disease has decreased successively from 1972 to 1987.

This is the region of lowlying areas of Krishna, Bhima and Sina river basins, where majority of the people are engaged in agricultural activities, hence infection of tetanus is more due to cuts, wounds and bare foot walking in the fields. It may be stated that physiography plays an important role in distributing tetanus infection in Pune division as the disease found to be concentrated in the areas of river basins.

3.8 MEASLE :

Measle is one of the most prevalent and typical infection disease of childhood. It affects children below the age of five and most common in 2 to 3 years of age. It is caused by virus transmitted by droplet infection due to close association. The disease is of universal nature, but shows serious infection in developing countries.

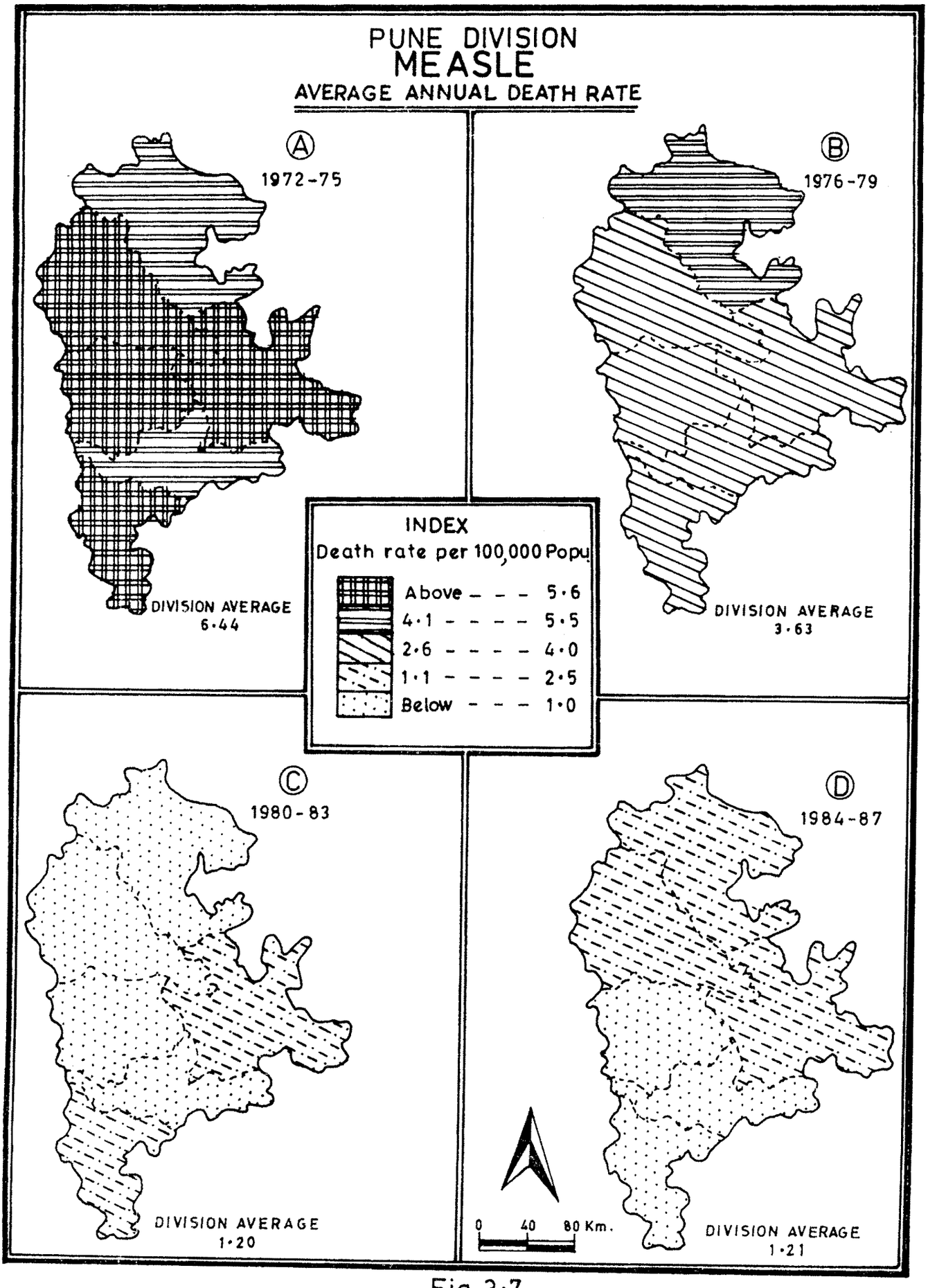
PUNE DIVISION
MEASLE
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
6·44
B
1976-79
DIVISION AVERAGE
3·63
INDEX
Death rate per 100,000 Popu
Above - - - 5·6
4·1 - - - - 5·5
2·6 - - - - 4·0
1·1 - - - - 2·5
Below - - - 1·0
C
1980-83
DIVISION AVERAGE
1·20
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
1·21

Fig. 3·7

It is sporadic, epidemic and relatively more severe in rural areas. Mortality rate is higher amongst the poor undernourished and overcroded population. It is more prevalent in winter and in spring season. It is an erruptive fever caused by a specific virus, and clinically characterised by fever and catarhal symptoms followed by a typical rash (Park and Park,1979).

3.8.1 Analysis of Measle mortality in Pune division (1972-87) :

Measle mortality rate in Pune division varies unevenly in the districts. Districtwise data have been collected for the period of 16 years. The choropleth map (Fig.3.7) shows the variations in the death rate through the span of sixteen years. Divisional average death rate has varied in between 0.74 and 8.37 per 100,000 estimated population.

In the first period (1972-75), the high death rate was observed in Pune, Satara, Kolhapur and Solapur districts. In Ahmednagar and Sangli districts, mortality rate was also high (5.53 and 4.56 respectively) per 100,000 est. population. In the second period (1976-79) death rate has decreased rapidly, but Ahmednagar was the only district where highest death rate was observed (D.R. 4.49).

In third period (1980-83) death rate has decreased very rapidly in Ahmednagar, Pune, Satara and Sangli districts,

while in Solapur and Kolhapur districts it was moderate. In the fourth period (1984-87), in Ahmednagar, Pune and Solapur districts death rate has increased, but in Satara, Sangli and Kolhapur districts it was very low. Generally, the choropleth map shows declining trends in Pune division during the four successive stages of time.

3.9 MALARIA :

The word 'Malaria' (Mal + air) means foul air. It was not easy to distinguish Malaria from other fevers until 1640 when Morton and Tort recommonded the use of cinchona in curing this disease (Misra,1970). Malaria is a communicable disease of first group as per international classification of diseases. Malaria is caused by the bite of mosquito. The Malaria parasite usually pass from one mode of transmission for this disease from infected to healthy person.

The mosquito is the only carrier to the germs. Mosquitoes need stagnant water to bread and human or animal blood to feed upon and the moist and warm climate to live in. Geographical factors have the considerable influence on the vectors, the causative agents and the host i.e. the man. Excessive rainfall creates more breeding and living places for the vectors. Tropical areas are therefore, the notorious for malaria epidemics. The direction and the speed of the wind may help or hinder the

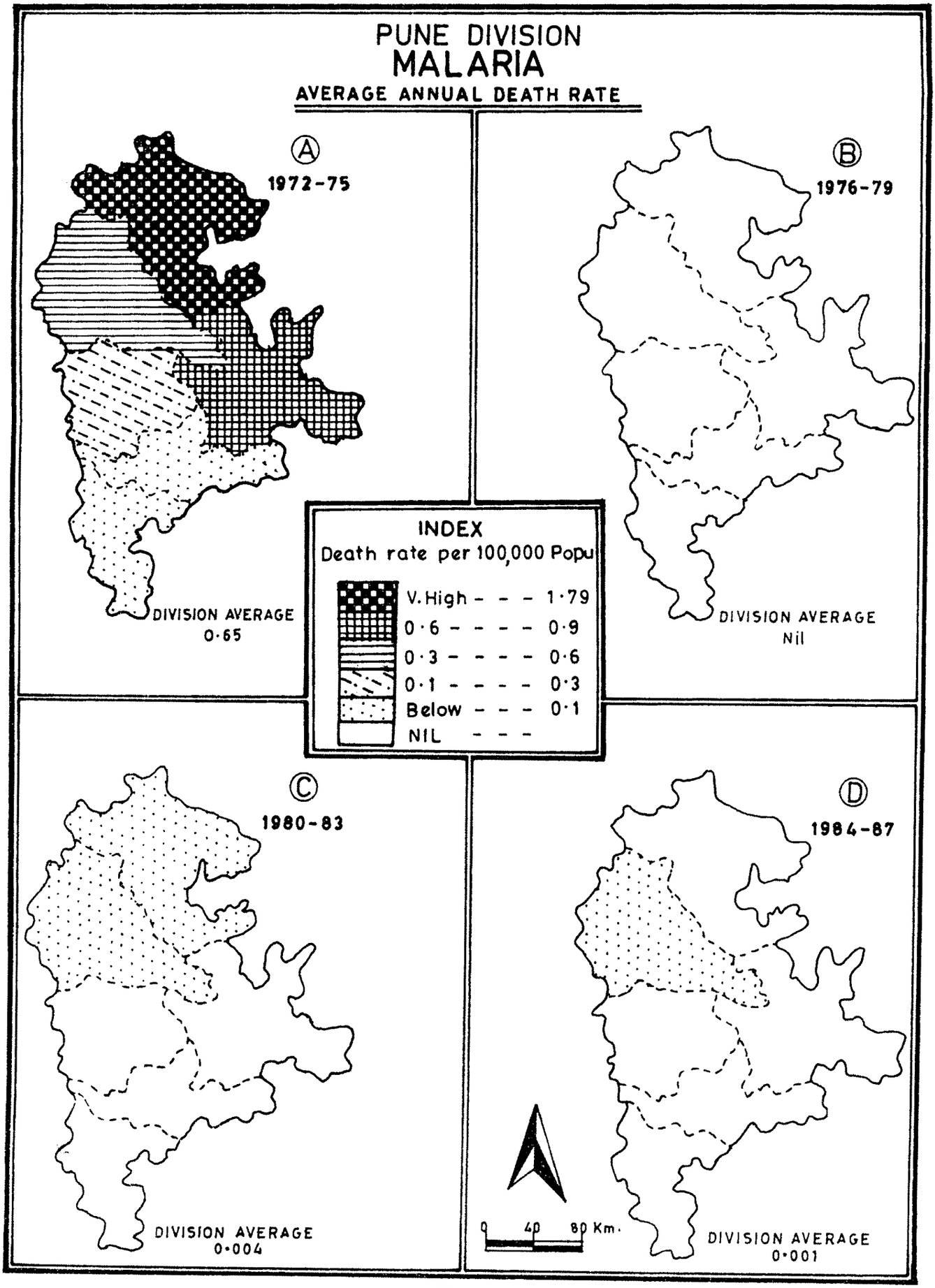
PUNE DIVISION
MALARIA
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
0·65
B
1976-79
DIVISION AVERAGE
Nil
INDEX
Death rate per 100,000 Popu
V. High - - - 1·79
0·6 - - - - 0·9
0·3 - - - - 0·6
0·1 - - - - 0·3
Below - - - 0·1
NIL - - -
C
1980-83
DIVISION AVERAGE
0·004
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
0·001

Fig. 3·8

mosquitoes from flying to adjoining areas. Natural vegetation, gentle slope of the land, lowlands, migration of popul tion, sleeping habits, the type of house in which people live, the type of occupation they engaged in and poor economic conditions are some of the factors influencing the spread of malaria epidemics.

3.9.1 Analysis of Malaria mortality in Pune division (1972-87) :

Average annual death rate of Malaria in Pune division varies from district to district (Fig.3.8). Physiography determines the prevalence of the disease in the region. The choropleth map of malaria depicts that in the first period (1972-75) in the river basins of Godavari and Sina due to gentle slope of the land and water stagnation the breeding grounds for mosquitoes are plentiful and hence higher mortality is obvious. Ahmednagar district has recorded highest Malaria death rate in Pune division (D.R. 1.79), while in Satara, Pune and Solapur districts death rate was moderate and in Sangli and Kolhapur districts low death rate was observed.

In the second period (1976-79), mortality rate declined rapidly and malaria disease has completely came under the control. The Government of India has launched Malaria Eradication Programme, due to which during 1976-79, no single death of malaria was observed in this division.

Afterwards, the disease intensity has decreased rapidly during third and fourth period. Except in Ahmednagar and Pune districts it has been completely eradicated after 1980 from the Pune division and also from Maharashtra. Few deaths have observed during 4th period of time in Pune district.

3.10 CANCER :

Cancer is one of the major killers of the world. Cancer stands fourth amongst the Indian diseases in ranking order. The disease is neigher preventive nor curable. The study of treatment of this disease has crossed all the boundaries 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 regreatfully stated " What is Cancer we can't treat, and what we treat is not Cancer," (Kothari, 1978).

The word cancer is derived from Latin word 'crab' or tendancy of a tumour to spread and invade the surrounding tissues. The real cause of cancer is not known but it is detected in the early stage and in latter stage, there is no perfect solution.

It affects all types of living beings. There is no orgon in the body in which cancer develop. The most obvious

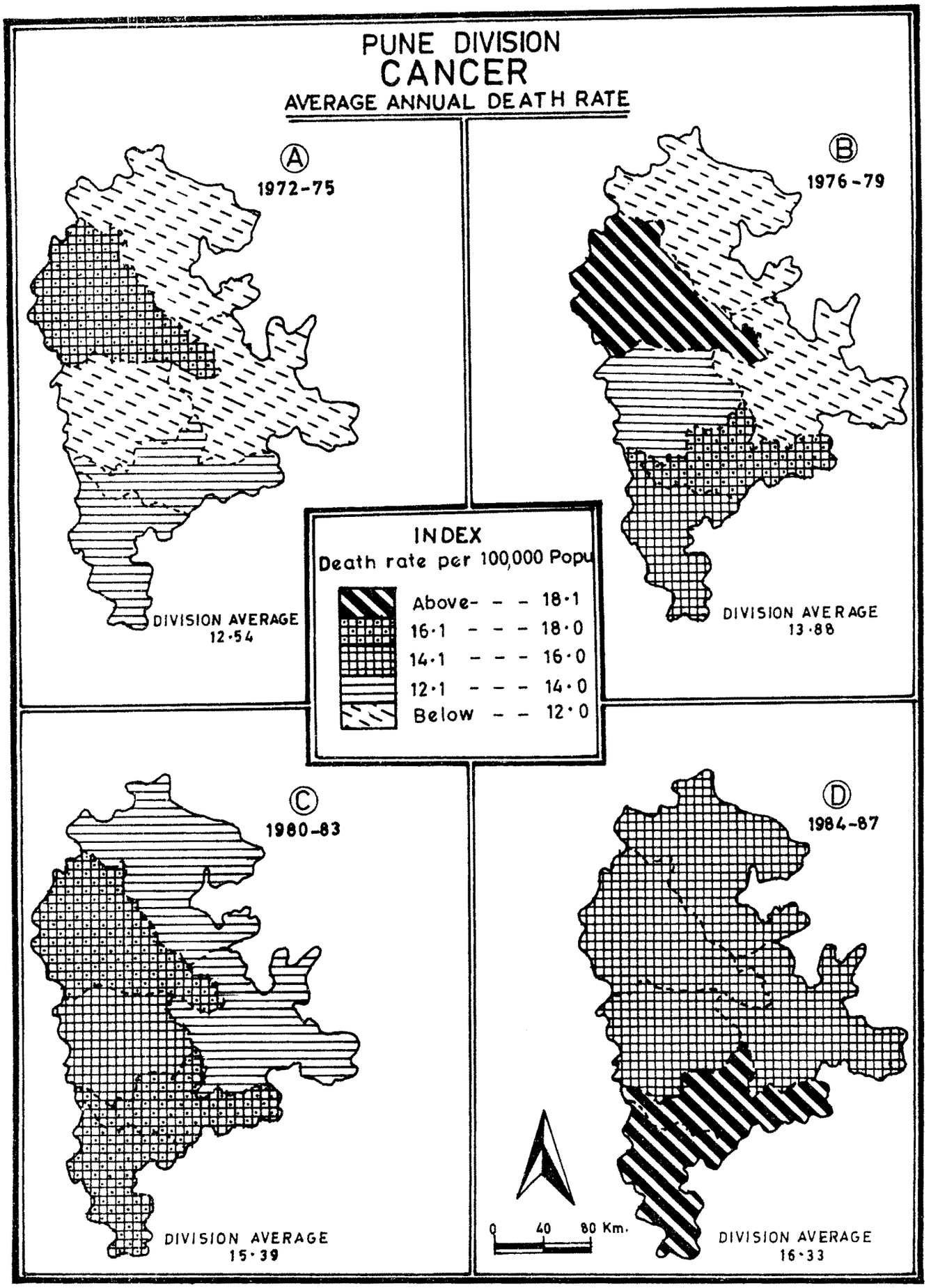
PUNE DIVISION
CANCER
AVERAGE ANNUAL DEATH RATE
A
1972-75
DIVISION AVERAGE
12·54
B
1976-79
DIVISION AVERAGE
13·88
INDEX
Death rate per 100,000 Popu
Above- - - 18·1
16·1 - - - 18·0
14·1 - - - 16·0
12·1 - - - 14·0
Below - - 12·0
C
1980-83
DIVISION AVERAGE
15·39
D
1984-87
0 40 80 Km.
DIVISION AVERAGE
16·33

Fig. 3·9

features of many cancer is the development of new growth, a nodule, or a tumour in the tissues of their origion. The disease is highly curable if it is treated at an early stage and adequately before its spread to distant areas of the body.

Cancer makes no distinction of sex, caste, age or social standings. In the beginning of the disease, there is process of cell multiplication and partial and complete differentiation, but the newly developed cancer cells are unresponsive to the cell restraining mechanism. It is obvious that tobacco chewing, cigarette or bidi smoking degenerates cancer of cheeks, tongue, mouth and of lungs amongst male in Maharashtra, while cancer of uterus and breast are more prevalent in female due to repeated and unsafe deliveries by untrained surgical staff in the rural areas.

3.10.1 Analysis of Cancer mortality in Pune division (1972-87) :

It is the fact that in all districts of Pune division mortality rates of cancer are increasing every year. From the districtwise collected data, it has found out that the cancer death rates vary between 12.5 and 16.33/100,000 est.population. Amongst all districts, this disease occupies 3rd or 4th rank in the order of importance except in Satara district.

The districtwise study of cancer shows that mortality rate was much higher in Pune district during 1972-75 while all other districts show less mortality. But in the second period (1976-79), Pune district remained on high death rate besides Sangli and Kolhapur districts rates have also increased. Satara, Ahmednagar and Solapur have affected less.

In third period (1980-83), the average death rate of cancer of the division has gone up and map shows that Kolhapur, Satara, Sangli and Pune were affected more. During fourth period (1984-87), the death rate of cancer mortality has again increased in all districts of Pune division. Generally higher cancer mortality is found where urban population is more and mortality rate is low in the rural areas of the districts. The diseases shows increasing tendancy and in future if this trend remains, the deaths by cancer may reach to the top rank.

3.11 PNEUMONIA :

Pneumonia is one of the major bacterial infectious diseases. It is chronic disease associated with pain in chest and usually a cough and breathlessness. The disease occurs at all stages but it is more frequent in early and middle adult life. The causative organisms most commonly observed are pneumococci type I, II, III and IV. Remainings

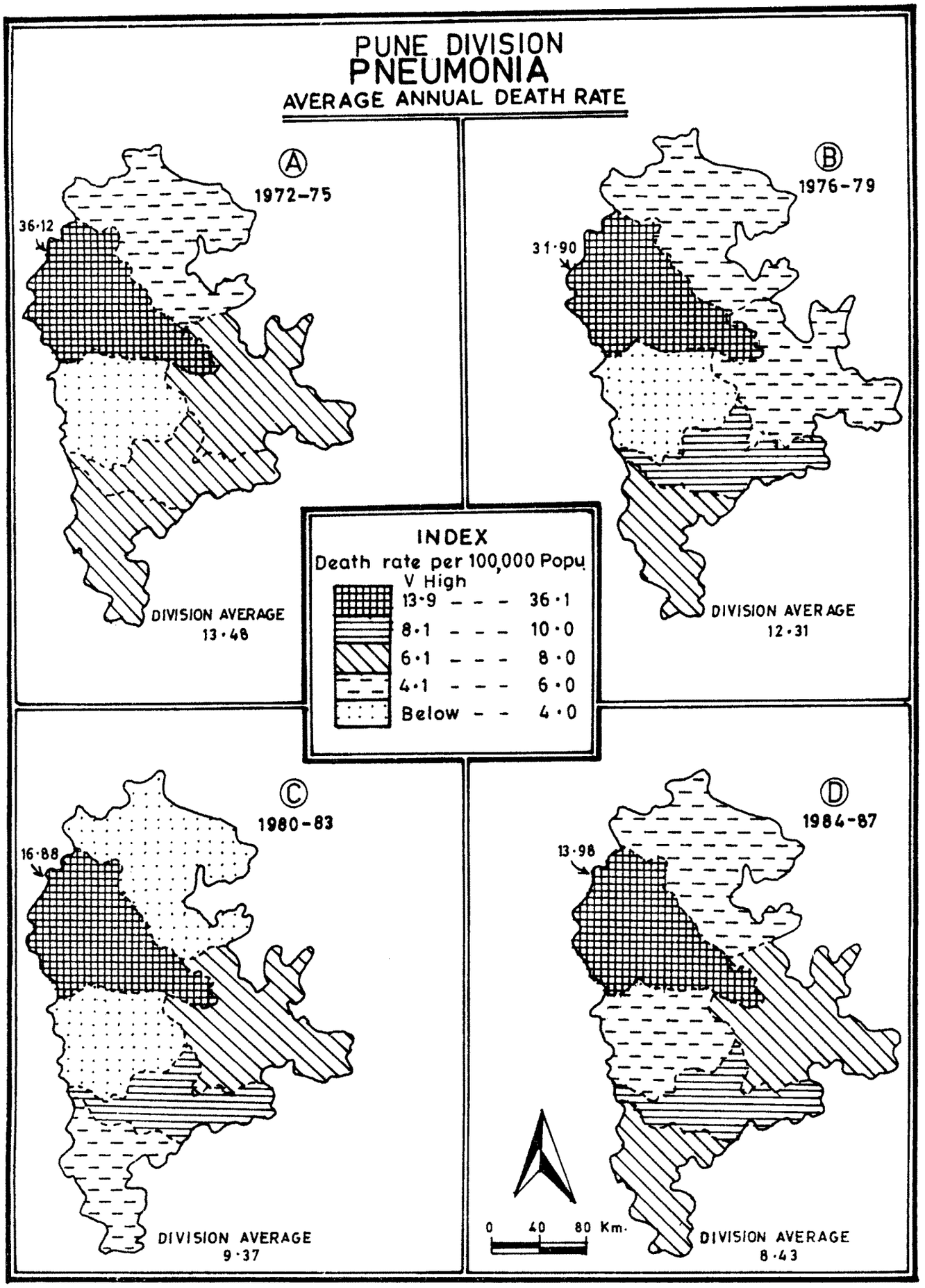
PUNE DIVISION
PNEUMONIA
AVERAGE ANNUAL DEATH RATE
A
1972-75
36·12
DIVISION AVERAGE
13·48
B
1976-79
31·90
DIVISION AVERAGE
12·31
INDEX
Death rate per 100,000 Popu
V High
13·9 - - - 36·1
8·1 - - - 10·0
6·1 - - - 8·0
4·1 - - - 6·0
Below - - 4·0
C
1980-83
16·88
DIVISION AVERAGE
9·37
D
1984-87
13·98
DIVISION AVERAGE
8·43
0 40 80 Km.

Fig. 3·10

are due to streptococci and other organisms. Source of infection is exogenous or endogenous when resistance goes down. It is usually sporadic, as the mode of spread is being by droplet infection. The clinical diagnosis are more related to environmental disorder especially to the atmospheric pollution (Vakil,1973).

The highest incidences are observed during winter season. There are mainly two types of pneumonia i) Broncho pneumonia - of which incidence is high below 6 years of age and after 65 and ii) Lobar pneumonia which incidence is higher after the age of 13 years and above.

3.11.1 Analysis of pneumonia mortality in Pune division (1972-87) :

In Maharashtra, during 1962-74, the average rural death rate of pneumonia was 0.06/100,000 est. population, while in the same period the urban mortality rate has reached upto 0.77 per 1000 estimated population. The districts with high urbanization show the higher mortality rates in Maharashtra (Pandurkar R.G.,1981).

As refered earlier, the disease shows its high prevalence in Pune district and moderate in Sangli,Solapur and Kolhapur districts. In Ahmednagar and Satar districts the mortality rate was low. In second period (1976-79), the highest mortality was found in Pune district (31.90)

followed by Sangli and Kolhapur districts. Moderate mortality rate was found in Solapur and Ahmednagar district. In the Satara district, the low death rate was observed.

During third period Pune district has shown high death rate while it was moderate in Solapur and Kolhapur districts. And in Ahmednagar and Satara districts low death rate was observed. In the fourth period (1984-87) also Pune district has shown more deaths. Death rate has increased slowly in Ahmednagar, Sangli and Satara districts, while it was moderate in Kolhapur and Solapur districts. Mortality rate of Pune district was more than the divisional averages throughout the span of 16 years period (Fig.3.10). More medical attention be paid to Pune district to reduce the higher intensity of pneumonia deaths.

3.12 RANKING OF DISEASES :

The study of diseases ranking may be very useful in understanding the diseases distribution in the districts of Pune division. The study may provide an idea of relative dominance of different diseases in order of importance.

The ranking techniques used here is based on mortality rates calculated for particular disease in a particular year and for particular district. Cause specific death rates were calculated for 16 years (1972 to 87). For example (Fig.3.11)in 1972 in Sangli district the number of deaths due to tuberculosis

PUNE DIVISION

DITRICTWISE RANKING OF DISEASES

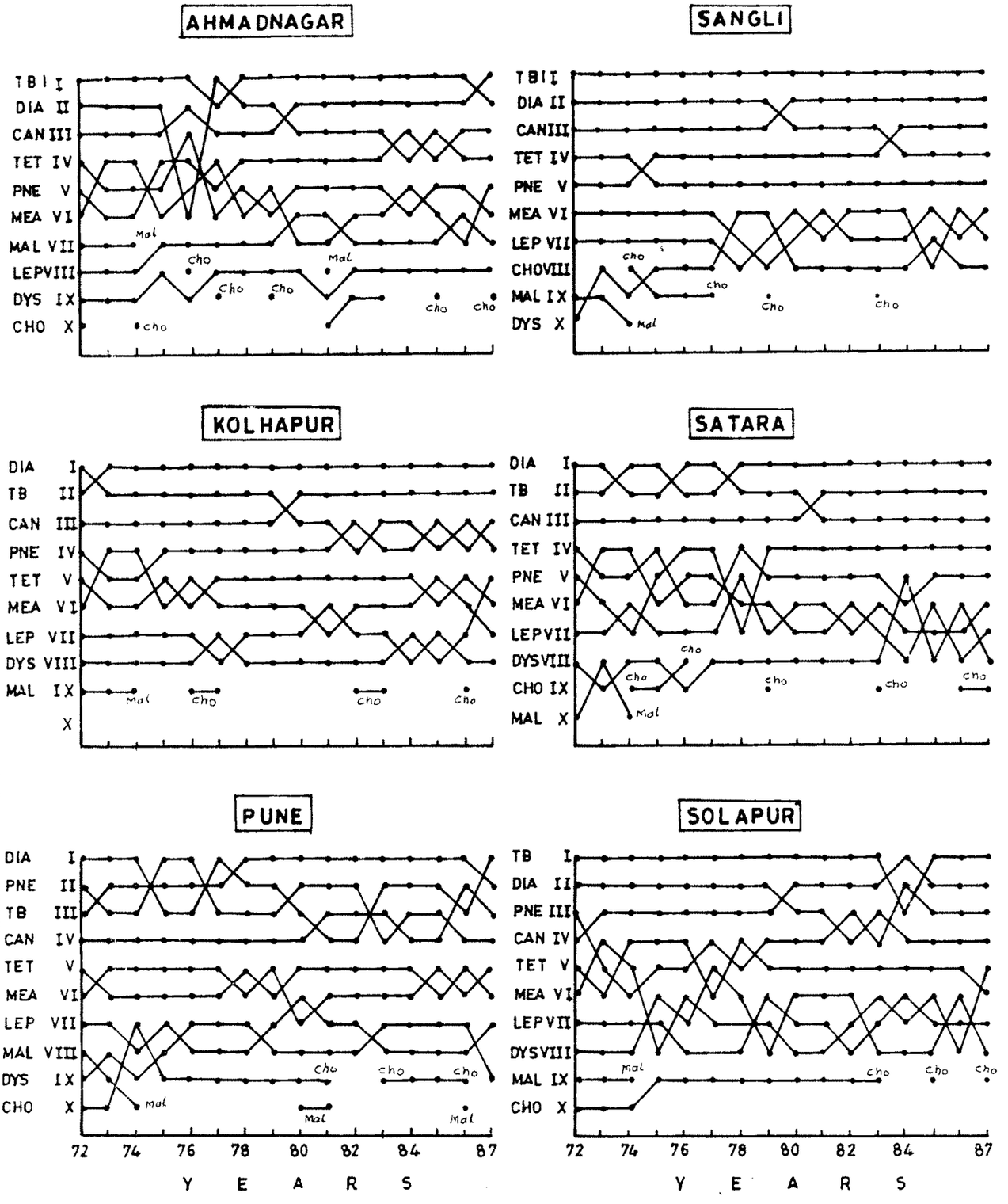

Fig. 3·11

disease were highest amongst all, hence this diseases has been given the first rank. While number of deaths by dysentery during the same year were lowest amongst all, hence dysentery was alloted the last rank i.e. Xth. Accordingly, for each disease yearwise ranks have been calculated and are shown in Fig.3.11.

The ranking technique shown here depicts that T.B., diarrhoea, pneumonia and cancer are the dominant diseases of the Pune division. Amongst them, tuberculosis was of serious nature which remained first in their rank in the district of Ahmednagar, Sangli and Solapur and remained second in the district of Kolhapur and Satara. Diarrhoea also shows its remarkable influence in this region particularly in Kolhapur, Pune and Satara districts. It remained first in it's rank and 2nd in Ahmednagar, Solapur and Sangli.

The cancer whose deaths were remarkable stands 3rd in the rank order. The prevalence of pneumonia should also be taken into consideration as the disease has grouped in the higher ranking order. The eradication of malaria and cholera has been noticed in the Pune division since 1976.

Considering the average ranking order during 1972-87, the following three groups of diseases with varying intensity can be brought out -

A) Diseases of higher ranking order
(Ist to IVth rank)

i) Tuberculosis
ii) Diarrhoea
iii) Cancer
iv) Pneumonia

B) Diseases of moderate ranking order
(Vth to VIIth rank)

v) Tetanus
vi) Leprosy
vii) Measle

C) Disease of low ranking order
(VIIIth rank)

viii) Dysentery

D) Diseases which have been eradication
(since 1976)

ix) Malaria
x) Cholera

3.13 CONCLUSION :

While studying the spatio-temporal analysis of selected diseases in Pune division, it is observed that there is positive correlation between physio-socio-cultural factors and spatial distribution of the diseases.

The physiography mainly attributes to the spread of malaria, as the lowlying areas of Krishna, Bhima and Godavari basins have proved to be the endemic places for malaria. Lowlying areas with gentle slope ultimately results in water stagnation due to which the spread of cholera is more in Pune, Satara, Solapur, Sangli and Ahmednagar districts. Dysentery and diarrhoea are dominant diseases of lowlying areas where the people use unsafe and contaminated water. The socio-cultural factors rather than physical are more effective in disease proliferation in Pune division. Malaria is the best example for this. The altered environment due to high degree of urbanization, industrialization and mining activities are responsible for the spread of cancer, T.B., and pneumonia. The Pune is the best example for this in this division. The highest mortality rates of tuberculosis, cancer and pneumonia are noted in the city of Poona. Majority of the people of the Pune division are engaged in agricultural activities where there is every possibility of getting injuries. Tetanus infection is the result of it and it is an important disease which shows remarkable death rate.

In Pune division, tuberculosis, cancer and pneumonia are the disease of higher ranking order. The urban air pollution of Pune city and degree of urbanization and industrialization are mainly responsible for the spread of diarrhoea,

pneumonia, tuberculosis and cancer. Deaths due to leprosy are more and are mainly found in Sangli, Satara and Solapur districts. The diseases like cholera and malaria have been completely eradicated from 1976. The special precautionary measures be implemented to control the increasing number of deaths by cancer, T.B. and pneumonia in Pune division.

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