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4.1 INTRODUCTION

The spatial analysis of any disease is closely associated with the physiography of the region. Hence, it is a very complex phenomenon. It is found that the certain diseases are the characteristics of certain regions. Therefore, the study of spatial temporal analysis in relation to changing environmental factors become the important study of Medical Geography.

Accordingly, the researcher proposes to study the spatio-temporal analysis of diseases in selected cities of Marathwada division. The data about the mortality of major diseases in the Marathwada region has been collected. The data covers the span of fourteen (14) years (i.e. between 1974 and 1987). The citywise data is also presented.

4.2 METHODOLOGY :

The collected data has been shown in the form of line graphs in Fig. 4.1 to 4.10. There are ten cities selected for the study of certain diseases. The mortality data of these cities were available in the vital statistics of Maharashtra. The yearwise cause specific mortality rates were calculated. The dotted lines on each graph shows the average death rate of particular disease to the last fourteen years (1974-87). The Ten diseases selected are as follows -

- 1) Cholera 2) Malaria
- 3) Dysentery 4) Diarrhoea
- 5) Tuberculosis 6) Leprosy
- 7) Tetanus 8) Measle
- 9) Cancer 10) Pneumonia

An attempt is made to corelate the dependant variables wherever possible with major diseases and the major cities of the Marathwada division. The cities selected for the study are Ten in number and they are as follows -

Ambejogai
 Aurangabad
 Beed
 Jalna
 Latur
 Nanded
 Osmanabad
 Parbhani
 Parli-Vaijnath
 Udgir

4.3 AMBEJOGAI :

Ambejogai, with a population of 57,054 is the headquarter of the tahsil of the same name and lies in 18°41' North and 75°24' East. The town has cut into two halves by



the river Jayanti which takes its rise in the Bhimkund Tirth situated to the south of the town. She latter meets the river Banaganga a little after the Mukundraj Samadhi.

Ambejogai, being the headquarter of the tahsil has the offices of the Tahsildar and the Panchayat Samiti, a Court of the Civil Judge, a police station, a post and telegram offices and resthouse. Ambejogai is known as a great centre of education. The town is well provided with medical facilities, there being a T.B., Sanatorium, a mobile hospital and general hospital. The hospital maintains ambulance and has a co-operative store and pharmaceutical store attached to it. A water works constructed in 1942 provides tap water to the town population.

Fig.4.1 shows that the T.B. is major disease of the city whose average death rate was 32/100,000 of estimated population and shows the slowly decreasing tendency. The deaths by tetanus which rank IInd in the list shows that average death rate was 5/100,000 of estimated population. The deaths by pneumonia rank IIIrd in the city, shows the average death rate of 40/100,000 estimated population. The highest death rate of pneumonia was recorded in 1982 (24/100,000 est.population). The deaths by cholera, leprosy, malaria and measle have been not noticed within 14 years period.

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4.4 AURANGABAD :

The geographical location of Aurangabad is 19°53' North latitude and 75°20' East longitude. Aurangabad, with a population of 572,634 in 1991 is the headquarter of Aurangabad districts as well as that of Aurangabad revenue division. It is actually situated on the Manmad-Secunderbad metre-gauge line of the South Central Railway. It is also connected by state highways with Pune, Ahmednagar, Jalgaon and Hydrabad. Aurangabad city is also connected by air service to Bombay and Delhi. The world's famous Ellora and Ajanta caves have put Aurangabad on the tourist map of the world. It is a municipal town having its corporation recently established.

The purified chlorinated piped water supply is available to the town. The supply of water once upon a time abandant. The supply of water is Kham and Harsul tanks and Jayakwadi dam. The city is being provided with an underground drainage system by E.E.D. of the Maharashtra State.

Fig.4.2 reveals that the T.B., the cancer and the diarrhoea are the leading diseases as the death rates are higher than other diseases. Highest death rate by T.B. was recorded in 1975 (50/100,000 estimated population). The highest death rate was recorded by Cancer in 1987 was 22/ 100,000 estimated population. Deaths due to pneumonia,



Fig. 4.2

diarrhoea and tetanus are also remarkable. The deaths due to pneumonia was decreasing upto 1982 and then deaths by pneumonia is increasing slowly year by year. The deaths by diarrhoea are increasing upto 1979 and then show the decreasing trend in every year. The diseases like measle, cholera, dysentery, malaria and leprosy are sporadic and of less magnitude as the death rate of these diseases is below 1/100,000 estimated population.

4.5 <u>BEED</u> :

Beed with 112,351 inhabitant according to the 1991 census is the headquarter town of the district of the same name situated on 18°59' North latitude and 75°46' East longitude on the banks of the Bendsura river across which a dam has been recently constructed.

Beed is one of the wholesale commercial centres of the districts. Though it is not a railway station, there are good and direct roads connecting Beed with Jalna, Ahmednagar, Aurangabad, Barshi, and Parli-Vaijanath. Beed municipal corporation has an area of 69.15 km² under its jurisdiction. Wells, private as well as public is the main source of water supply. There are only surface drains. Recently health centres were established.

Fig.4.3 shows that in the Beed city, T.B. is the major disease whose average death rate was 45/100,000 of estimated



Fig. 4.3

population. The deaths by tetanus, diarrhoea, pneumonia and cancer were also of remarkable magnitude. Tetanus ranks IInd in order in death list of Beed city. Diarrhoea ranks IIIrd in order of important followed by cancer, measle, leprosy and dysentery. Cholera had mild attacks of Beed city. Malaria has been completely eradicated from Beed city. The highest death rate by T.B. was observed in 1979 (97/100,000 estimated population). The deaths by tetanus have slowly decreased every year within fourteen (14) years span (1974-1987). The deaths by pneumonia were recorded highest in 1977, 49.5/100,000 death rate.

4.6 JALNA

Jalna, (19°50' North latitude and 75°33' East longitude) population 174,958 (1991) is situated at a distance of 482 kms and 64 kms from Aurangabad. It is a railway station on Kacheguda Manmad railway line. The Jalna municipal council was established in the year 1933.

The town is situated at almost at the same level and has general slope from north-west to south-west. Two rivers viz. Kundalika and Sina flow through the town. If the period of whole year considered, the predominant wind direction is from west. The town is provided with piped drinking water. The present source of the scheme is Ghanewadi. The tank situated about 10 kms to the north-west of the town.



Fig. 4.4

Fig.4.4 shows that the T.B., tetanus, pneumonia, cancer and diarrhoea are the dominant diseases of Jalna city. Deaths due to T.B. and cancer are increasing every year. The death rate of T.B. was 28 in 1974 and it has increased upto 36 in 1987. The death rate of tetans was 37 in 1974 and it has decreased upto 8 in 1987. The death rate of pneumonia was 16 and it has increasing upto 35 in 1987. The highest deaths by T.B. were recorded in 1985 where the death rate was 52/100,000 of estimated population. The diseases like dysentery, measle, leprosy show their less effect on the city, they have recorded death rate below one per lakh estimated population; Cholera and Malaria have mild attacks in Jalna city.

4.7 <u>LATUR</u> :

Latur (18°0' North and 76°35' East) population 197,164 is situated on the eastern end between the Manjara and the Tavarja valleys and is thus surrounded by the very fertile valley of the Manjara and on the south by that of the Tavarja. Latur is an ancient place and the original home of the Rastrakutas.

Established in 1935, the jurisdication of the Latur municipal council extends over an area of 29.27 km². A water scheme constructed on the Manjara at the village of Sai, 9.66 kilometer distant from Latur, supplies the city with tap water.



Fig. 4.5

In respect of medical facilities the town is well provided. In addition to it the city has the municipal dispensary, a government civil hospital and tuberculosis sanatorium. Latur enjoying a salubrious climate, is rarely affected by epidemic diseases.

Choropleth map (Fig.4.5) shows that T.B. is a major disease of the town whose average death rate is 16/100,000 of estimated population. The deaths due to pnuemonia, diarrhoea, tetanus and cancer are in the 2nd, 3rd, 4th and 5th in order successively in the Latur city. The deaths due to T.B. have slowly decreased from 1975 upto 1980 and then again increased by every year upto 1987. The highest death rate of T.B. was recorded on 28/100,000 of estimated population in 1986. The highest deaths by diarrhoea were recorded in 1985 where the rate was 25/100,000 estimated population. Tetanus is also remarkable disease of the city. The number of deaths have increased every year by T.B. and cancer. In Latur city, measle, leprosy and dysentery show less mortality rates. Cholera and Malaria have been completely eradicated from the Latur city.

4.8 NANDED :

Nanded (19*9' North and 77*10' East) population 274,626 is the headquarters of the Nanded district. The town is famous for the Sikh Gurudwara. It is situated on the north bank of the Godavari and has grown in commercial importance due to its being



a railway station on the Kaceguda-Manmad route of the Central Railways.

The water supply scheme of Nanded consists of drawing water from the Godavari through an infiltration gallery and lifting the same by means of pumps operated on electricity to the elevated R.C.C. tank of 682,500 litres water capacity. Then the water is distributed to the town through the network of pipes with an aggregate length of 24.14 kms. Nanded municipality established in 1937. It covers an area of 16.48 km² and is governed under the Hydrabad district.

Fig.4.6 shows that T.B. and tetanus are the major diseases of this city. T.B. ranked Ist and tetanus ranked IInd in death list of the Nanded city. The highest death rate due to T.B. was observed in 1977 in Nanded city which was 81/100,000 of estimated population. Tetanus ranked 2nd in the list of Nanded city. The highest death rate due to tetanus was observed in 1980 in Nanded city and was 18/100,000 estimated population. After 1980, the mortality trend of tetanus has declined upto 1987. Pneumonia was also a remarkable disease of Nanded city. Pneumonia ranked 3rd in order of importance followed by diarrhoea, cancer, measle and dysentery. The highest rate due to pneumonia was observed as 43 in 1983. Cancer mortality trend has increased since 1974 upto 1985. Cholera had mild attacks in 1977. The average annual death rate of dysentery and leprosy was below 0.5 within 14 years. Malaria has been completely eradicated for this city.

4.9 OSMANABAD :

The latitudinal and longitudinal of Osmanabad city are respectively 17°35' to 18°40' North and 75°16' to 76°40' East. The town Osmanabad has a 'B' class municipal council and is the district headquarter of Osmanabad district. It was established in 1958. It is situated on the Malkapur-Solapur state highway No.50 A. The total area under the jurisdiction of Osmanabad municipal council is 12.06 sq.km. The general terrain of the town is plain. The population of the town is 67,980 according 1991 census. The river Bhagavati passes from north to south along the eastern and southern boundaries of 'Gaothan'. The town gets most of the rainfall from south-western monsoon winds.

The Graph 4.7 reveals that the city Osmanabad has maximum deaths by pneumonia of which the average death rate was 17.5/100,000 of estimated population in the span of fourteen (14) years. It is followed by T.B., tetanus, cancer and diarrhoea. The highest death rate by pneumonia was observed as 100/100,000 of estimated population in 1986. The average death rate of T.B. was 19/100,000 within fourteen years. The highest death rate of T.B. was recorded as 74/100,000 of esti. population in 1984. Death due to leprosy and measle were very low. Mortality rate for the span of 14 years. The diseases like cholera, malaria and dysentery were not noticed in the fourteen (14) years period.



4.10 PARBHANI :

The geographical location 19°30' North latitude and 76°40' East longitude of Parbhani city. Parbhani, the headquarters town of the district lying on the Manmad-Kaceguda railway route, had a population of 190,235 according to 1971 census. The town situated on the left side of the railway station, covers an area admeasuring 20.72 km². The civic affairs of the town are looked afterby the Parbhani municipality established in 1943.

The river Dudhana is 11.26 km away from Parbhani town. The water is pumped and stored at the reservoir near the town and from there is supplied to the town through pipes.

Choropleth map (Fig.4.8) reveals that the city Parbhani has maximum deaths by T.B. (death rate 45/100,000 of estimated population) in the span of fourteen (14) years. It is followed by tetanus and diarrhoea. Deaths due to tetanus were showing average death rate of 44/100,000 estimated population. T.B. ranked 1st and tetanus ranked 2nd in order list of Parbhani city. The highest deaths by T.B. was recorded as 85 in 1978. The highest death rate of tetanus was observed as 78/100,000 of estimated population in 1979. After 1979, the death rate has declined sharply. The average death rate of pneumonia was 21/100,000 estimated population. Deaths due to diarrhoea have declined successively. The highest death rate of diarrhoea was as 49.5 in 1977. Cancer was also major disease followed by T.B., tetanus,



Fig. 4-8

pneumonia and diarrhoea. The deaths due to dysentery, leprosy and measle have very less mortality rates (less than 01/100,000 estimated population) in the span of 14 (fourteen) years. The disease like cholera and malaria have been completely eradicated from Parbhani city.

4.11 PARLI-VAIJNATH :

Parli-Vaijneth with 72,573 population in 1991. Parli Vaijneth one of the fast growing towns of Beed district lies in Ambejogai tahsil and is an important centre of trade and commerce. It is very well served by road and rail transport, there being rail connections with Parbhani and Hydrabad and road connections with Nanded, Jalna, Barshi, Latur and Hingoli. Parli is well-known for the shrine of Vaijneth containing one of the femous twelve Jyotirlings of India. The municipality at Parli-Vaijneth was established in 1933 and covers an area of 46.62 km². A water works constructed in 1942 provides tap water to the town populace.

According to Fig.4.9 reveals that deaths due to T.B. was highest the death rate was above 09/100,000 of estimated population. It is important to note that the deaths rate due to T.B. was highest in 1978 i.e. 25/100,000 of estimated population. The deaths rate due to cancer was high and was 14/ 100,000 of estimated population. Cancer was also remarkable disease. The average death rate due to cancer was observed



Fig. 4.9

as 5/100,000 of estimated population. T.B. and cancer were the major disease of the Parli-Vaijnath city. They are followed by tetanus, diarrhoea and leprosy were death rate was very low. In 1976 measle deaths were occurred once during within fourteen years. Pneumonia was also occurred once in 1989. Cholera had mild attacks in 1975 and 1979. The diseases like Malaria and dysentery have been not proliferated in this city during the span of fourteen years.

4.12 UDGIR :

Udgir is a tahsil headquarters which is nearly as large as Osmanabad, the district headquarter. The town is situated on the plateau where a stream by headword errosion has cut back across the scrap upto the town. By bunding this a big tank has been formed which is used for bathing, washing and watering the cattle. The town is situated on a rising southern end of the tank and has an advantageous situations on road and rail route from Parli to Bidar in the midst of a rich cotton growing area.

Udgir municipality council started its functioning with an elected council from 1953. Udgir has two dispensaries, one civil and the other vetarnary, both are controlled by Zillha Parisad. The town for the most part has kaccha drains, there being very few stone-lined gutters. Arrangement is made to collect the waste water in less pools. Tap water would soon



be made available when the water scheme undertaken on Mahmadnala is completed.

The Graph 4.10 shows that T.B. was a major disease of the town whose average death rate was 06/100,000 of estimated population. The highest death rate due to T.B. was observed as 16/100,000 estimated population in 1979. After 1979, the death rate of T.B. has shown decreasing trend every year upto 1987. The cancer ranked IInd in the list of Udgir city. The average death rate of cancer was experienced as 3.2/100,000 of estimated population. The highest deaths were occurred in 1974. T.B. and cancer were followed by diarrhoea, tetanus, measle, and pneumonia whose death rates were very low. Leprosy had a single point of occurance in 1975. Cholera, malaria and dysentery have been not noticed in this city within fourteen years.

4.13 RANKING OF DISEASES :

An idea of relative dominance of different diseases in order of importance may be provided with the study of ranking of diseases. This technique is based on the calculated mortality rates for particular diseases in particular year and for particular city.

The data have been taken into consideration for the period of fourteen (14) years (1974-87) and also for six (6) years for in case of some cities (Fig.4.18). In 1974 in Beed



Fig. 4.11

city, the number of deaths due to tetanus were highest amongst all, hence this disease has been given the first rank in 1974 while number of deaths of cancer during the same year were lowest amongst all hence for cancer, the last rank was alloted i.e. Vth. Accordingly, for each disease yearwise ranks were calculated and shown in Figs. 4.11 to 4.13.

Table 4.1 shows diseasewise ranking of cities for the period (1974-87) and Table 4.2 indicate citywise ranking of different diseases for the period of 14 years (1974-87). Total ten diseases are considered for the study.

Generally, it is observed that in almost all cities death rate by tuberculosis, tetanus, pneumonia, cancer and diarrhoea are of higher order during fourteen years (1979-87) period. Expect Parli-Vaijnath and Udgir cities the T.B. stands first in the ranking order.

The tetanus is dominant in Ambejogai cities. Pneumonia has also created serious problems as the stands on rank IInd or IIIrd in the cities like Aurangabad, Jalna, Latur, Nanded, Osmanabad and Parbhani. The disease cancer ranks 4th or 5th in the Ambejogai, Aurangabad, Beed, Latur and Udgir. As per the collection of data of 1974 to 1987 ranking orders have been shown in the following groups of disease with varying intensity.







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- 1) Diseases of high ranking order
 - i) Tuberculosis
 - ii) Tetanus
 - iii) Pneumonia
 - iv) Cancer
 - v) Diarrhoea

2) Diseases of moderate ranking order

- vi) Leprosy
- vii) Dysentery
- viii) Measle

3) Disease of low ranking order

- ix) Cholera
- x) Malaria

Table 4.2 shows the picture of citywise ranking of different disease. Almost all cities are badly being suffered with tuberculosis, tetanus, pneumonia and diarrhoea.

Table 4.1 shows diseasewise ranking of cities. It shows that Parli-Vaijnath ranks first and takes highest ranks amongst all the 10 cities of Marathwada division by cholera. Ambejogai ranks 1st amongst all the cities in tuberculosis deaths. While mortality due to pneumonia occurred more in the Osmanabad city. The death rate by cancer was highest in Jalna city. Deaths due to dysentery are highest in Latur city. Deaths due to leprosy and malaria are found more in Udgir city.

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	P n eumon ia	Osmanabad	parbhani	Jalna	Nanded	Beed	Latur	Ambejogai	Aurangabad	parli- vaijanath	Udgir
•	Cancer	Jalna	Ambe- joga1	A ura n- gabad	Beed	Parbha- ni	Nanded	Parli- Vaija- nath	Latur	Osmana- bađ	Udgir
easéwise) , 1974–8°	Measle	Auran- gabad	Beed	Nanded	Udgir	Jalna	parli- Vaija- nath	Parbha- n1	Osmana- bađ	Latur	8
cies (dis pulation	Tetanus	parbha- n1	Beed	Nanded	Jalna	Osmana- bađ	Ambejo- gai	Parli- Vaija- nath	Latur	Auran- gabađ	Udglr
ing of cit	Leprosy	Udgir	Parli- Vaija- nath	Osmana- bađ	Beed	parbha- ni	Jalna	Latur	Nanded	Auran- gabad	•
ion - Ranki eat b Rate/1	Tubercu- losis	Ambejo- gai	parbhani	Nandeđ	Osma na- bađ	Beed	Auranga- bad	Jalna	Latur	parli- Vaija- nath	Udgir
wada divis Specific D	Dysentery	Latur	Ambejoga1	parbhani	Beeđ	Jalna	A uranga- bad	Nanded	ı	I	•
<u>.</u>] : Marat ¹ Cause	Diarrhoea	Beed	Nanded	parbhan1	Jalna	Auranga- bad	Latur	Osmana- bad	Am be jo- gai	Udgir	Parli- Vaija- nath
Table 4.	Malaria	Udgir	Jalna	Auran- gabad	1	ł	I	I	1	 I	
	Cholera	Parli- Vaijna-	Beed	Jalna	Nanded	Auranga- bad	Auranga- bad	1	8	ł	E Contraction of the second seco
	Rank No•		II	III	IV	Λ	IV	IIV	IIIV	XI	×

· SOURCE : Compiled by author, based on Vital Statistics, Maharashtra State.

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Table 4.2 : Marathwada division - Citywise ranking of different diseases cause

specific death rate/100,000 population (1974-87).

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SF. No.	Town	Cholera	Malaria	Dlarrhoea	Dysentery	н. Н	Leprosy	Tetanus	Measle	Cancer	Pneumonia
7	Ambejogai	ł	ł	>	IV	н	•	II	ł	IV	111
N	Aurangabad	XI	IIIV	III	IIV	н	×	Γ	II	IV	^
n	Beed	TIV	1	TII	X	н	IIIV	HI	ΝI	Λ	IV
ب ې	Jalna	IIA	×	٨I	VIII	ы	IX	H	ΓΛ	>	TT TT
IJ	Latur	ł	1	NI	ΛI	н	VIII	III	VII	ν	II
Q	Nandeđ	IIV	1	TII	XI	н	IIIV	TI	IV	Λ	IV
6	Osmanabad	•	ł	ΛI	ł	F-i	ΙΛ	III	VII	Ν	H
œ	Parbhani	ł	i	٨T	IIV	н	IIIN	ΤŢ	ΪΛ	Λ	III
9	Parl i- Vaiinath	IV	1	IIV	1	н	>	н	I IIV	III	ΓΛ
10	Uðgir	ł	н	IV	ł	II	III	IIA	IV	>	VIII
- 10pp				-							

SOURCE : Compiled by author, based on Vital Statistics, Maharashtra State, Pune.

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The deaths due to tetanus have occurred more in Parbhani and deaths due to measle were more in Aurangabad city. With considering total deaths occurred in Ten (10) cities of Marathwada division following three groups can be classified.

- 1) Cities of High Ranking Order (I to Vth)
 - i) Beed
 - ii) Jalna
 - iii) Nanded
 - iv) Parbhani
 - v) Aurangabad
- 2) Cities of Moderate Ranking Order (VIth to VIIIth)
 - vi) Latur
 - vii) Ambejogai
 - viii) Parli-Vaijnath
- 3) Cities of Low Ranking Order (IXth to Xth)
 - ix) Udgir
 - x) Osmanabad

The cities like Osmanabad and Udgir are most safer cities of Marathwada division where deaths due to all diseases were observed very less. In future more attention to be paid to improve the medical facilities in the cities like Beed, Jalna, Nanded, Parbhani and Aurangabad.

4.14 CONCLUSION :

The study of spatio-temporal analysis of diseases in cities of Marathwada division shows that the proliferation of respiratory diseases is more in many cities as compared to other division of Maharashtra state. Economically Marathwada is the most backward region. Industrialisation has not spread rapidly. Still the prevelance of T.B., tetanus, pneumonia and cancer is more. Tuberculosis takes the maximum toll from Marathwada. T.B. stands as a disease of first order in 8 cities out of 10 under study. In remaining two cities i.e. Parli-Vaijnath and Udgir the T.B. deaths are of 2nd order. Tetansus, eventhough the disease of rural origin is mainly found in all the ten cities of Marathwada and these to IInd and IIIrd order. The cities which are mainly located in the area of Godawari river basin show higher occurances of water borne diseases like Diarrhoea and Dysentery. The disease cancer observed in these cities is of specific nature. The death rate of cancer is successively increasing in these cities. More and more industrialisation in Marathwada will result in increasing more and more cancer deaths. The unsafe and contaminated water is mainly responsible for the spread of water borne diseases in the cities. The disease like cholera and malaria are in sporadic nature and shows the decreasing tendency. Out of ten cities under study cholera is observed in discontinuous manner only in 5 cities out of ten. In remaining five (5) cities cholera is not observed at all. Malaria has also observed with very less intensity only in three (3) cities namely Udgir, Jalna and Aurangabad.

These results lead to the conclusion that physical factors are not much responsible for the disease distribution. The socio-cultural factors do spread the specific diseases in the cities with varying intensity. Use of safe and uncontainmated drinking water and controlling the urbanisation and industrialisation at its minimum level will solve some of the disease problems of these cities.

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