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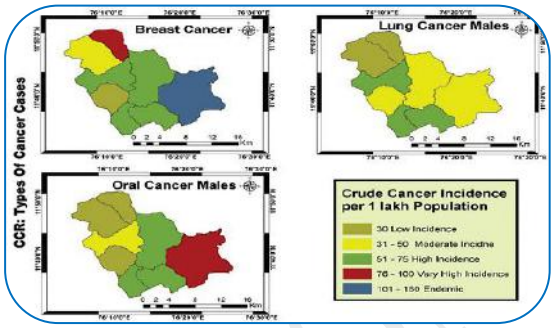
SPATIO-TEMPORAL DISTRIBUTION OF CANCER MORTALITY IN MAJOR URBAN CENTERS IN MARATHWADA REGION



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ABSTRACT:

Cancer is one of the most important causes of death in the world and also in India. Excluding a few diseases like AIDS, most of the major killers of the world as well as India are on the decline. Cancer is, however, on the rise. India is now the highest Cancer burden country in the world.

The data regarding Cancer has been collected from vital statistics published by government of Maharashtra. The present study attempts to evaluate the Spatio-temporal analysis of cancer mortality in major urban centers of Marathwada region of Maharashtra state. The objective of this research paper is to study the distributional pattern both spatially and temporally, The researcher proposes to analyze the available data at various stages is being calculated using various statistical methods. The distributional pattern of Cancer is to be investigated at urban centre wise. The data collected for 35 years period has been analyzed by locational graph methods, Standard Mortality Rate (S. M. R.)and simple ranking technique is used for understanding comparison and distributional pattern.

The study reveals that various physical and cultural factors of the environment associated with the occurrence of the Cancer in the urban centers of the study region. Moreover, various factors such as urban pollution, smoking and chewing of tobacco and betel pan, consumption of alcohol, malnutrition, poor post natal care and poor maternity services, poor genital hygiene, early consummation of marriage, multiple pregnancies, and contact with multiple sexual partners, dietary factors, life styles, occupational exposure, vitamin deficiency, water and air pollution, sunlight, radiation, pesticides and medications. Lack of application of screening techniques, adequate treatment facilities and lack of public awareness about cancer are some of the causes responsible for cancer mortality in the study region.

KEYWORDS: *Urban Centre, Cancer mortality, physical and Socio-cultural factors, Tobacco, genital hygiene, screening, Medical Facilities.*

INTRODUCTION:

Cancer is one of the most important causes of death in the world and also in India. Excluding a few diseases like AIDS, most of the major killers of the world as well as India are on the decline. Cancer is, however, on the rise. “At the beginning of this century, Cancer was the sixth cause of death in industrialized countries, today, it is second leading cause of death” (Park and Park, 2011,). The science of cancer is better known today but how to prevent the disease is only partly within the realm of science. “On the global level, all human population is susceptible to the disease but the cancers of different site are more common than in others” (Agnihotri R.C.1995)

Some recent studies reveal that genetic factors are significant only in a few types of cancers such as the breast and prostate cancer. Whereas, all other cancers linked to environmental factors such

as chemical pollution of air, water, and food, diet, infection, smoking of beedi and cigarette and chewing of tobacco, drinking of tea, coffee, and alcohol.

According to Misra R.P. (2007) "Causal factors for cancer are basically three: geographical, occupational and cultural (lifestyle), which in real terms mean bad environment, bad habits, bad working conditions and in some cases bad luck (heredity)".

"The total cancer burden is highest in effluent societies, mainly due to a high incidence of tumour associated with smoking and western lifestyle, i.e., cancer of the lung, colorectum, breast and prostate. In India the most common site of cancer in men are respiratory tract cancers and cancers of cervix is the most common in women" (Park and Park, 2011).

There are as many cancers as organs and tissues within the human body. In different places found different types of cancer. In India, there are three types of cancer e.g., Oral cavity, and of lung and cervix, which form more than half of the cancer burden.

"Cancer may be regarded as a group of diseases characterized by an i) abnormal growth of cells ii) ability to invade adjacent tissues and even distant organs, and iii) the eventual death of the affected patient if the tumour has progressed beyond that stage when it can be successfully removed" (Park and Park,2011).

"Cancer cells are endowed with tremendous growth energy; they lack growth restraint, which characterizes normal cells. Faults in the controls of the cell division are what cause cancer. Instead of dying, the mutated cells keep on dividing and eventually forming a tumour. Cancer may invade normal and adjacent tissues by direct or contiguous growth or it may infiltrate within the blood or lymph vessels in which cell are broken off and carried to distant organs" (Misra, R.P, 2007).

Now cancer is one of the most important causes of death in the modern world. Cancer is not just one disease, but a large group of almost one hundred diseases. Two main characteristics of the cancer are uncontrolled growth of the cells in the human body and the ability of these cells to migrate from the original site and spread to distant sites. It the spread is not controlled, destroy healthy tissues and endanger life. Cause death. Cancer occurs in most species of animals and in many kinds of plants and in human being.

"It is estimated that there are approximately 2-2.5 million cases of cancer in India at any given point of time, with around 7-9 lakh new cases being detected each year. Nearly half of these causes die each year" (Park and Park, 2011)

STUDY REGION:

This study region is heterogeneous in nature, in case of Physiography climate, soils, vegetation, drainage patterns, rainfall, occupation, social factors, sex ratio, urbanization, industrialization etc. The latitudinal and longitudinal extent of the area is 17^0 35^1 North to 20^0 40^1 North and 74^0 40^1 East to78^0 15′ East respectively.

Marathwada region is located in the (south) central part of Maharashtra state and it covers 64813-km2 area (21.04 percent). The environmental factors of this region may cause the larger morbidity and mortality of certain infectious and parasitic diseases.

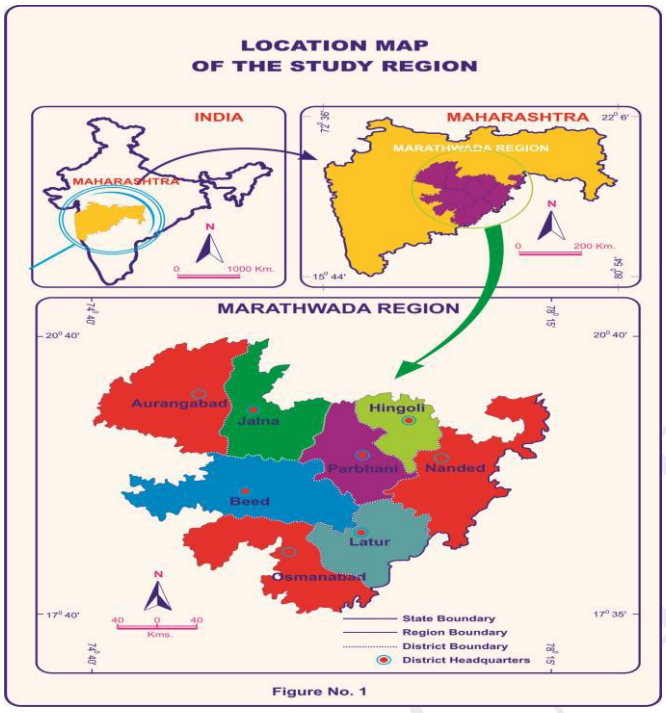


Figure No. 1

OBJECTIVES:

I. To study the distributional pattern of Cancer both spatially and temporally in the Urban Centers of the study region
II. To Study the Correlation between various factors and Cancer in urban centers in the study region

METHODOLOGY:

This paper is concerned with disease wise Spatio temporal analysis of selected urban centers in the study region. This chapter analyses the S.M.R., correlation factor and ranking of the diseases.

The collected data has shown in the form of located bar graphs. Eleven urban centers are selected for the study of certain diseases. The mortality data of these urban centers is available in the Vital Statistics of Maharashtra. The year wise cause specific mortally rates are calculated.

The major urban centers selected for the study of cancer mortality are eleven in number and they are as follows-

1] Ambejogai	2] Aurangabad	3] Beed	4] Hingoli	5] Jalna
6] Latur	7] Nanded	8] Osmanabad	9] Parbhani	
10] Parli-Vaijinath	11] Udgir			

SPATIO TEMPORAL DISTRIBUTION:

Cancer is one of the important diseases, which cause deaths. The table 1 shows the death rate and figure 2 shows the graphical presentation of deaths by cancer in the urban centre. The regional average death rate is 10.16 per lakh population. The distribution of cancer is uneven in the study region.

Five urban centers' death rate is above the regional average. The highest mortality rate is observed in the Beed (16.00) urban centre. After that Ambejogai, Jalna and Osmanabad have observed high mortality rate. The lowest mortality rate is in the Udgir (5.30) urban centre.

The mortality rate by cancer in urban centers is not constant from 1971 to 2005. During the year 1971 to 1975, the average death rate was 5.86, which has increased up to 16.03 per lakh population between the years 2001 to 2005. All urban centers have observed increasing trend.

Table 1.
MARATHWADA REGION
RANKING OF AVERAGE DEATH RATE BY CANCER

Sr. No.	Urban Centers		1971 To 1975	1976 To 1980	1981 To 1985	1986 To 1990	1991 To 1995	1996 To 2000	2001 To 2005	1971 To 2005
1	Ambejogai	Death R.	-	-	8.59	12.70	16.56	14.60	18.59	14.21
		Rank			VI	II	II	II	III	II
2	Aurangabad	Death R.	3.51	8.46	9.00	17.19	13.25	8.20	14.28	10.56
		Rank	VIII	III	IV	I	IV	VII	VI	V
3	Beed	Death R.	4.62	16.20	8.90	12.28	17.43	22.13	30.43	16.00
		Rank	VII	I	V	III	I	I	I	I
4	Hingoli	Death R.	4.90	5.20	12.06	11.79	6.64	10.35	12.14	9.01
		Rank	VI	VII	I	IV	IX	VI	IX	VIII
5	Jalna	Death R.	10.11	12.54	9.59	10.36	14.71	13.28	12.36	11.85
		Rank	I	II	III	VI	III	IV	VIII	III
6	Latur	Death R.	8.13	5.04	5.56	11.00	11.49	13.32	16.18	10.10
		Rank	II	VIII	X	V	VI	III	V	VI
7	Nanded	Death R.	1.55	6.85	10.38	8.72	13.07	7.66	13.33	8.79
		Rank	IX	VI	II	VII	V	IX	VII	IX
8	Osmanabad	Death R.	-	-	7.65	4.61	10.11	10.45	23.13	11.19
		Rank			VIII	IX	VII	V	II	IV
9	Parbhani	Death R.	6.02	7.75	7.69	8.22	8.74	7.85	17.69	9.14
		Rank	V	V	VII	VIII	VIII	VIII	IV	VII
10	Parli-Vaijinath	Death R.	6.29	8.37	6.91	2.55	4.90	3.33	7.10	5.64
		Rank	IV	IV	IX	X	XI	XI	XI	X
11	Udgir	Death R.	7.77	3.65	3.85	1.80	5.09	4.36	11.11	5.30
		Rank	III	IX	XI	XI	X	X	X	XI
Average		**Death R.**	**5.86**	**8.23**	**8.20**	**9.20**	**11.09**	**10.50**	**16.03**	**10.16**

Source: *Computed by Authors based on Annual Vital statistics Report published by Govt. of Maharashtra, 1971 to 2005.*

PROMINENT URBAN CENTERS:

The graphical distribution of death rate of cancer in urban centers is shows in figure 2. The incidence of cancer is found in all urban centers. However, this distribution is not even. There are some districts having consistently higher death rate and some have lower death rate. The consistent higher death rate shows the prominence of the disease. Some urban centers are prominent urban centers of cancer. Beed, Ambejogai and Jalna are prominent urban centers of cancer disease.

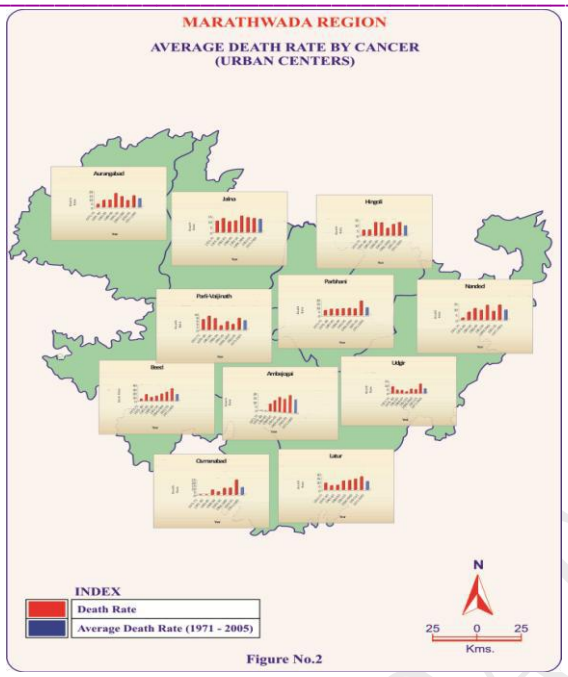


Figure No.2

CORRELATION FACTOR:

"Physical agents such as ultraviolet rays, sun-light, local heats etc. are important in cancer" (Deodar N.S. and Adranwala J.K., 1974, p.373).

Cancer is affected by various environmental and social factors. The table 2. shows the correlation between various selected factors and deaths by cancer and figure 3. shows the graphical presentation of the correlation values.

Table 2.
MARATHWADA REGION
CORRELATION BETWEEN VARIOUS FACTORS AND CANCER

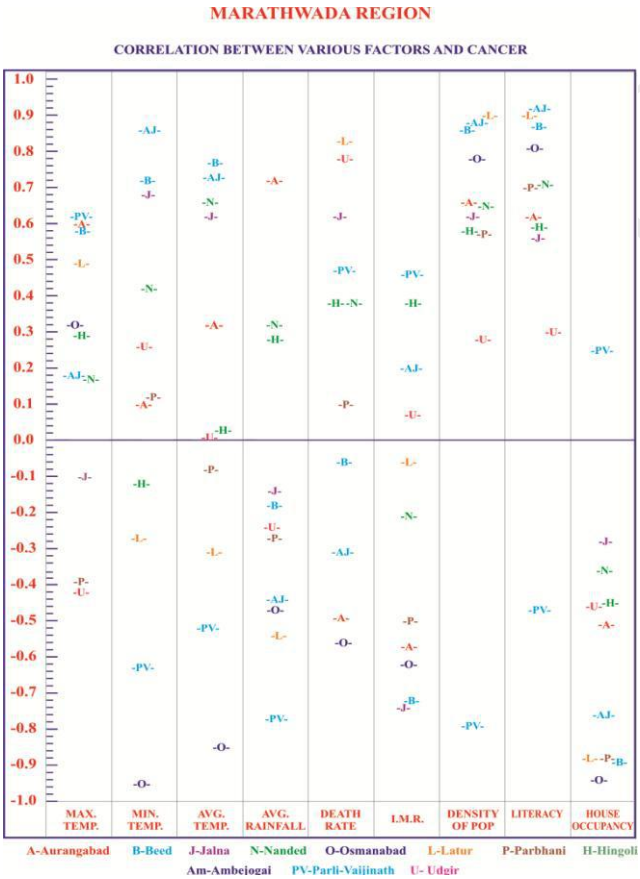
Sr. No.	Urban Centers	Max. Temp.	Min. Temp.	Aveg. Temp.	Aveg. Rain	Total Death Rate	Infant Mortality Rate	Population Density	Lite-racy	House Occupancy Ratio
1	Ambajogai	0.18	0.86	0.73	-0.44	-0.31	0.20	0.89	0.92	-0.75
2	Aurangabad	0.60	0.10	0.32	0.72	-0.49	-0.57	0.66	0.62	-0.51
3	Beed	0.57	0.72	0.77	-0.18	-0.06	-0.72	0.86	0.87	-0.89
4	Hingoli	0.29	-0.12	0.03	0.29	0.38	0.38	0.58	0.59	-0.43
5	Jalna	-0.10	0.69	0.62	-0.13	0.62	-0.74	0.62	0.56	-0.39
6	Latur	0.49	-0.27	-0.31	0.54	0.83	-0.06	0.90	0.90	-0.88
7	Nanded	0.17	0.41	0.66	0.32	0.38	-0.21	0.65	0.71	-0.35
8	Osmanabad	0.31	-0.95	-0.85	-0.47	-0.56	-0.61	0.78	0.81	-0.93
9	Parbhani	-0.39	0.12	-0.09	-0.27	0.10	-0.50	0.57	0.70	-0.87
10	Parli-Vaijinath	0.61	-0.63	-0.52	-0.77	0.47	0.46	-0.34	-0.47	0.24
11	Udgir	-0.42	0.26	0.01	-0.23	0.78	0.07	0.28	0.30	-0.46
Total		**0.28**	**0.88**	**0.87**	**-0.12**	**0.87**	**-0.88**	**0.90**	**0.83**	**-0.92**

***Source**: Computed By Authors.*

The correlation between maximum temperature and the death rate by cancer is slightly positive. Except three urban centers, all urban centers have positive correlation. Jalna of prominent urban centers have observed slightly negative correlation and Beed and Ambejogai have positive correlation.

The correlation between minimum temperature and the death rate by cancer is significantly positive (0.88). Four urban centers have negative correlation and seven urban centers have observed positive correlation. In the prominent urban center, the correlation is positive.

The correlation between average temperature and the death rate by cancer is significantly positive (0.87). Seven urban centers have positive correlation and four have negative correlation. Prominent urban centers have observed positive correlation.



The correlation between rainfall and the death rate by cancer is slightly negative. Seven urban centers have observed negative and four have observed positive correlation. In the prominent urban centre, the correlation is negative.

The correlation between total death rate and the death rate by cancer is significantly positive (0.87). Except three urban centers, all urban centers have positive correlation. The impact of cancer deaths on total deaths is observed in Jalna urban centre.

The correlation between infant mortality rate and the death rate by cancer is significantly negative (-0.88). Seven urban centers have negative correlation and four have positive correlation. This shows that the I.M.R. is not affected by cancer in the study region.

The correlation between population density and the death rate by cancer is significantly positive (0.90). Except Parli–Vaijinath, all urban centers have positive correlation.

The correlation between literacy rate and the death rate by cancer is significantly positive (0.83). All urban centers have negative correlation except Parli-Vaijinath. Most of the urban centers have significant positive correlation.

The correlation between house occupancy ration and cancer is significantly negative (-0.92) in the study region. All urban centers have negative correlation except Parli-Vaijinath. The correlation between house occupancy ratio and cancer is negative in the prominent urban centers.

RANKING OF DISEASE:

The ranking of the death rate by cancer in urban centers is shown in the table 1 and figure 4 shows the graphical presentation of the ranks. The districts of the prominent urban centers have higher ranks. The highest rank is in the Beed urban centre. Ambejogai and Jalna have second and third ranks respectively, while Osmanabad and Aurangabad observed fourth and fifth ranks respectively. The lower rank is in the Udgir urban centre. Parli Vaijinath, Nanded and Hingoli have lower ranks regularly.

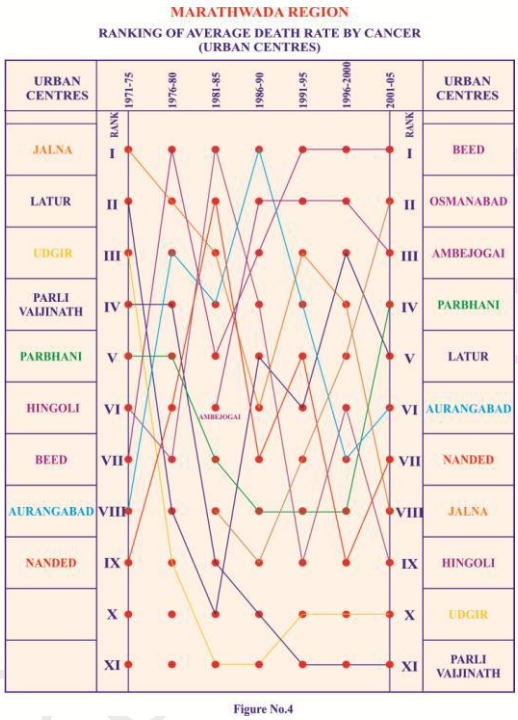


Figure No.4

CONCLUSION:

The Spatio-temporal distribution of ten diseases of urban centers of Marathwada region shows remarkable findings. The whole study is based on death rate, correlation factors and ranking disease technique.

Rapid and uncontrolled urbanization generates a series of complex problems, of which, besides basic sanitation and environmental pollution, housing is an important one. Poor housing in urban areas is usually associated with lack of adequate water supply and basic sanitation facilities. It also facilities entrance and harboring of rodents and insects with resultant spread of diseases like Malaria, Filariasis, Trachoma and also an excessive number of rat and scorpion bite cases"(Ghosh B.N. 1987).

Cancer deaths are maximum in Beed and Ambejogai urban centers but the urban centers of Udgir and Parli-Vaijinath show less deaths. The Cancer has shown increasing trends of deaths in the Marathwada region.

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