MORTALITY PATTERNS AND TRENDS OF POLIOMYELITIS IN MAHARASHTRA

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ABSTRACT : There is an ample evidence that Poliomyelitis has existed all over the world, while recently epidemics have been reported in increasing numbers from the tropical parts. The disease seems to be of exclusively urban origin. Therefore, its distribution both temporal and geographical needs special attention. The study is made with districtwise and citywise data for a period of 14 years from 1970. The rate of poliomyelitis in Maharashtra State shows the upward trend and it's major concentration is observed in the major cities like Greater Bombay, Nagpur, Pune and Kolhapur.

INTRODUCTION

Poliomyelitis or infantile paralysis or simply polio is an acute infectious disease caused by enterovirus. In this disease, the lower motor neuron in anterior horn cells are involved and it results in sudden flaccial paralysis which may be local or widespread covering all the limbs. Paralysis is proceeded by prodomal symptoms of sore throat, fever and pain in muscles. Respiratory muscles are also paralysed in spinal form of paralysis. The disease is either abortive, non-paralytic or paralytic in form and caused by viruses of type I, II and III. The viruses are present in the stools of patients at the time of onset of the disease. The disease is highly communicable and be transferred from one individual to another— (i) through faecal contamination and (ii) through pharyngeal secretions directly. Milk and water may be the mode of communication and flies may transmit it also. Epidemics vary widely in their incidence of abortive and non-paralytic case.

EPIDEMIOLOGY

There is much change in the epidemiological behaviour of poliomyelitis. The disease, originally sporadic, has now evolved itself into an epidemic form. In countries with poor living conditions with low public health organisational work, the disease is endemic. The disease was predominantly of infantile paralysis and was found much in infants but has now shown tendency to affect the higher age group. The epidemic poliomyelitis which was earlier confined to countries with temperate climate is now being increasingly reported from tropical parts of the world. Eventhough, it is a disease of infancy and childhood, its cases rarely occur before six months of age and maximum cases are being reported between 5 and 10 years of age. Some 80% of the total cases in India occur in children below 3 years and 95% of the cases are seen below five years of age. In the developed countries like U.S.A., 25% of cases are above the age of fifteen. Poliomyelitis mortality mostly ranges between 10 and 20%, but 50% of those who escape death are crippled in various ways and include permanent muscular paralysis and deformities in bones. Virus of this disease is more active during summer and severe winter. The rate of incidence is higher in thickly populated areas.

GEOGRAPHICAL DISTRIBUTION OF INCIDENCE

With the advent of immunisation like Salk vaccine, the disease has become uncommon in the developed countries, but incidences have been noted in the countries like Canada, S. Australia, New

Zealand, South Africa, Sweden, Norway, Austria and Hungary in which morbidity rate ranges between 40 to 80 per 1,00,000 population. In India, the first reported epidemic occured in 1936 in and around Calcutta where 1,068 deaths were noted. Since then more epidemics have occurred at various times in Madras, Bombay, Gujrat, Rajasthan, U. P. and Delhi and maximum reported paralytic poliomyelitis cases in India were 12,326 in the year 1974. Overall Indian morbidity rate has always remained below 10 per 1,00,000 population during last 80 years and it is considerably low as compared to other undeveloped countries of the world.

OBJECTIVES

While studying the trend and mortality patterns of poliomyelities in Maharashtra, the attempt has been made :

(i) to analyse the trend of mortality of the disease in the state,

(ii) to analyse the variations in mortality per rural and urban areas of Maharashtra,

(iii) to identify the areas of significant occurances of the disease,

(iv) to analyse the mortality trend in major cities of the state and

(v) to correlate the trend of spatial distribution of the disease with geographical phenomenon if any.

SOURCES OF DATA

The author has based his studies on the statistics available in the report of ' Vital Statistics of Manarashtra '. The data were available from 1970–83. The districtwise mortality rates are calculated separating the district into rural and urban areas. These rates were grouped into three periobs of time i.e. (i) 1970–73 (ii) 1974–78 and (iii) 1979–83. The records of deaths were also studied for 29 major cities whose population is more then 1,00,000 per 1981 census. The mortality rates for these major cities and for remaining small cities were also studied separately. The sexwise death rates were also considered for finding out the variations in the occurances of poliomyelitis in Maharashtra.

TRENDS OF POLIOMYELITIS IN MAHARASHTRA

In Maharashtra, the first reported incidence of poliomyelitis was noted in year 1949 in and around Bombay city, where 389 cases were reported and 65 out of them died. Afterwards the cases and even deaths were not properly recorded. Now, in this paper the author has studied the trend of mortality for 14 years i. e. from 1970 to 1983. The districtwise and sexwise mortality rates are studied and represented in Fig. Nos. 1 & 2 & in Table No. 1 to 3. The average mortality rate of Maharashtra is low and it ranges between 0.11 and 0.32 per 1,00,000 population.

TABLE 1

Sr. No.	Region	Death rate / 1,00,000 est. population							
		1970	1971	1974	1975	1976	1977	1982	1983
1	State average	0.11	0.18	0.18	0.20	0.25	0.19	0.28	0.32
2	State rural area average	0.01	0.04	0.03	0.03	0,06	0.06	0.10	0.20
3	State urban area average	0.36	0.50	0.50	0.57	0.66	0.50	0.60	0.50
4	Bombay city	0.60	1.00	0.80	1.00	1.10	0.90	1.30	0.90
5	Nagpur ciry	0.30	0.60	1.90	0.30	0.20	0.50	0.30	0.20
6	Pune city	0.10	—	0.20	0.40	0.50	0.20	0.20	0.20
7	Kolhapur city	0.80	1.90	0.70	1.30	0.30	1.00	1.10	—
8	Rest of major (25) cities of state	0.13	0.20	0.19	0.18	0.50	0.20	0.13	0.40
9	All other small cities	0.20	0.04	0.20	0.40	0.30	0.20	0.15	0.30

TABLE 2

Region	D. R. / 1,00,000 est. population		
	1970–73	1974–78	1979–83
State's rural area average	0.02	0.04	0.15
State's urban area average	0.43	0.50	0.55
State's average	0.15	0.20	0.30

TABLE 3

Rank No.	District	Total D. R./1,00,000 population 1970–83	Rank No.	Urban areas of the Dist.	Urban D. R./ 1,00,000 population 1970–83
I	Gr. Bombay	0.95	I	Gr. Bombay	0.95
II	Nagpur	0.27	II	Kolhapur	0.66
III	Kolhapur	0.24	—	State average	0.52
—	State average	0.21	III	Nagpur	0.46
IV	Pune	0.19	IV	Solapur	0.41
V	Satara	0.18	V	Pune	0.40
VI	Solapur	0.15	VI	Satara	0.38
VII	Jalgaon	0.13	VII	Jalgaon	0.33
VIII	Bir	0.11	—	—	—
VIII	Sangli	0.11	—	—	—

(*Source :* Compiled by author from records of vital statistics Pune, M. S.)

DISTRICTWISE TREND

The mortality rate of the state shows increasing trend from 0.11 (in 1970) to 0.32 (in 1983). It has also been observed that the districts with high urban population show more mortality. The highest mortality is observed in Greater Bombay District (0.95 average of 14 years), following Nagpur (0.27) and Kolhapur (0.24). These districts show more mortality rates than state's average (0.21). These districts are followed by Pune (0.19), Satara (0.18), Solapur (0.15), Jalgaon (0.13), and Bir and Sangli (0.11 each). The low death rates are observed in the rural districts like Raigad, Dhulia, Aurangabad and Yeotmal. The mortality rate of Greater Bombay district is 4.5 times higher than the state average (Fig. 1 & Fig. 2).

AREA AND SEXWISE TREND

The districts mortality data is separated into rural and urban areas and the areawise mortality rates were studied. It has been found out that 81.2% of the Poliomyelitis deaths of the state are occuring in urban areas. The urban death rate of the state was as big as 0.55 during 1979–83 while maximum rural death rate was 0.15 which is observed during same period (Refer Table 2). It seems that the areas of significant occurrance of the disease are the thickly populated urbanised districts and the major cities of the state. The state's urban death rates range between 0.36 and 0.66, while in the rural areas they vary in between 0.06 and 0.20.

The paralytic poliomyelitis is more common amongst the children below five years of age in the state and it is observed that in Maharashtra 58.3% deaths by this disease are occuring amongst the male population. In rural areas the male mortality percentage is 56.4, while in the cities it is 58.4%. It seems that male population is more susceptible to the disease than female.

TREND OF DISEASE IN URBAN AREAS

The data for 29 major cities (whose population is above 0.1 million) were studied separately so as to study the effect of overcrowding on the incidence. The mortality rates for remaining smaller towns are also calculated separately. It has been observed that the bigger cities have higher incidence of the disease and disease intensity goes on decreasing from bigger to smaller towns. In almost all cities in the state the prevalence of the disease show either the constant rate or the rates of increasing tendency within the period of study. The major cities like Greater Bombay (0.95) and Kolhapur (0.66) show the rates bigger than state's urban averages. It is followed by cities like Nagpur, Solapur, Pune, Satara and Jalgaon. The smaller towns have even the rates higher than the rural areas (Refer Table No. 3). It seems that the Greater Bombay city plays a greater roll in altering the poliomyelitis death rate of Maharashtra. 68.12% of the state's urban deaths are occurring in this city and the death rate of this city accounts to 4.5 times bigger than the state's average.

FINDINGS

The trend of poliomyelitis mortality in Maharashtra for the period 1970–83 reveals that :

(i) Mortality rates are increasing successively every year in the state.

(ii) The thickly populated districts like Greater Bombay, Kolhapur, Pune, Nagpur, Jalgaon and Sangli show higher incidence.

(iii) Poliomyelitis is exclusively the disease of urban origin in the state. The urban averages are 2 to 3 times bigger than the state's averages.

(iv) Major cities show increasing incidence as 68.2% of state's urban deaths do occur in Bombay city and are followed by Nagpur city

(5.4%) and Pune and Kolhapur cities (2.6% each).

(v) Male deaths are more than female.

(vi) The mortality rates of the state are decreasing from major urban areas to the smaller rural areas.

CONCLUSION

The continuous upward trend of the mortality rate of poliomyelitis in the state and in major urban areas specifically indicates its severe prediction in the future. Prompt notification of the cases to the health authorities is needed. Since polio virus has been mostly found in bowel waste of the patients, adequate arrangements for proper disposal of urine and faeces of the patients in the rural areas should be made. All the children of the susceptible age should be given active Salk vaccine immunization. The children in the schools in the urban areas of the state should be periodically checked to reduce the ever increasing rate of this disease in this state.

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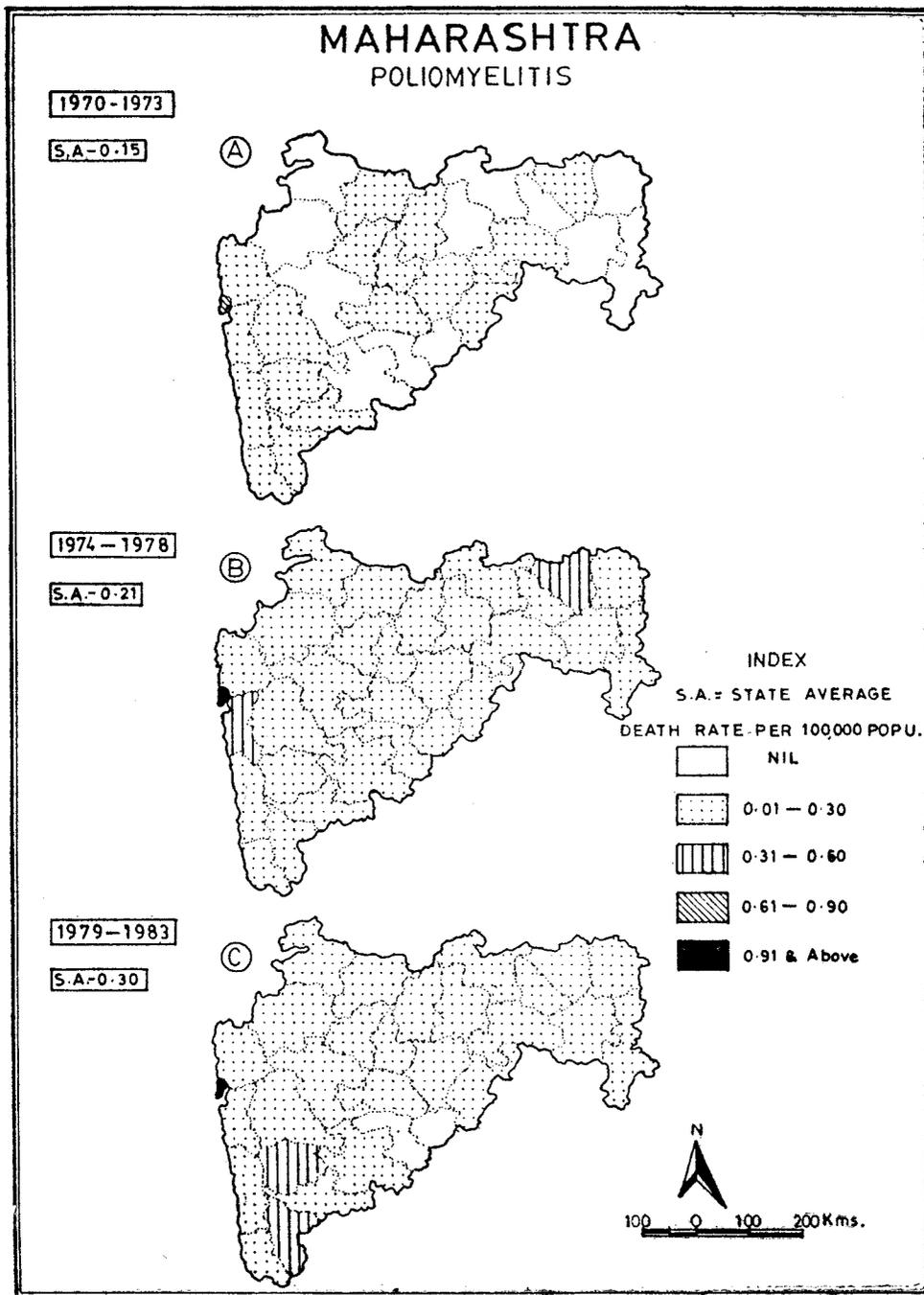Lecturer in Geography,
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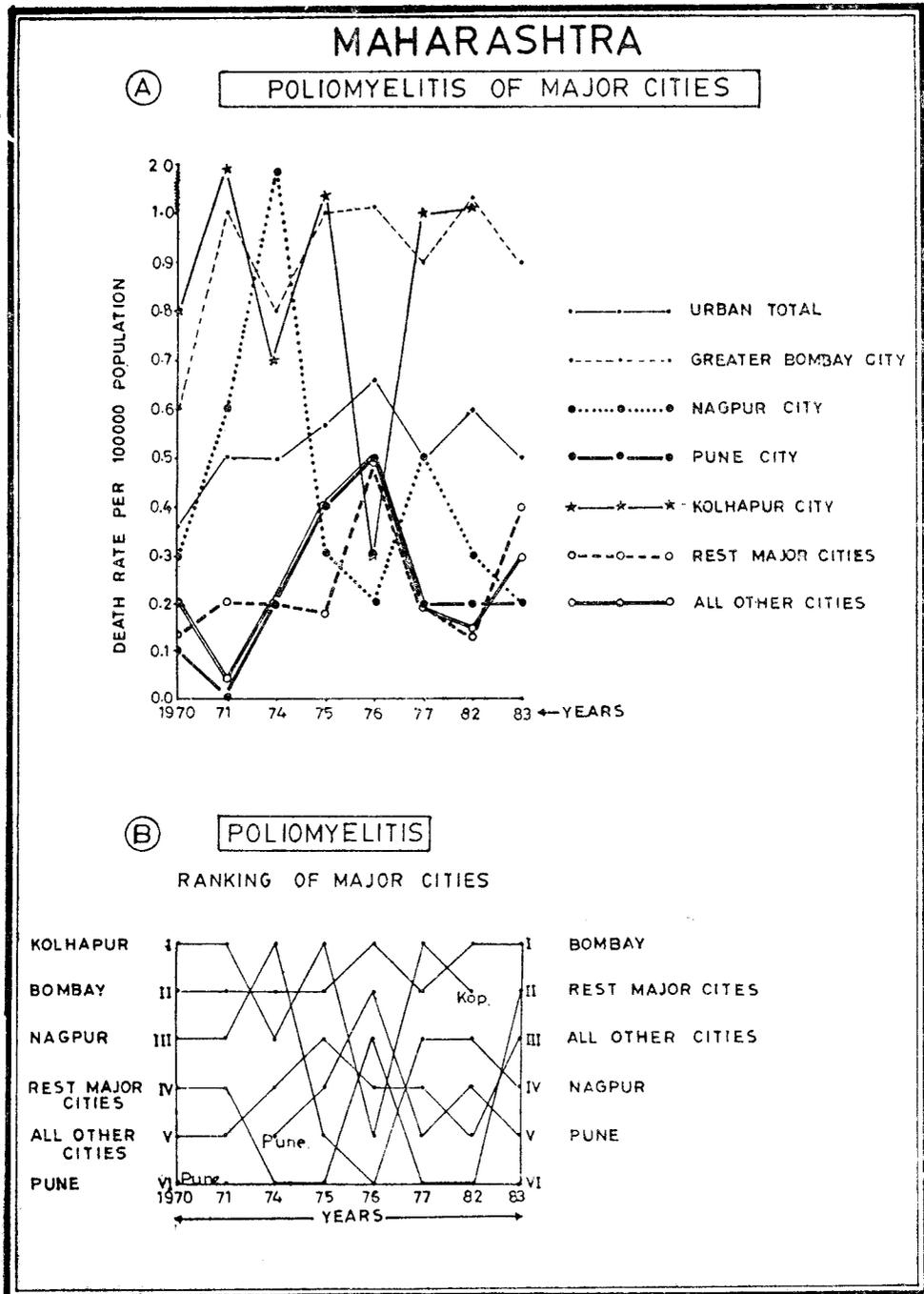Kolhapur 416 004.

Fig. 1

Fig. 2