CHAPTER- V

CHAPTER : V DISTRIBUTION OF LEPROSY

1.1 Introduction to Disease Distribution:

Study of disease distribution is said to be closely linked with disease mapping which has been playing an important role in medical geography since the eighteenth century. Probably the first attempt to produce a disease map was made in the United States by some physicians. A careful search of relevant documents indicates that in 1798 the maps produced by Seaman and Pascalis (Yellow fever in new slip,New York) are among the earliest examples of disease mapping. Thus since that time the importance of disease mapping to show the pandemicity of various disease are being carried forward to the present time by various medical geographers.

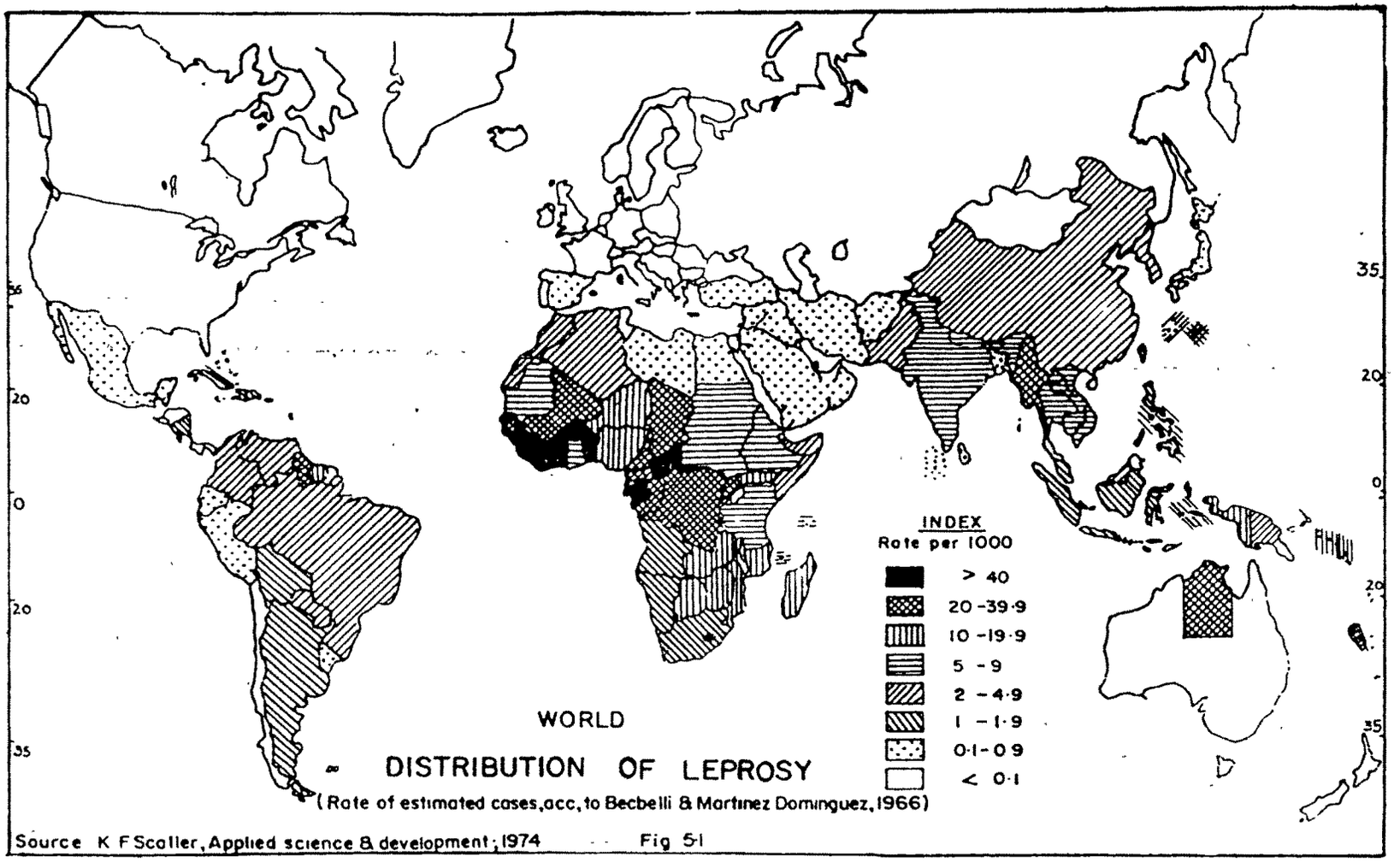
Maps provide instant visual impression of the relationship of disease (incidence, prevalence or mortality) to their appropriate geographical position. With reservations such as the likelihood of an element of chance (examined by the application of probability theory) of variations in medical diagnosis, and differences in the application of the rules of disease coding (WHO, 1957) disease maps can reveal spatial varitions and distributional patterns not previously discernible nor suspect from the examination of tables of statistics. They provide essential descriptive

information relating to geographical variations in disease incidence, prevalence or mortality. They answere the question 'where'. As such they can be used to facilitate the allocation and reallocation of health care service or to aid planning, evaluating and monitoring services provided by the community.

Thus the mapping of disease and the analysis of geographical variations and meaningful spatial patterns of disease afford a valuable contribution to the detection of the cause of those diseases whose aetiology is as yet unknown. At the same time it affords a valuable and complementary addition to other standard methods of epidemiological studies and serves as a counter point to the essentially anthropocentric view-point of the clinical and laboratory methods adopted by most medical scientists. An attempt has been made here to discuss the geographic distribution of leprosy at three different levels and at different periods of time with the help of maps.

5.2 Geographic Distribution of Leprosy in the World :

Early statistic on the number of leprosy cases all over the world are difficult to obtain. In the 1960's it was assumed that their number may be approximately 10-15 million. Bachelli and Martinez Dominguez updated the global figure to 10,407,200. The vast majority of leprosy patients live in the tropical and subtropical regions as shown in figure 5.1, in countries that are, acco



Source K F Scaller, Applied science & development; 1974 Fig 5·1

rding to their economic status, referred to as "developing countries".

The largest proportion of leprosy is encountered in Asia with an estimated number of six and a half million, of which not more than one million has actually been rounded up. There has been little information about what has been happening in China in relation to leprosy. Hwang (1959),presents the official figures for the year 1957 with 380,390 leprosy cases. But later Bechelli and Martinez Dominguez (1966) present an estimate of 3.42 per 1000 population, which would amount to a total of 2,280,000 cases. Schujmann (1959) in a survey conducted in the Kanton and Shunghai (1958/59) report rates of 20-30 per 1000. For the whole of China his estimates of 1-2 per 1000 are based on the assumption that large parts of the country are all together free from leprosy. In 1948 Muir (1948) estimated that the number of leprosy cases in China was over one million,in India 1.2 million and in Africa 885,000. These figures are certainly far too low compared to WHO reports which refer to two and a half million in India, and as many as 3,800,000 in Africa. In central and south America estimates refer to 357,000 cases. In North America the estimated number of leprosy cases is according to 1966 reports, less than 1000 (While no more than 451 have actually been reported to the authorities). In Europe and Oceania (Austrialia and the Pacific Islands reported numbers are of about the same order of magnitude

(16,624 and 9681 respectively) as against estimates of 52,000 and 33,000 respectively. The above discussion have been summerized in

Table : 5.1 World prevalence of leprosy (according to WHO statistic, 1966)

Name of Contient	Number of Leprosy cases				
	Estimated	Reported	Treated number	% of estimated number	Expected to occur during next five years
Asia	6475000	915525	755334	11.7	650000
Africa	3868000	1712132	1062527	27.5	312000
America	358000	177813	95804	26.8	26000
Europe	52000	16624	9973	19.2	3000
Oceania	33000	9681	4291	13.0	4000
Total	10786000	2831775	1927929	17.9	995000

Source : K.F. Schaller, 1974.Applied Science and Development, p-45.

Later the WHO expert committee in its fifth report estimated a figure of over 12 million cases (WHO,1977) and the WHO study group on epidemiology of leprosy in relation to control in 1983 referred to an estimate of 5368202 cases (WHO 1985). Figure 5.2 gives the total number of cases registered (WHO,1986) was found in South east Asia 3801343 and then comes Africa 886445. After them follow the Americas and western pacific regions. The above figures are summerized in table 5.2.

Number of registered cases in the world, 1985

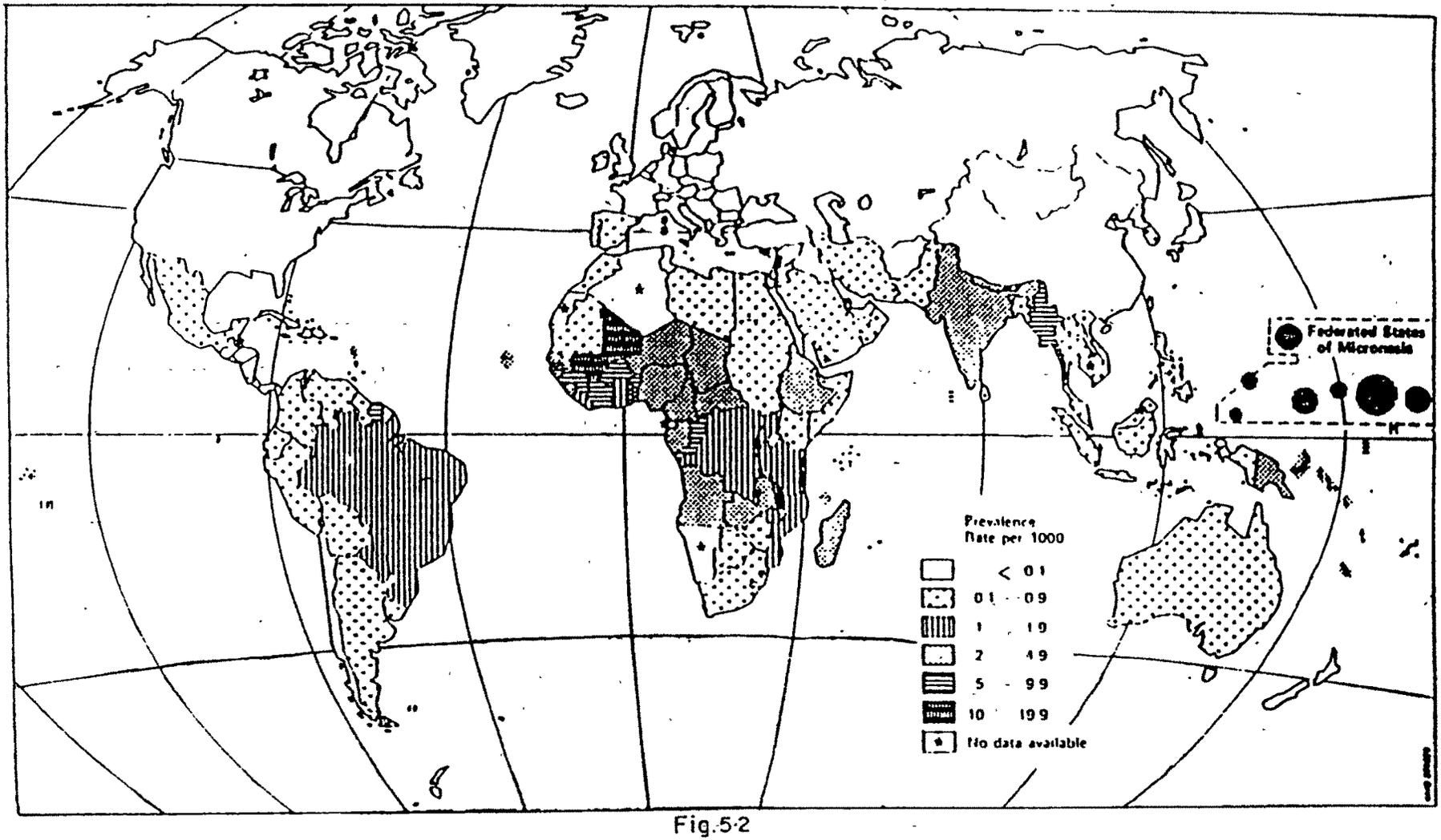


Fig.5-2

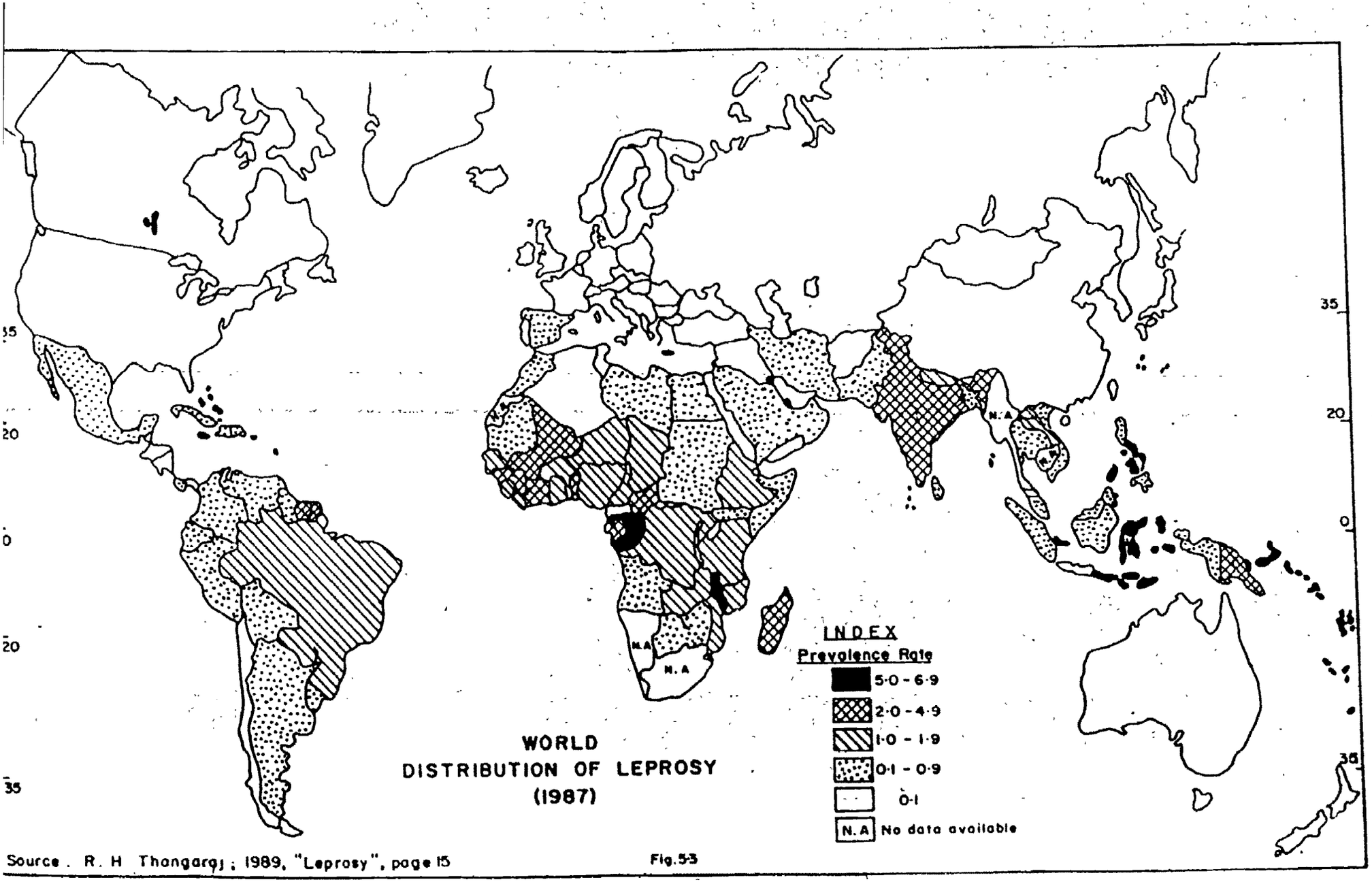
Source: Leprosy in India ; A Statistical Compedium, 1992

Table 5.2 : Distribution of registered Leprosy cases by WHO regions, 1986.

Sr No	WHO Region	Estimated population (million)	Registered Number	P.R.	Proportion of Cases total (percentage)
1.	Africa	421.78	886465	2.10	16.6
2.	Americas	654.96	320535	0.49	6.0
3.	Eastern Mediterranean	310.70	74384	0.24	1.4
4.	Europe	613.42	12775	0.02	0.2
5.	South East Asia	1130.61	3801343	3.36	71.2
6.	Western Pacific	1359.56	245392	0.18	4.6
	Total	4491.56	5340895	1.19	100.0

Source : Leprosy in India : Statistical Compendium -1989,p-137

According to WHO 1987 reports,the estimated number of leprosy cases in the world was about 10-12 million. During this period leprosy was highly prevalent in central Africa, India and South-east Asia as shown in figure 5.3. Although most leprosy sufferers lived in Asia, the prevalence rate was highest in Africa. Leprosy was also common in central and south America. Brazil had the greatest number of leprosy sufferers in South America. Endemic foci existed in the U.S.A in Texas, Louisiana and Hawaii. The disease was also seen in California, Florida and New York city, chiefly among immigrants. No cases have been reported amongst the American Indians. In the United States there are over 5000 known cases. About 350 patients are under treatment at the National Hansen's Disease Centre, at Carville, Louisiana.



WORLD
DISTRIBUTION OF LEPROSY
(1987)

Source . R. H Thangaraj ; 1989, "Leprosy", page 15

Fig.5-3

There had been a very steady increase in the number of registered cases over 20 years :2.8 million in 1966, 3.6 million in 1976 and 10-12 million during mid eighties. But with the advent of multidrug therapy (MDT) in the early 1980's there has been a dramatic downward revision of the estimated number of leprosy cases in the world,ie, from the figure of 10-12 million it is reduced to 5.5 million. Figure 5.4 and table 5.3 highlight the present distribution of leprosy cases in the world. Once again it is observed that south-east Asia contributes the largest number (2,693.104).

Table 5.3 : Distribution of registered leprosy cases,by WHO region, 1990.

Sr No	WHO Regions	Registered cases	P.R per 10,000	%age of Total	New cases dectected
1.	Africa	482669	9.20	12.91	37335
2.	Americas	301704	4.20	8.08	30543
3.	South-East Asia	2693104	20.50	72.06	488285
4.	Europe	7246	0.10	0.19	87
5.	Eastern Medite-rranean	99913	2.60	2.67	6008
6.	Western Pacific	152739	1.00	4.09	14103
	World	3737375	7.10	100.00	576361

Source : S.K. Nooredeen et al 1991, WHO statistic, P-4.

Table 5.4 gives information on the estimated number of cases in the top 25 countries and also the number of registered cases in each country by WHO region. They also happen to be countries with more than 20,000 cases each. According to B.N. Mittal (1992) it clearly indicates the extent to which only 25 countries having

Distribution of leprosy in the world, 1990

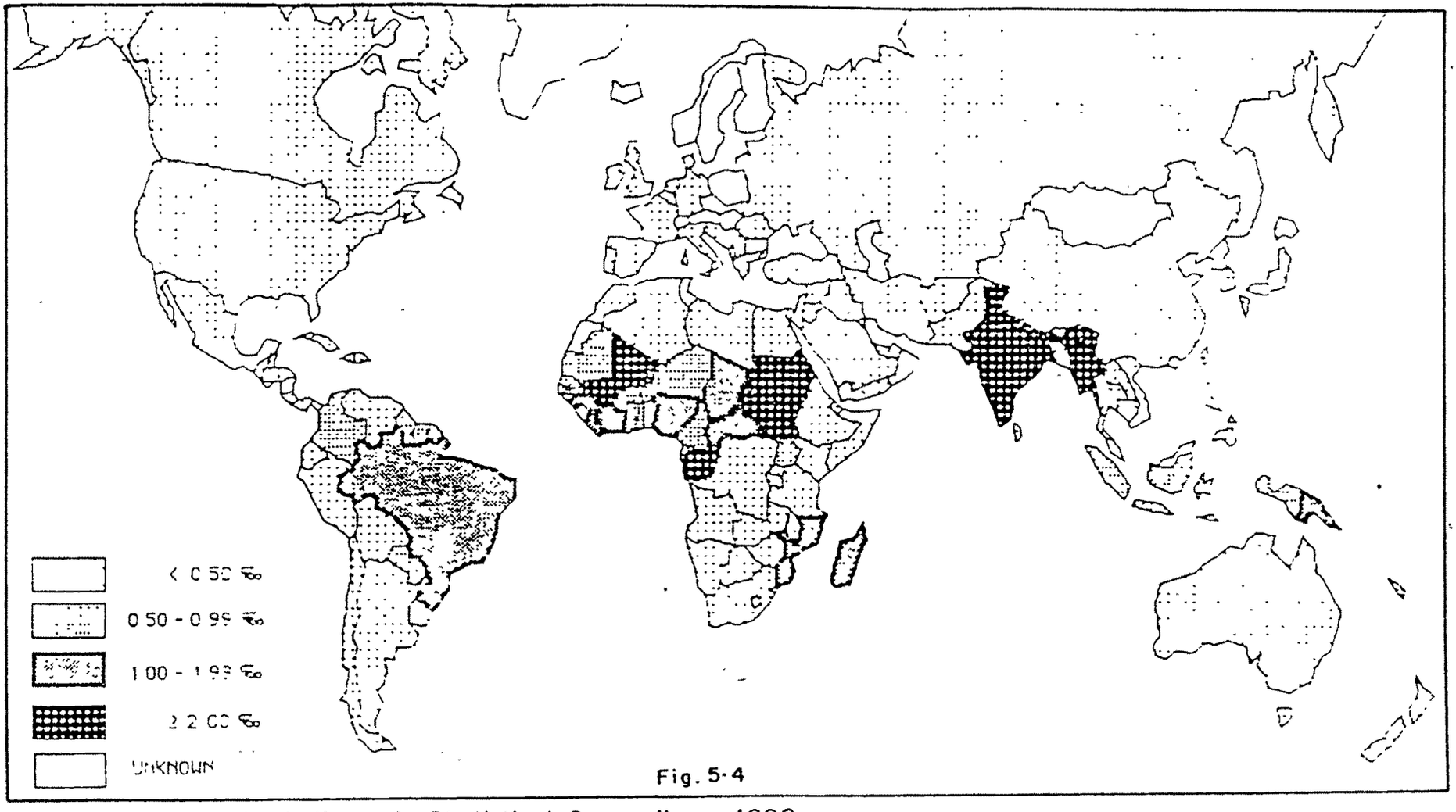


Fig. 5·4

Source: Leprosy in India ; A Statistical Compedium, 1992

the largest number of estimated leprosy cases and contributing 93.7% of the total estimated cases in the world, contribute to the total global case-load.

Table 5.4 : Estimated and registered leprosy cases in the top 25 countries, by WHO region, 1991.

Region and country	Number (in thousand)	
	Estimated	Registered
Africa		
- Nigeria	360	150
- Mozambique	65	24
- Ethiopia	60	16
- Zaire	58	9
- Madagascar	50	19
- Cote d' Ivoire	40	14
- Uganda	30	8
- Mali	28	13
- Cameroon	22	10
- Chad	22	11
Africa Total	735	280
South-East Asia		
- India	3000	1996
- Myanmar	240	112
- Indonesia	200	102
- Bangladesh	150	25
- Nepal	100	25
- Thailand	54	13
South-East Asia	3744	2273
Americas		
- Brazil	270	260
- Colombia	31	19
- Argentina	26	16
Americas Total	327	295
Eastern Mediterranean		
- Sudan	52	36
- Egypt	50	7
- Iran	50	14
Eastern Mediterranean	152	57

Cont...

Region and country	Number (in thousand)	
	Estimated	Registered
Western Pacific		
- Vietnam	120	20
- Philippines	47	39
- China	40	30
Western Pacific	207	89
Total (25 countries)	5165	2994
Total (All countries)	5511	3162

Source : B.N Mitial 1992, Indian Journal of Leprosy, p:525.

With increasing political commitment in many countries to deal with leprosy effectively, with the increasing appreciation of the value of multidrug therapy as a very potent technology, and with increasing international co -operation, both from the bilateral and multilateral sectors enabling additional inputs, it is not unrealistic to expect a reduction of the leprosy case load by as much as 60-80% in the next 5-7 years, at least in countries with effective programmes.

However as pointed out by Noordeen (1992)," not with standing anticipated major reductions in prevalence, it should be recognized that other problems remain for long time to come, such as disabilities after patients have been cured for several years and a continued, albeit reduced, incidence of new disease arising from infections caught several years earlier."

Table 5.5 : Reported registered leprosy cases by WHO region for the year 1966, 1976, 1985 and 1990.

WHO Region	Number of registered cases			
	1966	1976	1985	1990
Africa	1685526	1398220	987607	482669
Americas	177813	241248	305999	301704
Eastern-Mediterranean	40963	63236	74892	99913
Europe	19589	20452	16794	7246
South-East Asia	790851	1748468	3737157	2693104
Western Pacific	117003	128325	245753	152739
Total	2831745	3599949	5368202	3737375

Source : S.K.Noordeen, 1991, Lepr, Rev., P - 176.

5.3 Geographic Distribution of Leprosy in India :

Upto 1910, the exact figures about the total number of cases of leprosy in India are not available. It is natural that the estimates have been rising with progressive increase in the attention paid to this disease and consequently in the anti-leprosy activities including increased attempts at case finding. The knowledge about the extent and distribution of disease in India was very meagre before the Indian Council of the British Empire Leprosy Relief Association (Predecessor of the present Hind Kusht Nivaran Sang or the Indian Leprosy Association) carried out leprosy surveys in the country during ninteen-twenties and thirties. As a result of these surveys carried out in various

parts of India and by multiplying the detected number of cases by a certain factor, it was estmated that the number of cases in the country would be about 1 million. Since then, anti-leprosy work in the country has been intesifıed especially in the post-independence years after 1948 and particularly after the initiatıon of the National Leprosy Control Programme in 1955 by the Govt of India. The estimated number of cases continued to rise and the figure in 1971 stood at 3.2 million. These figures were based on the assumption in the endemic parts of the country. Apart from the increase in population, the main reason for the increase in the estimated number of cases over the years was the increased activity in the case-finding programme.

Variation in the prevalence of leprosy in the different states in India is shown in figure 5.5 from the map it will be apparent that though cases of leprosy are found throughout India, the disease is not equally distributed in different parts of the country. According to the prevalence of the disease the various parts of the country can, in general, be divided into three categories, Viz, areas of high, moderate and low prevalence. There may, however, be wide micro-level variations in the prevalence of the disease in an area of a particular category.

The areas of high prevalence (5 or more per thousand) are mostly found in the eastern parts of the country, though there are foci of high prevalence in the central and southern

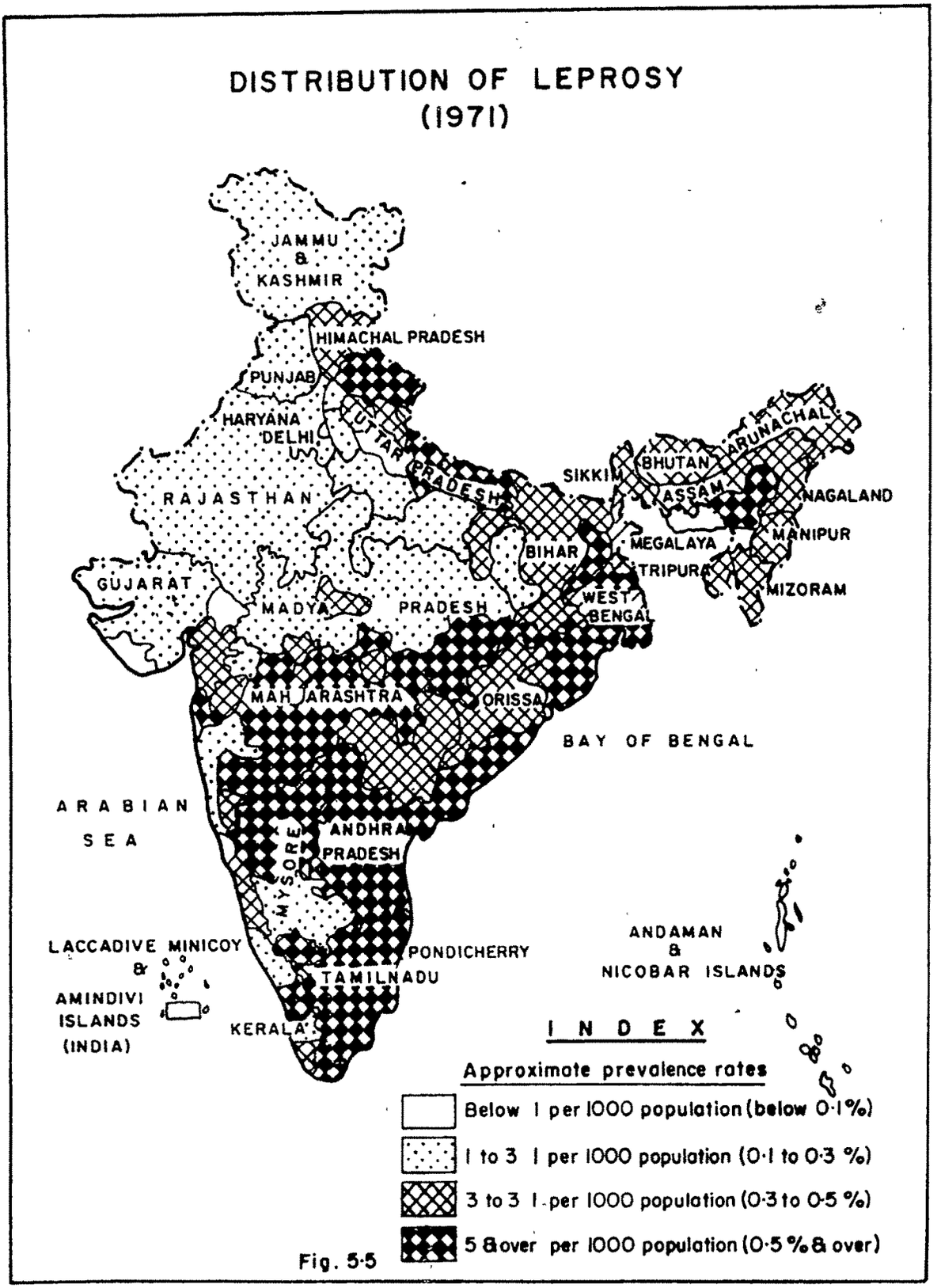


Fig. 5·5

Source : Dharmendra , 1978.

parts and on the western coast. These areas of high prevalence include large parts of Andhra Pradesh, Tamil Nadu, Orissa and West Bengal,with a prevalence of more than 10 per thousand almost uniformly throughout these states. In these areas of high prevalence there are whole districts with rates as high as 20 to 40 per thousand or even more. These four states account for about 60% of the total leprosy in India. Limited parts of Assam, Bihar, Kerals, Madhya Pradesh, Maharastra,Karnataka and Uttar Pradesh also have a high prevalence of the disease, but it is restricted to only some districts. It may be said that between themselves the state of Andhra Pradesh, Bihar, Tamil Nadu, Maharastra, Karnatake, Orissa and West Bengal account for three quarters of the total leprosy in India.

The areas of moderate prevalence (1 to 5/1000) are found in the central and western parts of India and the Himalayan foothills. These areas include parts of Assam,Bihar, Himachal Pradesh, parts of Jammu and Kashmir, Kerala, Madhya Pradesh, Maharastra, Karnataka, Himachal Pradesh and sub-Himalayan regions of Punjab and Uttar Pradesh.

The areas of low prevalence (below 1/1000) are found mostly in the north-western part of the country. These areas include parts of Himachal Pradesh and Jammu and Kashmir, Plains of the Punjab, Haryana and western parts of Uttar Pradesh, Guja-

rat and Rajasthan. Table 5.6 indicates a rough estimate of cases of leprosy in the various states in India arranged according to degree of endemicity and the estimated average prevalence rates of the disease.

India has the largest number of leprosy cases compared to any other country in the world,accounting for one third of the total world leprosy patients.Although no part of the country is free from the disease, the incidence of the disease is not uniformly distributed. The prevalence rates varies not only from state to state, but also from district to district and within a district itself. A similar type of situation is observed from the information given in NLEP in India (1987) which is depicted districtwise in th map of India as shown in figure 5.6. The prevalence is high in the south eastern areas and low in north western areas of India. Some districts of West Bengal,Orissa and Tamil Nadu are hyper endemic areas. The over all distribution pattern in India shows that the majority of cases are confined to 196 districts (Out of total 201 leprosy affected districts) with prevalence of 5 and more cases per thousand of population. This map (figure 5.6) depicts the position of the country after the commencement of multidrug threapy. But the general pattern of distribution remains similar to the position observed by Dharmendra.

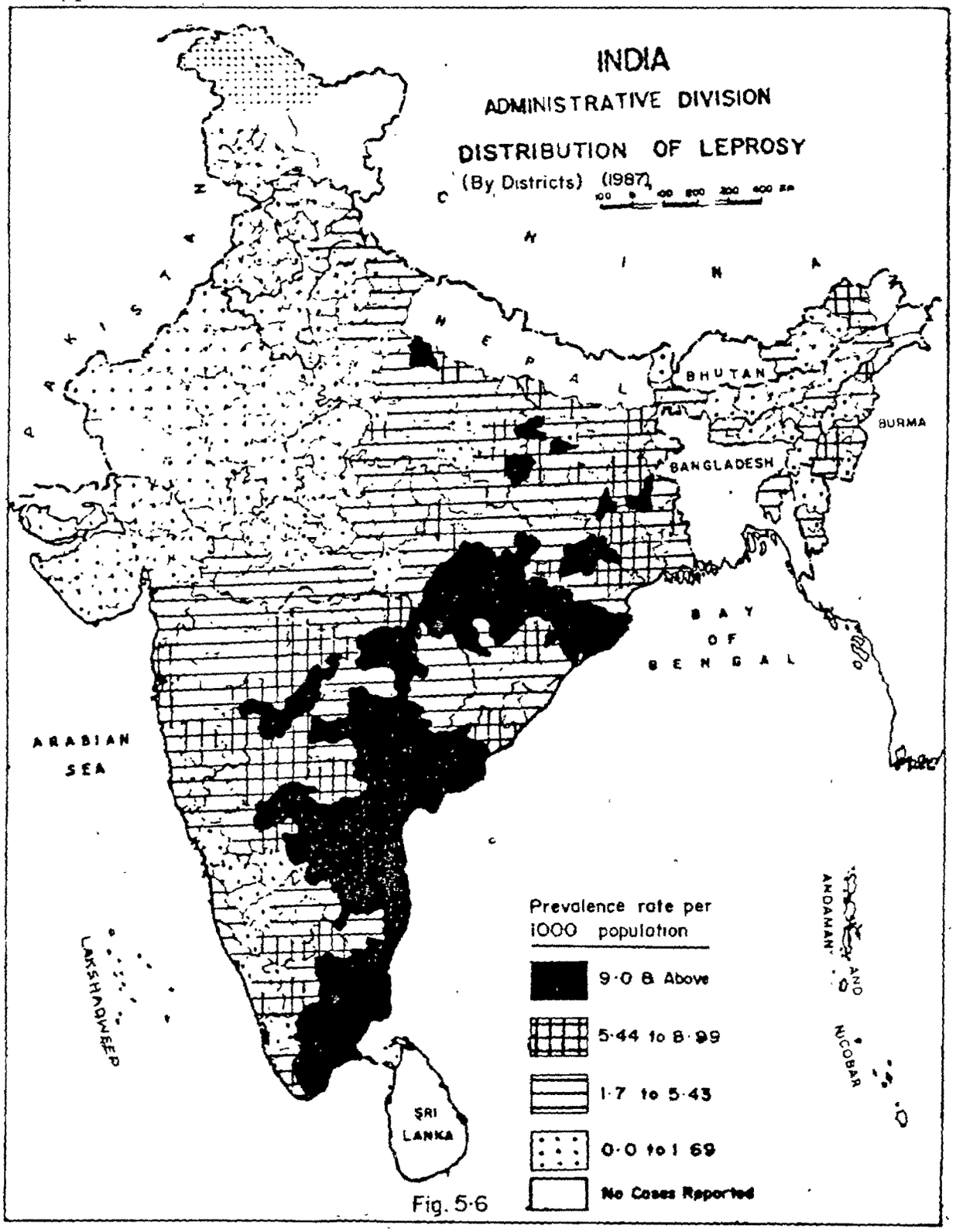

INDIA
ADMINISTRATIVE DIVISION
DISTRIBUTION OF LEPROSY
(By Districts) (1987)
BHUTAN
BURMA
BANGLADESH
BAY OF BENGAL
ARABIAN SEA
LAKSHADWEEP
SRI LANKA
ANDAMAN AND NICOBAR
Prevalence rate per 1000 population
9·0 & Above
5·44 to 8·99
1·7 to 5·43
0·0 to 1 69
No Cases Reported

Fig. 5·6

Table 5.6 : A rough estimate of state-wise distribution of leprosy.

Degree of Endenicity	State	Estimated average P.R per 1000	Estimated Number of cases in Lakhs	in million
High	Tamil Nadu	20.0	7.0	0.7
	Andhra Pradesh	15.0	6.0	0.6
	Orissa	12.0	2.0	0.2
	West Bengal	10.0	3.5	0.35
Moderate	Maharastra	7.5	3.0	0.3
	Bihar	6.5	2.0	0.2
	Kerala	6.5	3.0	0.3
	Madhya Pradesh	4.0	0.8	0.08
	Uttar Pradesh	3.0	1.0	0.1
	Assam	2.5	2.0	0.2
	Meghalya	2.0	0.5	0.05
Low	Gujarat	1.7	0.5	0.05
	Himachal Pradesh	1.5	0.5	0.05
	Jammu & Kashmir	1.0	0.2	0.02
	Punjab Haryana Rajasthan	0.5	0.3	0.03
	India	0.50	32.0	3.20

Source : Dharmendra, 1978, "Leprosy', P-27.

More recent situation of leprosy in the country shows that the average prevalence rate of leprosy in India is 2.41 (1991). A study of the districtwise distribution pattern of the disease as shown in figure 5.7 shows, that on the whole, if a line is drawn from north to south roughly through the centre of the country, the districts in the eastern half have a higher prevalence rate than those in the west, The highest prevalence

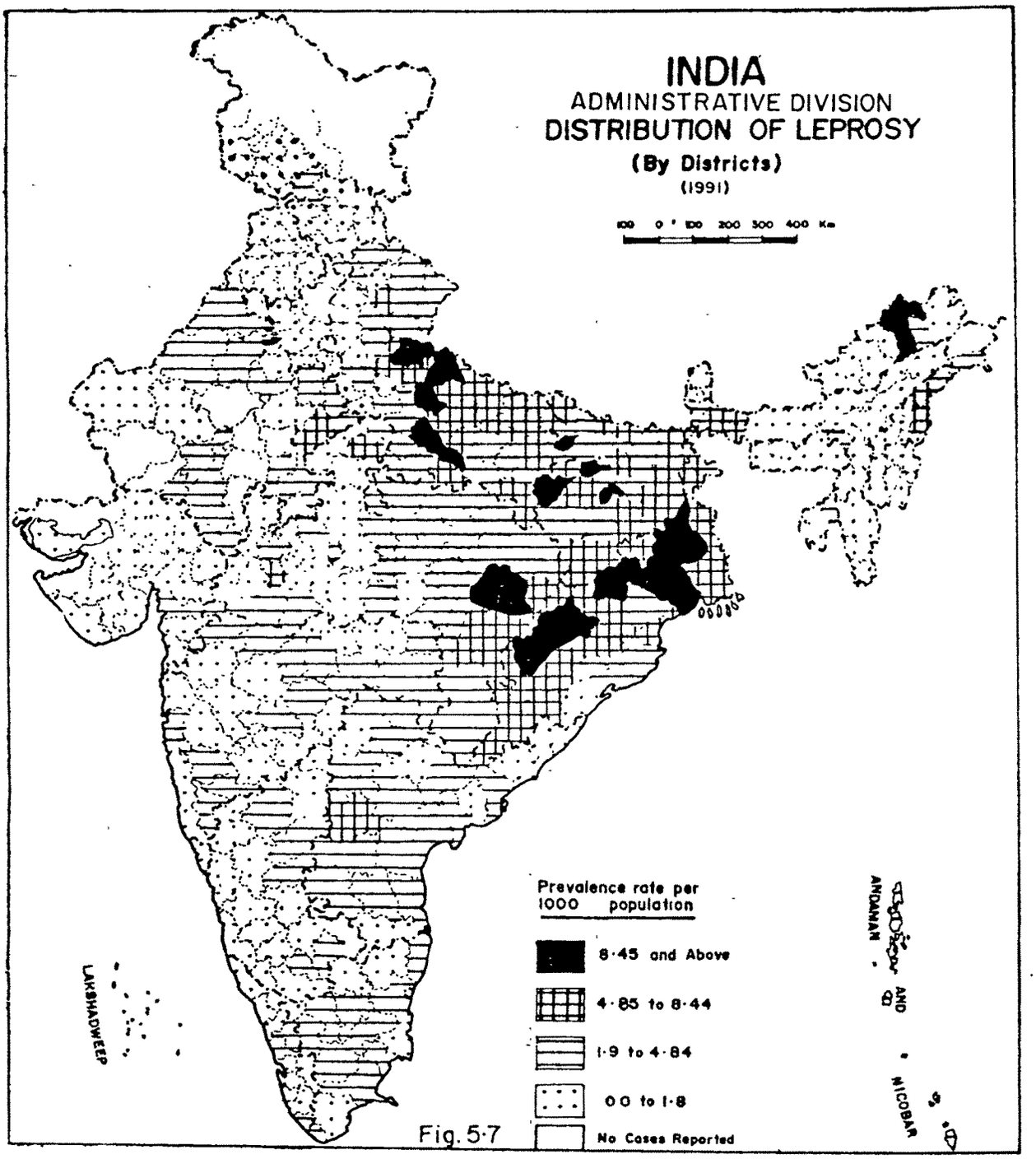

INDIA
ADMINISTRATIVE DIVISION
DISTRIBUTION OF LEPROSY
(By Districts)
(1991)
100 0 100 200 300 400 Km
Prevalence rate per 1000 population
8·45 and Above
4·85 to 8·44
1·9 to 4·84
0·0 to 1·8
No Cases Reported
LAKSHADWEEP
ANDAMAN AND NICOBAR

Fig. 5·7

rates are found in the districts of states like Orissa, West Bengal, Uttar Pradesh. Moderate to high prevalence rates are found over most of the Gangetic plains extending from Western Uttar Pradesh to the deltaic areas of West Bengal, most of Orissa and the coastal districts of Andhra Pradesh, Tamil Nadu and Kerala. Incidentally all the areas of high prevalence rates are districts which lie either in the terai region, or river valleys or coastal blets all of which are high humidity areas. The districts in the western and North Western parts of the country, eg, Maharastra, Gujarat, Rajasthan, Punjab and Haryana have low to moderate prevalenee rates. These are the districts that concide with the dry and arid parts of the country. It may be noted at this point that the groupings of prevalence rates seen in figure 5.6 & 5.7 have been based on average and standard deviation values.The lower average rate in 1991 accounts for the difference in the values of the limits in each class.

Tracing the leprosy cases from the Indian Council of the British Empire Leprosy Relief Association,it is found that there has been considerable variation in the prevalence rate in the country over the decades as shown in table 5.7.

It is clear that the British Govt had taken necessary steps to control the disease and hence till 1931 (1941 survey was not done due to political reasons) the prevalence rate was quite low. But after independence there was a sharp increase in prevalence

rate till 1981. During this period the treatment regime was only with Dapsone.But susequently there has been a significant decline in the number of cases on record in the various states and union territories. This is mainly due to the introduction of the MDT and a continuous release of cases on completion of treatment. As against three millon recorded cases in 1985, there were only 1.69 million cases on record at the end of March, 1992.

Table 5.7 : Prevalence of leprosy in India 1871-1991.

Year	Population (Millions)	Estimated leprosy Patients (millions)	Prevalence rate (per 1000 pop)
1871	198.291	0.109	0.55
1881	216.679	0.128	0.59
1891	274.334	0.126	0.49
1901	294.361	0.097	0.33
1911	315.156	0.109	0.35
1921	318.942	0.102	0.32
1931	324.753	0.159	0.49
1951	360.958	1.374	3.81
1961	439.118	2.561	5.83
1971	547.958	3.200	5.84
1981	685.185	3.919	5.72
1991	843.930	3.933	2.42

Source : Leprosy in India : A statistical Compedium, 1992, P-42.

During this period 0.45 million cases have been detected annually.

The leprosy situation in the country was re-analysed recently with reference to government objectives. On the basis of the result of this in-depth analysis completed in January 1992, a 9-point startegy had been planned to achieve the goal of elimina-

tion of leprosy by the year 2000 (B.N. Mittal, 1992).

The programme envisages : -

1. To bring the remaining 66 endemic districts under the regular MDT programme, using a seprate set of leprosy workers for five years. These workers will be appointed on temporary basis.
2. To bring the 77 moderately endemic districts under the modified MDT programme, involving a partial integrated approach.
3. To extend the modified approach to endemic pockets in low endemic districts for this purpose five to six contiguous districts will be regrouped and Zonal Leprosy Unit will be set up.
4. Mounting of health education.
5. Checking of register in both 66 and 77 districts to update the records, screening of cases and their clinical update, and also to detect hidden cases.
6. Organizing training of leprosy workers through mobile teams and short/term orientation training courses for health personel special training on disability care and ulcer management will also be taken up under this programme.
7. Provision of disability care and ulcer care management services.
8. Community based rehabilitation of cured cases wil be encouraged in cooperation with other agencies.

9. Integration of services in MDT districts which have been under MDT for eight or more years and where prevalence rate has come down to less than 1 per 1000 population.

With the proposed approach and sustained efforts, it is expected that leprosy cases on record will decline as indicated in table 5.8.

Table 5.8 : Expected decline in cases on record (in thousand)

Year	No of cases at the beginning of the year.	New Cases	Discharges MDT	Monotherapy death, other reasons.	No of cases at the end of the year.
1991	2120	+450	-500	-300	1770
1992	1770	+420	-650	-250	1290
1993	1290	+400	-500	-200	990
1994	990	+370	-500	-100	760
1995	760	+320	-500	-050	530
1996	530	+280	-450	-030	330
1997	330	+240	-380	-020	170
1998	170	+220	-250	-020	120
1999	120	+150	-200	-010	60
2000	60	+120	150	-010	20

Source : B.N.Mittal, 1992, Indian Journal of Leprosy, P-519.

If leprosy programme is to be implemented as per the proposed strategy, therer will be an immediated need for additional resources. Thus there is expectation that subsequently there will be a definite and progressive decline in the required expendiiture to 10% of the initial level. And hence it is expected that cases on record will not be more than 20,000 by the end of the

year 2000 and also it is expected that new cases will keep coming up for the next eight to ten years or more. There would be from those who would have got the infection before the year 2000. We expect that there may not be more than 50,000-70,000 such cases annually, which would not constitute a public health problem. These cases would also progressively decling over the years. Secondly, there will remain a good number of persons who had been cured of leprosy and will not require MDT, but will need to be taken care of for their disabilities.

5.4 Geographic Distribution of Leprosy in Gujarat :

Noted from the leprosy distribution maps of India, Gujarat had been always in the low prevalence area along with the other Northern Western states. One of the earlier available figures of average prevalence rate per thousand population was 1.7 in 1955. But since exact figures regarding the number of leprosy sufferers was not known, this was merely an estimate made in the very early years (1948) of post-independence. In 1961 and in 1971 the prevalence rates had dropped and remained almost constant at 0.48. Thus in the national context, Gujarat has always been an area of low occurrence of leprosy.

A glance at the prevalence rates as shown in table 5.9, gives a clear indication of the decreasing trend of the prevalence rate and the reducing case load decade by decade.

Table 5.9 : Prevalence rate of Gujarat from 1955 onward.

Year	Prevalence Rate per thousand
1955	1.7*
1961	0.48
1971	0.48
1981	2.93
1987	1.90
1990	0.59
1991	0.61

Note : * figure of this year is estimated prevalence rate given by Govt. of India Under National Leprosy Control Programme.

Source : Leprosy in India : A statistical Compendium 1992, p-43, 47,48 and Leprosy in India : A statistical compendium 1989, P-74.

A study of the situation within the state of Gujarat during the earlier years of implementation of Multidrug thrapy (MDT) programme in 1984 as shown in figure 5.8, indicates that the districts of southern Gujarat are in the high prevalence area while the northern districts fall in very low prevalence zone. A similar type of distribution pattern is found in the recent years as shown in figure 5.9, although there has been a sharp fall in the average prevalence rate. Since the prevalence of leprosy in Gujarat has always been low, Gujarat is placed in the low endemic zone (of Leprosy).

The figure of leprosy elimination programme with the introduction of multi-drug therapy had left only 20,000 cases still

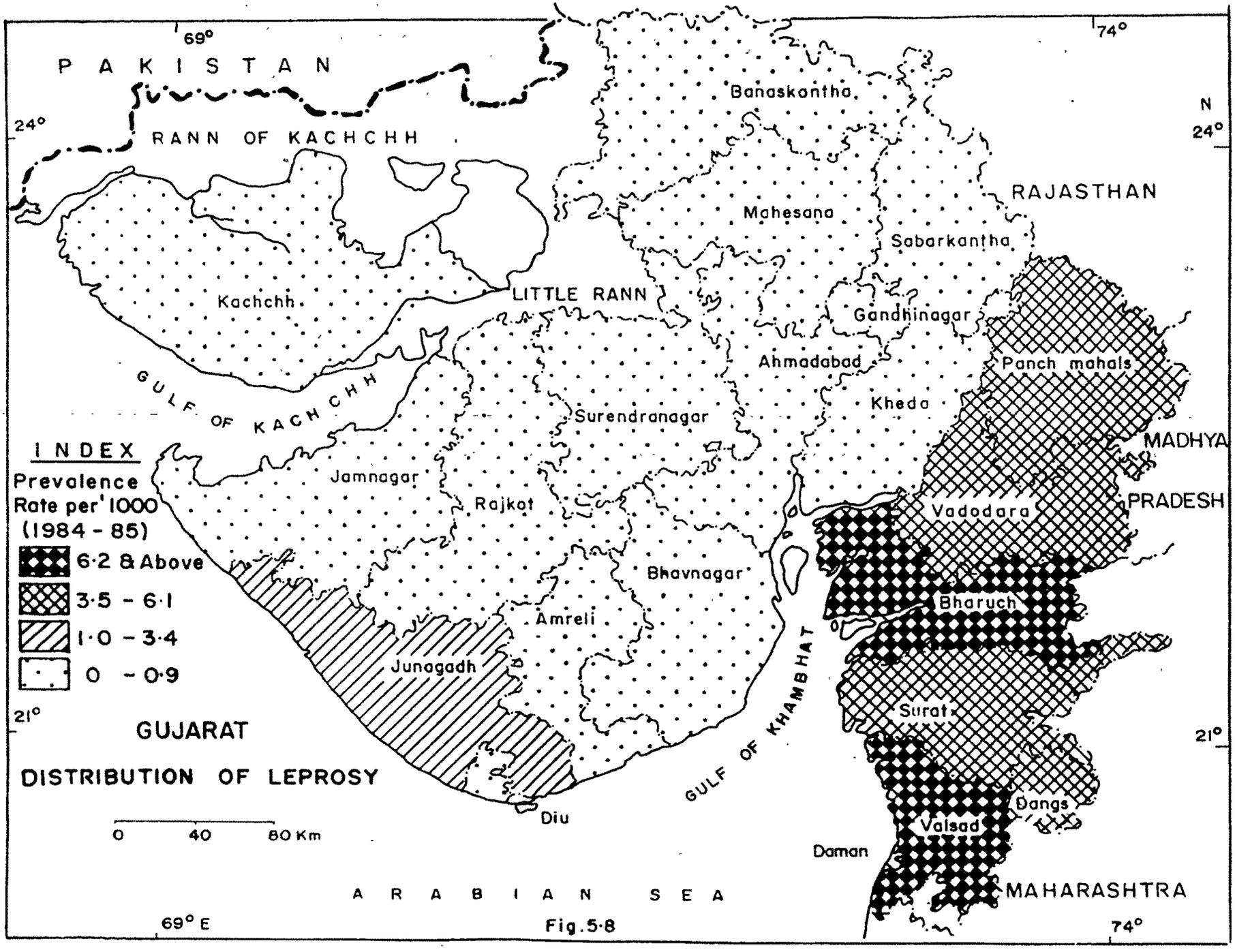

69°
74°
PAKISTAN
24°
RANN OF KACHCHH
Banaskantha
N
24°
RAJASTHAN
Mahesana
Sabarkantha
Kachchh
LITTLE RANN
Gandhinagar
Ahmadabad
Panch mahals
GULF OF KACHCHH
Kheda
Surendranagar
MADHYA
PRADESH
INDEX
Prevalence
Rate per 1000
(1984 - 85)
6·2 & Above
3·5 - 6·1
1·0 - 3·4
0 - 0·9
Jamnagar
Rajkot
Vadodara
Bhavnagar
Bharuch
Amreli
Junagadh
GULF OF KHAMBHAT
Surat
21°
GUJARAT
DISTRIBUTION OF LEPROSY
21°
Dangs
Valsad
Diu
Daman
0 40 80 Km
MAHARASHTRA
A R A B I A N S E A
69° E
74°

Fig.5·8

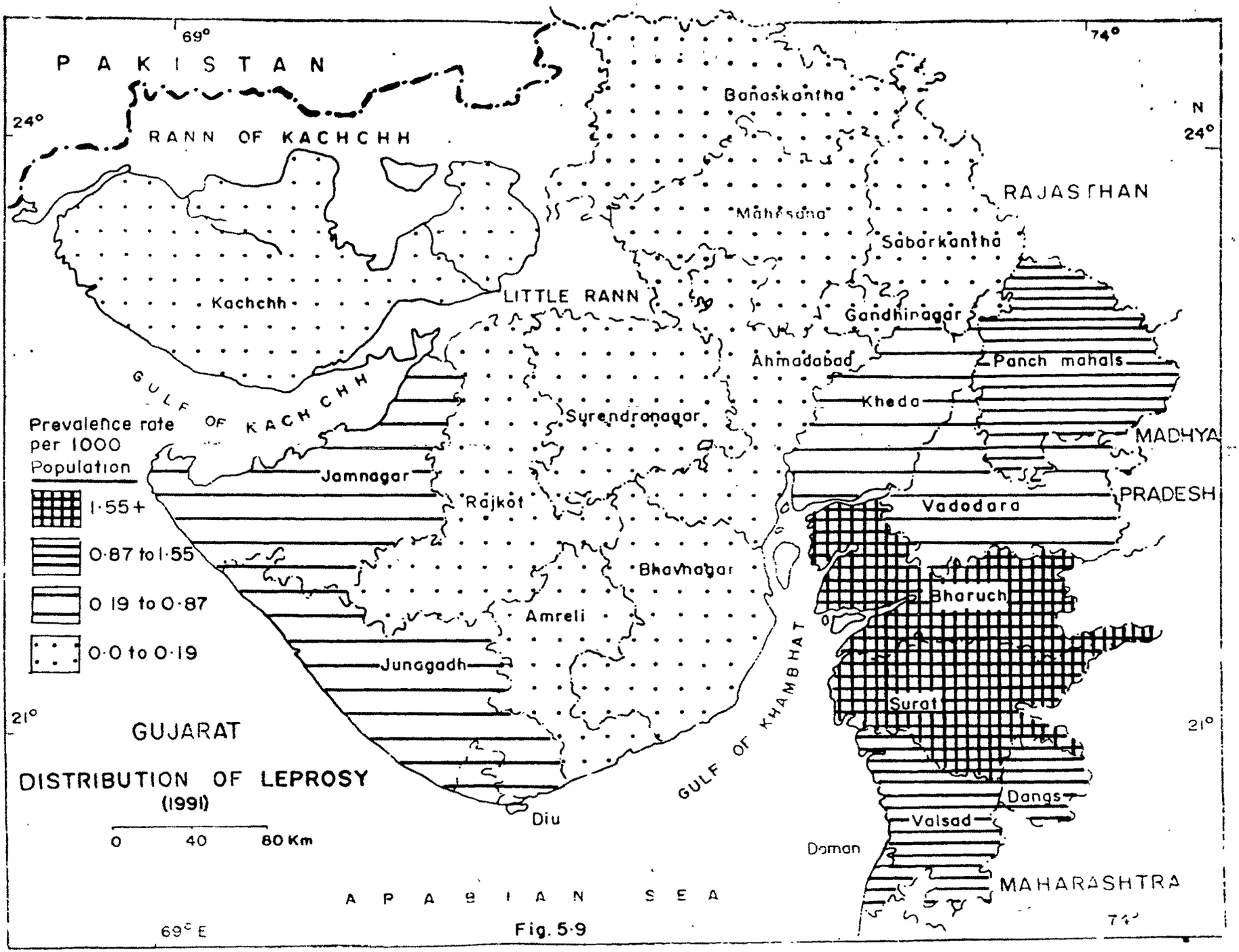

69°
74°
PAKISTAN
24°
RANN OF KACHCHH
Banaskantha
N
24°
RAJASTHAN
Mahesana
Sabarkantha
Kachchh
LITTLE RANN
Gandhinagar
Ahmadabad
Panch mahals
GULF OF KACHCHH
Kheda
Surendranagar
MADHYA
Prevalence rate per 1000 Population
Jamnagar
PRADESH
1·55+
Rajkot
Vadodara
0·87 to 1·55
Bhavnagar
0·19 to 0·87
Bharuch
Amreli
0·0 to 0·19
Junagadh
21°
Surat
21°
GUJARAT
GULF OF KHAMBHAT
DISTRIBUTION OF LEPROSY
(1991)
Dangs
Valsad
0 40 80 Km
Diu
Daman
MAHARASHTRA
ARABIAN SEA
69° E
74°

Fig. 5·9

under treatment in Gujarat as against 1.20 lakh cases in 1984. Along with this one should remember that the leprosy elimination programme did not include cured patients with residual disability. But the new cases would continue to occur in small numbers beyond 2000 A.D as a result of the disease making an appearance in individuals who acquired infection several years earlier before the introduction of MDT. In Gujarat mostly from the tribal areas of Surat, Dang, Panchmahal, Bharuch and Baroda there is likely to be a constant source of new cases, as per information from Directorate of Leprosy in Gujarat.
