

CHAPTER- IV

CHAPTER : IV LITERATURE SURVEY

This topic, attempts to offer a systematic review of research studies on the social dimensions of leprosy. Unfortunately, there are very few studies addressing this aspect of the disease. The limitations of available resources on the socio-economic aspects of leprosy are such that they have remained as ideas still to be tested, still to be validated and to be systematized so that they become valid input to policies beneficial to leprosy control programs. In order to offer comprehensive idea regarding the social dimension of leprosy, one would need a number of studies that address such issues as how allocation of local efforts and resources are used for prevention and control of the disease, the impact of leprosy on the life of individuals and on their households and communities and consequently how the disease leads to economic degradation and psychological dislocation in the households of patients. Various researches in medicine and allied sciences have given details regarding the clinical aspects of the disease. But as discussed earlier the environmental and social aspects of occurrence and spread of the disease are yet to be adequately defined systematically.

4.1 Geographical : Study of the geographical distribution of leprosy in the world was first attempted by J.M May¹¹⁰ (1958). He has analysed the ecological associations of the disease and classified the ecological factors into inorganic, organic and cultural. These factors operate in close association in determining the geographical pattern of the disease. May has also emphasised that contact is the most important mode of spread of the disease. The role of crowding and diet are among the cultural factors identified as determining epidemiological and predisposing conditions of leprosy. However, in the final analysis, May is unable to establish definite causative factors for explaining the geographic pattern of occurrence of the disease.

K.F.Schaller¹⁶¹ (1974) while studying the global distribution pattern of leprosy based on WHO estimates, states that the known number of leprosy patients are only a small fraction of the actually existing cases. He believed that only one fifth of the recorded cases were undergoing treatment. He also identified the population at risk by stating that 5 - 10 percent of those exposed to infection are likely to contract the disease, and that half the patients acquire the infection through casual contact.

Schaller has revealed the uneven distribution of leprosy in most parts of the world, taking the example of Ethiopia; but has not been able to explain the phenomenon. However, on the basis of the global distribution trends, where the disease shows greater

prevalence in underdeveloped countries, he has assumed that environmental factors play a major role in the spread of the disease. He has also cited nutritional status of the population as a predisposing factor. He has noted how different races have reacted differently to leprosy infection.

Schaller has also commented on the age-sex distribution and has shown that male cases are usually twice as high as female cases. However, age distribution does not show any difference in the prevalence rates.

M.J Pallen¹³⁷ (1984) in his editorial address had pointed out that geographical variation occurs in the prevalence of environmental mycobacterial disease. for e.g. : M Xenapi infection, although relatively common in Europe, is almost unknown, in the U.S.A, and within Britain, the disease may be found in the south and west of England but is unknown in the midlands or the north. Ecological factors are probably involved here.

4.2 Social Science : In a national seminar on social science research on leprosy Mr: S.N Morankar¹²² (1987) has come out with the literature survey of social science research on leprosy. The maximum studies have been in the sphere of rehabilitation as shown in Table41.

Table No : 4.1 Area Specific Studies on Leprosy

Sr No	Area of study	Articles in Journals				Papers presented at Conferences			
		Upto 1960	1961 -70	1971 -80	1980 onward	Total	1961 -70	1971 -80	1980 onward
1.	Social problem/ Stigma	18	10	22	24	74	7	11	10
2.	Health Education	2	15	14	5	36	6	4	16
3.	Rehabilitation	9	29	24	12	74	19	7	14
4.	Patient Psychology	1	2	2	3	8	1	3	6
5.	Health Service	-	-	2	4	6	2	-	-
6.	Community Participation	-	1	-	2	3	-	1	2
7.	Primary Health Care & Integration of Leprosy	-	2	1	12	15	-	-	3
8.	Measure for leprosy Control programme	4	5	5	2	16	-	2	3
9.	Scope of Social Science in leprosy	-	-	-	-	-	-	1	2
10.	Social Science Methodology	-	-	-	-	-	-	-	1
11.	Urban leprosy problems	1	2	-	5	8	-	-	-
12.	Not Specific	1	2	-	5	8	-	-	-

Source : Social Science research on Leprosy, Wardha, 1987, Page :

60.

Although the content analysis of these studies is not presented, it seems that the studies must be based on research in leprosy and not in the community. There is a sizeable publication in journals on social problems of stigma but little on health services, community participation and none on urban leprosy problem and physical environment.

Studies published and papers presented in conferences are

shown separately in Table 4.2 It is interesting to note that India stands first in terms of the number of the papers produced, presented in conferences are 58 and published in journals 122.

Table : 4.2 Countrywise nos. of Social Science articles/papers published or presented.

Sr No	Name of the Country	Articles published in Journals	papers Presented at conferences
1.	India	122	58
2.	U.S.A.	18	6
3.	U.K	6	2
4.	Malaysia	5	4
5.	Ethiopia	4	1
6.	Nigeria	3	-
7.	Brazil	3	11
8.	Tanzania	3	-
9.	West Germany	3	1
10.	Phillipines	3	3
11.	Mexico	2	5
12.	Indonesia	2	1
13.	Japan	2	1
14.	Australia	2	-
15.	South Africa	2	-
16.	Sudan	2	-
17.	China	2	-
18.	Argentina	1	7
19.	Egypt	1	-
20.	Korea	1	-
21.	Israel	1	2
22.	Hongkong	1	-
23.	Thailand	1	-
24.	Srilanka	1	-
25.	Nepal	1	2
26.	Netherland	1	1
27.	Spain	1	1
28.	Belgium	-	2
29.	Cuba	-	1
30.	Dominican Rep.	-	2
31.	Pakistan	-	1
32.	Paraguay	-	1
33.	Somaliya	-	1
34.	Switzerland	-	2
35.	Taiwan	-	1

Cont...

36. U.S.S.R	-	1
37. Venezuela	-	2
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Source : Social Science Research on Leprosy, Wardha, 1987 page : 55-56		

This shows the direct relationship, between the extent of the problem and number of papers published. Due to cultural diversity in India, problems of leprosy also vary in different cultural setting. This also might have led to document more papers. Even though table 4.2 shows that, many countries facing the problem of leprosy have conducted comparatively few studies, it is quite possible that they might have conducted more studies that have been published only locally.

However most of the papers were of a descriptive type, written by leprosy workers, out of their own field experinces. Social science methodology was not adopted as the papers were not presented by persons trained in social science.

In order to offer a comprehensive idea regarding the various aspects of leprosy which are relvant to this study. Papers on various topics associated with leprosy which were collected during the course of study may be briefly noted here.

4.3 Environment :

The famous authors of "Preventive and Social Medicine", J.E.Park and K.Park³¹ in (1991) had quoted that the risk of transmmision is predominantly controlled by environmental factors

i.e. the presence of infectious cases in that environment. There is evidence that humidity favours the survival of *M. leprae* in the environment. *M. leprae* can remain viable in dried nasal secretion for at least nine days and in moist at room temperature for 46 days.

Mark J Pallen¹³⁷ in (1984) has stated that although both the leprosy and tubercle bacilli were first described over 100 years ago, over half of all known species of environmental mycobacteria have been recognized in the last thirty years. He further describes that immuno diffusion analysis has shown that among the strains tested all mycobacteria possess three types of antigens. First are antigens common to all mycobacteria, second are antigens common to the slow-growing species and third are species specific antigens. Stanford and Grange (1974) listed some 19 species of environmental mycobacteria, as defined by immuno-diffusion studies.

Pallen further pointed out that *Mycobacterium leprae* may, of course, remain viable for extensive periods when shed into the external environment by infectious individuals. Besides this, the environmental mycobacteria of one sort or another have been isolated from a wide variety of inanimate sources : Soil, Vegetable (including a radish the original source of the so-called "radish bacillus" *M. ferrace*) house dust, operating theatre sinks

and tap, river, pond and coastal water. In addition several species of mycobacteria are pathogenic too and have been isolated from, non-mammalian vertebrates, including species of birds, reptiles, amphibians and fish. Mycobacteria have also been isolated from meat and from raw and pasteurized milk.

Pallen M.J. further quoted that early studies of soil mycobacteria found notable difference in the mycobacterial flora of soil samples from two states of the U.S. They also demonstrated that mycobacteria were common in muds and loams but could not be isolated from clay and sand.

The most systematic study to date of the ecology of environmental mycobacteria, according to the Pallen, was carried out in Uganda. Initially samples of grass from dry grassland and from both permanent and seasonal swamps in several regions of Uganda were taken. The rate of isolation of mycobacteria from the samples was highest (41%) in those from permanent swampland, somewhat less in those from seasonal swamp (15%) and lowest in those from grassland (9%). Further study using sample of mud from the edges of permanent swamp led to the production of a map showing the geographical distribution of six species of environmental mycobacteria in Ugandan soils.

Pallen also points out the work undertaken by Kazada on the mode of transmission of leprosy. Kazada has isolated non-

cultivable acid-fast bacilli (NC AFB) from a variety of environmental sources (Sphagnum moss, soil and water) present in leprosy endemic areas around the world. He claims that at least two strains so isolated are indistinguishable from *M. leprae* in their behaviour in mouse foot pads and armadillos. However this does not prove that they are capable of causing leprosy in humans. He has also investigated the ecology of NC AFB living in association with sphagnum moss in Norway, and has shown that the largest number of NC AFB are found on the surface of the so called "Gray layer" of Sphagnum vegetation.

Pallen further explains that some species of environmental mycobacteria may be entirely free living or may simply colonize human body surface; most species under certain conditions cause human infections. Disease caused by the environmental mycobacteria fall into four main categories, viz., pulmonary infection, cutaneous infection, lymphadenitis and disseminated infection. In cutaneous infection *M. marinum* and *M. Ulcerans* are slow growing bacteria while *M. chelonci* and *M. fortuitum* are fast growing bacteria.

S.Kaur⁸³(1982) had harvested bacilli from fresh lepromas which were subjected to drying at room temperature for varying periods. These were exposed to direct sun-rays, UVR and were then injected into the foot pads of thymectomised irradiated mice for checking the viability. The organisms could survive in UVR for

thirty minutes, direct sunlight for two hours and room temperature for seven days.

4.4 BCG Vaccination :

Reference to the use of BCG vaccine against leprosy shows conflicting results and the potential for eradication of leprosy through BCG vaccination still remains questionable.

Anne Rego¹⁵⁰ (1991) summerized the vaccine era as ever since J.M Fernandez wrote his famous treatise in 1939 on "Estudion comparative de la reaccione de mitsuda con las reaccione Tuber- culinos" in the Argentinian review of Dermatology, when the quest for the elusive leprosy vaccine began. In essence the report was on "the possibility of awakening in healthy people a resistance against Hansen's bacilli by BCG vaccination". He found that 92 percent of 123 lepromin negative children converted to lepromin positivity following BCG. The possibility of a close relationship between the two diseases was extended in the late 1950's by Chaussinand when he suggested that the decline in leprosy throughout Europe was due to the rising incidence of tuberculo- sis. Shepard later provided the first experimental evidence of the protective effect of BCG in M. leprae infection in the mouse foot pad model. The 1950's and the 1960's brought on the "Age of the BCG Trials". The results depicted are puzzling in their variation. The difference could be due to :

1. Different exposure of the population to leprosy.
2. Difference in Immuno-genetic characteristics of the population.
3. Different strains of *M. leprae*.
4. Varying protective effect of BCG.

C.K Job⁷⁸ (1983) had highlighted one of the earliest findings of Dharmendra and Chatterjee which showed that there is a higher incidence of leprosy among lepromin negative individuals and that a majority of them developed lepromatous disease. A much smaller number, among the lepromin positive population, contract the disease and then it is only the non-lepromatous variety.

M.J Pallen¹³⁷ (1984) had discussed about the variable results of early trials of BCG vaccination in humans. Controlled field trials of the efficacy of BCG vaccination against both tuberculosis and leprosy are of much greater clinical relevance. The results of such trials have been shown in table 4.3 Even before the recent Indian trials there was a dishearteningly low level of protection shown by several trials. A trial in Burma showed little or no effect of BCG vaccination in protecting against leprosy in the population tested. A trial of BCG vaccine against leprosy in Uganda children, however, achieved a protection rate of some 87%.

Table : 4.3 The variable results of early trials of BCG vaccination in human with variable result of tuberculosis or leprosy using animal model of human disease

Sr. No	Population Group	Period of intake	Disease under consideration	Overall Protective efficacy in %
1.	North American Indians	1935-1938	Tuberculosis	80
2.	Chicago (USA) Infants	1937-1948	Tuberculosis	75
3.	Georgia (USA) School Childrens	1947	Tuberculosis	00
4.	Illinois (USA) School Childrens	1947-1948	Tuberculosis	00
5.	Puerto Rico General population	1949-1951	Tuberculosis	31
6.	Georgia & Alabama (USA) General Population	1950-1952	Tuberculosis	14
7.	U.K. Urban School Leavers	1950-1952	Tuberculosis	78
8.	South India Rural Population, Chingleput	1950-1955	Tuberculosis	31
9.	Uganda Children	1960-1962	Leprosy	87
10.	South India Rural population	1968-1971	Tuberculosis	00
11.	Burma Childrens	1964-1973	Leprosy	17

Source : Based on M.J. Pallen 1984, International Journal of

Leprosy, Vol 52 (2) p: 237.

Very recently Mirian¹¹⁵ L.O. et al (1992) had conducted a case control study to evaluate the protective efficacy of intradermal BCG against leprosy in a high - endemic area of leprosy in central Brazil. Cases were all newly diagnosed leprosy patients under 16 years of age and all of them being school children. The presence of BCG was negatively associated with leprosy, indicating a 5.3 risk of leprosy for those non-vaccinated and protective efficacy of 81%. Paucibacillary patients were more likely to have a BCG scar than multibacillary patients.

4.5 Epidemiology :

Epidemiology is expected to form the basis of all meaningful public health activities. Here are some epidemiological studies conducted in the context to leprosy.

One of the earliest studies on leprosy conducted by Pranesh Nigam¹³¹ et al (1977), in rural population of Bundelkhand (U.P) shows that out of the 3,362 individuals studied, 18 cases of leprosy could be detected giving a prevalence rate of 5.41 per thousand population. No association between the size of village and prevalence of leprosy cases was observed. The highest prevalence rate (7.40/1000) was seen in age group 15-49 years with male to female ratio of 2.6 : 1. The disease was not prevalent in pre school age-group. Poor class of people contributed to a greater extent (6.37/1000). Size of the family did not seem to be associated with the prevalence of disease. More than one case of leprosy in a family was observed in 30.7% of the families. Early cases of leprosy remained acceptable in rural society whereas advanced cases were not acceptable. The disease seemed to manifest at all ages except pre-school age group. Majority of the cases (55.56%) were of early stage with a duration of the disease of less than two years.

M.Z Mani¹⁰⁷ et al in (1981) had conducted a study in Punjab. Nearly 185 new leprosy cases were seen, of whom 52 (28.2%) were

Punjabis and 133 (71.8) were non-Punjabi patients. A minimum of 13 (25%) Punjabi leprosy cases were indigenous. He concluded that the migrant labourers from Bihar and eastern U.P are the probable sources of leprosy in Punjab.

N.K Mathur¹⁰⁹ et al (1981) had done analysis of 537 leprosy patients in Jaipur (Rajasthan). An incidence of 4.1 per thousand, attending skin out patient department was found. Lepromatous leprosy (30%) was the most common form. Three hundred and thirty five (62.3%) cases were in the age group of 30-59 years. Males were affected twice as compared to females. 5.0 percent of affected families showed multiple cases.

P.K Guha⁵⁹ et al (1981) had conducted a study to know the age of onset of leprosy in West Bengal. He found out that majority of N and N/L type patients were in 10-39 age group, whereas most of L type patients fell in 20-49 age group at the time of onset of the disease and later found that in general, age of onset was some what lower in their study than that in other similar studies.

Sardar Lal,¹⁰¹ et al (1982), had conducted a study on leprosy in rural population of Pondicherry. A total of 138 cases of leprosy were found in 94 families making a prevalence rate of 6.9%. There were single cases in 61 families and two to four cases in 33 families, child rate for leprosy was 37%. The male to

female ratio showed no sex predilection. Maximum percentage (30.4%) of cases belong to maculo~~ana~~esthetic type, followed by tuberculoid (27.5%), indeterminate (19.6%), border line (14.5%) polyneuritic (6.5%) and lepromatous (1.5%) type. Nerve involvement was more frequent in multiple skin lesion cases than in single lesion cases.

V.N Sehgal,¹⁶³ et al (1982) had studied age at onset of leprosy in males was 31.49 years and in female 29.43 years. The mean age-at-onset of leprosy in males was 31.49 years and in female 29.43 years. The mean age-at-onset for N,N/L and L types was 30.14, 30.12 and 34.13 years respectively.

B.N Reddy¹⁴⁹ et al (1984) had conducted a study of leprosy in rural community of Pondicherry among 5281 persons. Nearly 191 were found to be suffering from leprosy giving a prevalence rate of 36.16 per thousand. The prevalence was highest in children aged between 5 and 14 years ie, 41.61 per thousand population. Among adults the highest prevalence was seen among those aged above 45 years, ie, 45.66 per thousand population. Both the sexes were found to be equally affected in this area. Tuberculoid leprosy was the most common type found with a prevalence rate of 23.29 per/ thousand population, followed by indeterminate type with a prevalence rate of 5.3 per thousand population. Lepromatous rate was 3.69 percent. The disability rate was found to be 16.23%

with a mean disability index of 0.927.

P.Kaur⁸⁴ et al (1988) had conducted a similar type of study of leprosy in tribals of Adhaura plateau in which out of a total of 7,521 persons, mostly tribals, 5,476 were examined giving a coverage of 72.8%. Prevalence rate of leprosy was 20.6 per thousand population. Maximum prevalence was seen in the age group of 55 and above. The disease was more common in males and in the literate and educated group. The ratio of tuberculoid was 57.5 percent, borderline 29.0 percent, lepromatous 10.0 percent and indeterminate type constituted 3.5 percent. The population had a poor nutritional status with caloric intake of 1471 cal per day.

A. Bagshawe⁷ et al (1989) had conducted an epidemiological study of leprosy in a high prevalence village in Papua New Guinea whose prevalence rate was 8.6 per thousand population. Dapsone resistant disease and faulty compliance with treatment are considered to be contributory to persistent infectivity of old cases which together with the presence of 20 previously undiagnosed cases, comprised a large infective social mixing of all ages would facilitate widespread dissemination of infection. The greater prevalence of clinical leprosy following childhood in the village favours altered susceptibility following exposure in childhood. There was a higher prevalence of leprosy in close relatives of cases when compared with the same relatives of age

and sex matched leprosy-free controls. The occurrence of familial clustering of leprosy in a hyper-endemic area with intense transmission suggests that unidentified inherited factors influence susceptibility to clinical leprosy. It is suggested that the clustering of adverse inherited traits through intermarriage may explain this hyper endemic focus of leprosy.

M.A Ibrahim⁷⁰ et al (1990), had conducted a study in leprosy in Saudi Arabia for the period of 1986-89. He observed a steady decline in the number of patients reported : 432 (54.55%) were non-Saudi and 360 (45.45%) were Saudi. Patients were reported from a total of 22 different countries. The majority of the non-saudi patients were from the Yemen. The male-to-female ratio was 3.83:1. The age group comprised: 133(16.79), 51 to 80; 575 (72.60%), 21 to 50 and 84 (10.61%), Under 20 years of age. The disease was classified into five categories 295 (37.25) lepromatous type, 238 (30.05%), tuberculoid type : 146 (18.43%), Borderline Tuberculoid 29 (3.66%), borderline type and 84 (10.61%) borderline Tuberculoid type.

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L.M. Irgens et al (1990) had conducted a study on leprosy in Portugal for the period of 1946-80. The highest incidence rates were observed in the coastal countries in the middle of Portugal and particularly in the municipalities with a high annual rainfall. Peak incidence rate in males was observed at the

age of 25-29 years against 50-59 in females. A continuous and increasing decline in incidence rates was observed throughout the observation period 1946-80. The pattern observed in other areas during the declining incidence rates was an increase in age at onset. Also there was a break in the transmission of the disease a long time before the final termination of the endemic situation.

D . Berhe¹¹ et al (1990) had conducted a study on leprosy in Ethiopia. Since 1976 the data revealed that leprosy is a disease of Ethiopian highlands where prevalence rate as high as 7 per thousand population had been recorded in some provinces while the cumulative national average for the last thirteen years was 2.6 per thousand. The paucibacillary form was predominant. However unlike other African countries, a relatively high proportion of multibacillary leprosy was found in Ethiopia. The male to female ratio was 2:1 with the highest prevalence in the 15-44 years age bracket. Detection rates for new cases have shown a gradual decline since 1982 a year before multidrug therapy (MDT) was introduced into the country.

4.6 Clinical Features :

4.6.1 Impact of MDT : There are number of papers in which impact of MDT had been discussed.

S.K.Kundu,⁹⁸ et al (1984) had done evaluation of MDT with rifampicin, clofazimine and dapsone in multibacillary leprosy cases. Compared to dapsone monotherapy remarkable clinical and bacteriological improvement was observed with this combined therapy with attainment of negative BI in ten cases. Use of this combination therapy is thus advocated to achieve non-infectivity in a shorter period and to prevent emergence of dapsone resistance there by easing the part of leprosy control before it becomes unmanageable due to dapsone resistance.

R. Ramanan¹⁴⁴ et al (1987) had followed up paucibacillary leprosy on multidrug regime. Nearly 129 newly registered cases of paucibacillary leprosy were put on dapsone daily and rifampicin once a month and were followed up for one year out of 129 cases, 108 (83.7%) were found to be clinically active at the end of one year of MDT. In 25 out of these 108 cases, skin biopsy was done and well defined granulomas were seen after therapy in 11 patients (44%).

C.R Revenkar¹⁵³ et al (1989) had done three year clinical assessment of paucibacillary leprosy under multidrug therapy. The clinical assessment at the end of surveillance showed that 276 (82%) of all the cases attained in activity. Two patients who were inactive showed signs of relapse. Five Patients showed more activity though they were regressing under treatment. The inactivity rate was much higher amongst the patients with one to three

skin lesions (88%) as compared to the patients with seven to four lesions (60%). The difference was statistically significant (PL 0.001). The past treatment before MDT did not appear to influence the clinical cause of the disease. 17% of the patients, essentially borderline type, continued to show sign of activity even after three years surveillance indicating the need for triple drug therapy.

P.S.Sundar Rao¹⁷⁵ et al (1989) had done preliminary study on the incidence rates of leprosy among household contact during the period 1970-1985. The incidence rates of leprosy among the household contacts prior to and during the initiation of multi-drug therapy are presented here. The overall incidence rate among the house hold contact was four per thousand population at risk. Contacts of multibacillary and paucibacillary cases had a relative risk of 3-6 times and 2-4 times the risk of leprosy in the genral population, respectively. The incidence rates among children were higher than adults, the peak age specific incidence rate was between 5-9 years and nearly one third of the primary cases were children. These finding are presented and the methodological issues discussed.

N.K Chopra²⁶ et al (1989) had studied impact of MDT on leprosy in Vadodara district (Gujarat State) which shows that MDT on leprosy in the tribal, rural and urban population with

high rate of compliance. In Vadodara district, on an average, a compliance of 96.27% was obtained. Sharp decline in prevalence rate of leprosy can be attained through MDT strategic plans. In Vadodara district the prevalence rate declined from 5.81 to 1.01 per thousand population, and the deformity rate declined from 6.15 to 1.50. Besides this, child incidence rate also came down from 13.45 to 8.80 per thousand population. Nearly 17 cases (15 PB + 2 MB) relapsed after MDT out of 13752 discharged as cured. There was a fall in BI in majority of MB Positive cases who took regular treatment.

N.K Chopra²⁹ et al (1990) had studied reaction in leprosy among 250 patients after introduction of MDT. It was observed that all patients who showed ENL were LL and those that showed reversal reaction were BB, BT and BL. In our series the incidence of the reactions amongst leprosy patients was 1.39% more in MB cases (3.31%) 235 MB cases developed reaction out of 7098. 235 MB cases developed ENL reactions between six months to two years of treatment and reversal reaction between six months and one year of treatment. The incidence of reaction was more common in age group between 21-40 years (70.8%). Besides this, out of 250 cases 179 cases (71.6%) had some relation with these observed precipitating factors while the remaining 71 cases (28.4%) were of unknown aetiology.

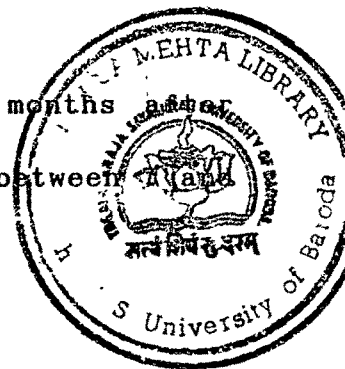
4.6.2 Relapse :

Kiran Katoch⁸⁶ et al (1989) had studied relapse in paucibacillary patients after treatment with three short-term regimens containing rifampicin. He shows that the disease in activity rates by one year of treatment was much greater with regimens II and III than with regimen I (94% & 97% v/s 76%). Since the patients in the three regimens were otherwise comparable, it is concluded that the high inactivity rate, low relapse rate (1%-2%) and no early or late reaction as observed in regimen II patients were because of adequate treatment.

N.K Chopra²⁷ et al (1990) studied the relapse in paucibacillary leprosy in a multidrug therapy project, Vadodra district India. Here the incidence of relapse are very low, showing that relapse rates fall down to a very low level after multidrug therapy. Their study shows a mean relapse rate of 0.19% after multidrug therapy.

Antonio Grugui⁵⁸ et al (1990) had done clinical investigation and studied the relapse in paucibacillary leprosy after MDT. Out of the 1509 PB patients 85 relapsed, a relapse rate of 5.63% (17.5 per thousand persons at risk). There relapse included 12 cases with features of reversal reaction. 79% of the patients relapsed with skin lesions. The relapse rate was higher in borderline cases and in those with more lesions and it was lower in

those who had received dapsone for at least six months after cessation of MDT. 74% of the relapse were detected between 12 and 24 month of follow up.



4.6.3 Bacteriological Index :

O.P Tiwari¹⁸¹ et al (1991) had studied the decline in bacterial quantum contributed by *M.leprae* derived from multibacillary (MB) cases in Vadodara district, where the total prevalence rate (PR) is reported to have shown a decline from 4.7 per thousand in 1984 to 0.6 per thousand population in 1988 after the introduction of MDT. In 1989-90 three years after the "intensive phase" was completed, the reduction in the bacterial quantum was only 49.2% as compared with the fall in the total PR of 87.2%. It is concluded that if the incidence rate of Hansen's deformity in the MDT district is to be reduced significantly a strategy to find and treat hidden MB cases in the community has to be evolved.

4.6.4 Deformity :

S. Hasan⁶³ (1977) had done survey of leprosy deformities among the patients of Hyderabad city. Nearly 44.3% of the patients have one or the other kind of deformity of the hand, foot or face. 29% were affected in the upper limbs, 30.7% in the lower limbs and 5.2% in the face. The patients with lepromatous leprosy

showed greater tendency of deformity (66.4%). Patients with simply anaesthesia in hand and feet formed the majority among the deformity cases, a total of 41.6% education of the patients in hand and foot care is an essential task of the clinical physiotherapy technician.

S. Prasad¹⁴⁰ (1981) had done a survey of leprosy deformities in a closed community of East Champaran, Bihar. Out of nearly 1011 leprosy patients, 200 (20%) cases were with permanent deformities.

V.D.Tiwari¹⁸⁰ et al (1981) had done a respective study for deformities in leprosy patient of Indian armed forces treated and reviewed at military hospital, Agra. It was found that deformity rate was 9.13% with only 1.5% cases developing deformity while on DDS treatment. Besides this deformity rate increased with increasing age. Though lepromatous, borderline and polyneuritic types were more prone to develop deformities, on treatment tuberculoid type developed more deformities. Reaction precipitated deformity in 6.75% of the deformed.

M.Girdhar⁵³ et al (1989) studied the pattern of leprosy disabilities in Gorakhpur (U.P) in 514 leprosy cases. About 229 (44.56%) had disability. Disability was not commonly seen in lepromatous leprosy. There was an increasing trend in disability with increasing age of patient and duration of disease. Nerve

thickening and duration of disease. Disability rate was higher in males as compared to females. Nerve thickening and reactional states were more common in disabled cases. Dapsone treated group showed a disability rate of 63.8% as compared to 30.0% in untreated group. Hand was the most commonly affected site and mobile claw hand was the single most common disability. The overall disability index (D.I) (2) of Bachelli was 1.25 and lepromatous cases had highest D.I (1.89) D.I was higher in males and was found to increase with increasing age of patient and duration of disease.

N.K Chopra²⁸ et al (1990) had studied Hansen's disease deformities in a MDT project. Vadodara district, Gujarat state. It was observed that deformity rate declined from 6.15% at the commencement of MDT to 2.66% until March 1988. In both old and new cases the percentage of deformed cases was found to be higher among the MB type. This finding is contrary to the general belief that because of greater nerve involvement, the rate of deformity is higher among PB type cases. The higher percentage of deformity among MB cases can be attributed to longer duration of disease, larger number of ENL type and more frequent episodes of reactions in multiple nerve damage.

The above findings are similar to those of Srinivasan Noordeen (1976) where they found a higher incidence of deformity among Hansen's deformity patients with large number of patches

and longer duration of the disease.

4.6.5 Leprosy in children :

A.P Selvapandian¹⁶⁴ et al (1980) had done a school survey in the Kaniyabadi panchayat union areas, know as leprosy endemic area. Out of 10,163 students examined a total of 137 leprosy cases were detected 122 cases (89.1%) belonged to tuberculoid type and the rest of the 15 cases (10.9%) belonged to borderline leprosy cases were no cases of lepromatous type and none of them had any deformity. 86.1% had single lesion and the rest multiple lesions. Study of the distribution of patches over the body surface did not reveal any significant difference between covered and uncovered parts of the body.

B.S Bhavsar¹⁵ et al(1980) had done a school survey covering 21,412 students attending thirty primary and secondary schools in Surat and 25 primary and secondary schools in surrounding villages was carried out. The overall prevalence rate of leprosy was 0.12% and it was significantly higher in rural areas. Prevalence of leprosy did not show any association with the age of students but male preponderence was observed. Prevalence rate increased significantly with deterioration of socio-economic condition and home sanitary condition. BCG vaccination seemed to protect against leprosy in rural areas. Majority of the case (92.3%) were

non-lepromatous type. Single skin lesion was seen in 15.4% cases only. Nearly one third of the total skin lesions were observed on the area of skin covered by clothes.

B.S Bhavasar¹⁶ et al (1981) had an assessment of 21,412 school children of 5-19 years age, attending 30 and 25 school in urban and rural areas respectively of Surat district. Matched controls of these leprosy cases were selected from their healthy class mates by employing certain criteria. Home visit paid to these 24 cases and their controls revealed a positive family history in 50% of the affected students .Case detection rates were 17.9% and 0% among the affected students and their control respectively. Out of 26 cases, 16 (16.5%) were detected for the first time (undetected cases) However, record analysis revealed that only 32.6% and 39.5% of the detected cases of school going age, were attending schools in rural and urban areas respectively.

Sushil Chandra²¹ et al (1981) examined students attending high school in two community blocks in district Varanasi for evidence of leprosy. Among the 995 students surveyed 20 cases were detected. There was no case of lepromatous leprosy.

P.Ingle⁷¹ et al (1982) had done comparision of slum survey, school survey and health education as method of detection of leprosy cases in children in urban areas of Vadodara from

from 1972-1982. It reveals that slum survey (1.90/1000) has better results as compared to school survey (0.29/1000). 91 cases were detected in one year (1/9/81 to 31/3/92), 38 were through slum survey (41.76%) and 37 were through health education (40.66%) (School survey was not carried). Thus health education has a very important place in case detection.

D.S Dave³² et al (1984) had done a cross sectional clinical study in slum and adjoining villages of Raipur town. All the children in 100 families, in which at least one patient of proved leprosy was present were examined. Children of 100 non-leprous families served as control. In leprous families prevalence was 14.2 times higher in comparison to children in control group. Also prevalence was higher in children of those families in which number of patients were more than one, or there was lepromatous leprosy. In children the common type of lesion were tuberculoid, indeterminate, borderline and pure neural type, while no case of lepromatous leprosy was seen.

V. Kumar⁹⁵ et al (1989) had examined 9795 children in Pondicherry. The prevalence of leprosy among children was 7.2 per thousand population. The youngest patient was two years old. The ratio between boys and girls was 1.3:1. History of contact was present in 23.9% cases. The commonest type of leprosy found in this study was BT. Single patch was seen in 57.7% cases. In 65.9%

a single patch was present on the exposed parts. Leprosy disability rate was 8.5%.

K. Mutatkar¹²⁵ (1992) had done a literature survey on leprosy in children in which he had discussed the various topics viz, epidemiology, clinical, social, etc, on childhood leprosy, contributed by various authors.

4.7. Sociology :

The studies referred to so far have stressed on the physical, (environmental), epidemiological and clinical aspects of leprosy, But there has been little attempt to correlate the same with the social context. Studies on the social aspects of the disease are very limited.

N .S Hari⁶² (1978) had studied about personal hygiene and environmental sanitation in Visakhapatnam in the context of leprosy infection. An analysis of the dietary habits of these people indicated that out of the 1000 patients, 50% were taking only rice without any dietary supplements like proteins, fats and vitamins. The remaining people were taking their meals without any idea regarding the importance of the diet and its advantages. The need for intensive health education for all the slum dwellers was therefore felt.

A.K Govila⁵⁶ et al (1980) conducted a study of at Gwalior on

contacts among leprosy patients in 96 families and 566 population residing with leprosy patients and 20 new secondary cases were identified, giving rise to gross prevalence rate of 3.45%. Males were mostly affected and younger population were the main victims of the disease. Cases were present in the low socio-economic groups of population and the disease was mainly confined among illiterates and poorly educated population. The incidence of secondary cases was highest among those who were residing in extended type of family system.

A. Girdhar⁵¹ et al (1981) had done a quantitative estimation of discharge of *M. leprae* in the milk of 39 leprosy female patients. 12 of the 39 patients (10 LL,BL and one each of T,BT and BB) showed bacilli in their milk. Only one of these patients was on treatment. AFB count in 10 ml of milk was found to range from 4.3×10^4 to 4.3×10^5 . Thus, an infant being breast-fed by these patients, would be getting a daily dose of 3.7 to 6.2×10^6 bacilli through its alimentary tract in addition to other routes of infection. There is as yet, no positive proof whether the ingested bacilli could be responsible for the spread of infection. The possibility cannot be ruled out.

N.S Chauhan²⁴ et al (1981) had studied the psychodynamic side of leprosy in eleven children in Agra. The salient features which were charted out are, that they have a general craving for sociogenic needs like love and affection, security, affiliation,

co-operation etc. Their anxiety level trends to be high due to certain conflicts. The obvious fact has been that leprosy appears as asomatic devastation in the presence of highly active psychogenic stravation of personality.

Ashok Kumar⁹¹ et al (1982) had studied about the illness and service utilization behaviours of 225 adult leprosy patient in Chengalpattu. Almost all patients perceived their disease as leprosy but 71.50% did not know how they got it. 10-11% did not reveal the disease to their family for fear of rejection. The time-lag between first suspicion and medical consultation was one year or more in 48% of cases. For the treatment of leprosy, 36-38% of patients consulted private practitioners and general hospitals at one or the other time. 42.6% of patients changed 3 or more medical agencies for treatment. On an average a patient had taken 62.3% of expected treatment. 41% of patients were not aware of the name of the drug (DDS) that they were taking. 44% of patients had tried home remedies. Most of the patients preferred to take treatment at leprosy referral hospitals.

Usha Ramanathan¹⁴⁵ et al (1982) had conducted a study to assess the attitude of doctors to working in leprosy. Nearly 33% of them have inadequate knowledge. Fears of being socially stigmatised and facing poor job prospects while working in this field were also revealed.

A. Kumar⁹³ et al (1982) had done diagnostic efficiency of paramedical worker involved in leprosy case detection programme. Out of the 1394 cases detected by PMWs, 257(18.44%) were wrongly diagnosed as leprosy, mostly as non-lepromatous (N) type. Though all lepromatous (L) and 98% of n-type cases were correctly classified by PMW's , 25.64% of borderline (N/L) cases were either under-diagnosed as N-type (17.95%) or over-diagnosed as L-type (7.69%). The activity status of 19% cases was wrongly assessed by PMW's including 8% active lesion assessed as inactive. The discrepancy between two PMW's in diagnosis, classification and assessment of activity status of leprosy was found in 1.39%, 7.41% and 25.67% cases respectively.

G.K Vyas¹⁸⁷ et al (1982) had done a sociological study of leprosy cases in the Gandhi Kusth Ashram, Jodhpur (Rajasthan). The study reveals that majority (95.2%) were Hindus; had onset of leprosy in the age group of below 20 years to 30 years (80.94%) had a literacy rate of 6.3% only. A history of contact with a case of leprosy could be traced in 38% but within the family only in 11.9%. The infection as a cause of leprosy was recognised only by 3.57% patients but a majority had no idea about aetiology (70.24%) or thought it to be due to punishment for past sin (3.57%) or due to super-natural causation (1.19%). Most of them (70.2%) left home for fear of losing family prestige

and to hide the disease (25.0%) or to avoid hatred of other family members (4.76%).

H.S Sandhu¹⁵⁹ et al (1984) conducted a study of knowledge, attitude and practice of leprosy among doctors of Bhopal has found that junior doctors had more exposure of lepralogy compared to all other groups. Medical college doctors had better knowledge and attitude about leprosy among doctors were influenced by qualification, age cultural and environmental factors. A strong association was observed between knowledge and attitude about leprosy of doctors and their practice of treating leprosy cases.

S. Gopalkrishnan⁵⁵ et al (1986) had studied 231 dropout during treatment for leprosy in Poonamallee (Madras). Dropout rate was lowest among lepromatous patients; patients with stigmal deformity were significantly less among dropouts were few. There was little association between socioeconomic status and dropout rate; dropout amongst patients who self-registered for treatment was much less than in those who were enlisted for treatment during survey; 38% had dropped out within the first six months of registration for treatment ; lepromatous patients attended clinics for more than 25 months before becoming dropouts; fear of loss of wages, belief that it was not leprosy, social stigma attached to the disease, disinterest for treatment when lesions were the main causes for discontinuance of treatment, all those who dropped out due to shyness were women of 15-44 age-group.

A. Girdhar⁵² et al (1988) had studied the drug compliance among self-motivated leprosy patients in Agra. It was found that only 54.6% of them had taken their last dose of drug within the previous three days. Those who kept their appointment showed better compliance than those who did not. Urinary DDS positivity was found to be unrelated to sex, occupation or the type of the disease. In the younger age group the compliance was low as also among the patients coming from nearby places as compared to those who were residing in far off districts.

K. George⁴⁸ et al (1990) had done a study to know the role of intra household contact in the transmission of leprosy in Balgayam Vellore. This study shows that persons with intrahouseholds contact within leprosy have a higher risk of acquiring leprosy compared with those who did not.

R. Premkumar et al (1991) had done a study on transmission of health information on leprosy from children to their families in the north Arcot district of Tamil Nadu. Although significant group of children compared with controls, no transmission of information on leprosy was detected in the family members of either group. The attitudes of children who had been educated about leprosy from children to their families in the north Arcot district of Tamil Nadu. Although significant improvement in knowledge about leprosy was detected in the leprosy educated group of chil-

dren who had been educated about leprosy may have been adversely affected by the health education session.

N.Awofeso⁶ et al (1992) have done a similar study to assess the knowledge and attitude of Nigerians nurses toward leprosy which reveals that leprosy should be included in the basic nursing curriculum in order to increase awareness and to decrease the stigma of leprosy.

R. Tekle-Haimanot⁶¹ et al(1992) studied the attitude of rural people in central Ethiopia which reveals that attitude toward leprosy was compared with attitude to epilepsy, studied in a previously performed survey in the same community. Analysis of attitudes in the same community showed that negative attitude to epilepsy, studied in a previously performed survey in the same community's deeply entrenched belief that leprosy in both hereditary and contagious, expressed respectively by 48% and 53% of the respondents.

4.8 Urban

J.T Marshall¹⁰⁸ et al (1981) had studied the distribution of leprosy among slum dwellers in two areas of Bangalore city. Out of a random sample of 483 it was found that 150 were suffering from leprosy. While 74 tuberculoid and 25 lepromatous cases

were detected, the remaning showed up as borderline and polyneuritic types.

K.V Krishnamoorthy¹⁰⁰ et al (1982) had conducted a study which includes the analysis of 240 leprosy cases detected during five years from 1977 to 1981 at Raydrug, a municipal town in Anantapur district of Andhra Pradesh. Various aspects like age, sex, deformity, educational, economic, caste occupational details are brought out. The strategy used in leprosy control and the results obtained are dealt with. The prevalence rate of leprosy in this area is estimated to be 8.4 per thousand population.

C.R Revankar¹⁵² et al (1989) had done leprosy survey in industries in Bombay. Nearly 22287 industrial workers were examined for leprosy by para-medical ancillaries in their establishment and 270 leprosy cases were detected (P.R 12/1000). However only 13 multibacillary cases (P.R, 0.5/1000) could be unearthed. 12 patients were with grade II & above 184 (83%) were untreated. 161 (60%) patient reported for treatment.

R.S Misra¹¹⁷ et al (1989) had conducted a study in low endemic area of Delhi which reveals that the rising incidence in these so called low to moderate endemic places is closely linked to factors related to urbanisation, movement of people in search of employment etc, which necessitate fresh surveys in the areas. A significant number of leprosy patients attending the centre were

irregular (37.7%) in therapy and may have absconded after the initial visit (35.3%).

S.S Naik¹²⁹ et al (1991) had conducted a study on problems and needs of women leprosy patients in Bombay and Goa. By studying the status of 151 women leprosy patients (24 from a leprosy asylum and 127 attending urban leprosy centre at Goa and Bombay) it was noticed that a sizeable proportion experienced problems of the disease. However, most of them seemed to have managed to settle well in their families as housewives subsequently. Younger women leprosy patients expressed the need for financial assistance for completing their own education and for starting small scale business. The older women were more interested in educating their children.

C.R Revenkar¹⁵⁴ et al (1991) had done a study on the reduction in case load after multi-drug therapy in an urban leprosy control programme in Bombay. The analysis showed that the case load per worker was 239 (139 active cases, plus 93 surveillance cases, plus 7 care after cure cases), though active registered case detection rate was 0.79 per thousand by the end of December 1989. The case detection rate was 0.49 per thousand population by the end of 1989. So although the active registered cases prevalence rate declined, the worker had enough to do because of the need for surveillance and the detection of relapses, early neuritis, early disabilities and care after cure. Simultaneously, new

case detection and treatment had to be continued.

T. Myint¹²⁶ et al (1992) had conducted a study to know the risk factors among defaulters in the urban leprosy control centre of Thaketa township in the city of Yangon, Myanmar, in nearly 884 leprosy registered cases. The defaulter proportion among cases registered for treatment at the Thaketa health centre was 34.16%. It was establish that patient's sex and occupation are not factors in defaulting. Paucibacillary cases and cases with no disability are more likely to default.
