

## Differential Trend of Leprosy in Rural and Urban Area of Western Maharashtra

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Leprosy, major public health problem in Satara District with prevalence rate of 61/10000 population in 1990. With a view to eliminate Leprosy, Government of India launched National Leprosy Eradication Programme (NLEP) in Satara district during July 1990 to overcome the burden of Leprosy with Multi-Drug Treatment and subsequently Modified Leprosy Elimination Campaign and Block Leprosy Awareness Campaign. The objective of the study is to assess the differential trend of Leprosy in rural and urban area of Satara district. Record based retrospective time series study was conducted in Urban Leprosy Control Units and Primary Health Centers of Satara district on NLEP evaluation indicators; prevalence rate, new case detection rate, percentage of cases released from treatment, proportion of female cases among new cases, proportion of multi bacillary cases among new cases, proportion of grade- II disability among new cases and proportion of child cases among new cases. Leprosy elimination was achieved in rural area i.e. prevalence rate < 1/10000 population but disease was still endemic in urban area of Satara district i.e. prevalence rate of leprosy was 1.3/10000 population in March 2007-08. Not a single case of grade -II disability was reported in both urban and rural area since March 2006-07 onward. New case detection rate was decreased to 0.7/10000 population in rural area but upward trend was recorded in urban area from 0.1/10000 population to 1.1/10000 population since March 2006-07 and trend was statistically significant ( $\chi^2$  trend = 37.26,  $p < 0.001^*$ ). Proportion of female cases among new cases decreased from 63% to 46.7% in rural area but reverse trend was observed in urban area from 39.6% to 52.8% with significant difference ( $\chi^2$  trend=5.42,  $p=0.01^*$ ). Proportion of multi bacillary cases among new cases showed little fluctuation in rural area from 57% to 55.2% but proportion was decreased in urban area from 59.1% to 44.4% and trend was statistically significant ( $\chi^2$  trend=29.82,  $p < 0.001^*$ ). Proportion of child cases among new cases decreased from 23.7% to 10.4% in rural but reverse trend was observed in urban area from 7% to 22.2% since March 2005-06 and proportion was significant ( $\chi^2$  trend=15.90,  $p=0.0001^*$ ). More than 90% cases were released from treatment in rural area but proportion was low in urban area and trend was statistically significant ( $\chi^2$  trend=19.38,  $p < 0.001^*$ ). The National Leprosy Eradication Programme showed favorable impact in rural area as compared to urban area in Satara District of Maharashtra.

**Key words :** Leprosy, NLEP, Multidrug treatment

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## Introduction

Leprosy, one of the chronic and oldest infectious disease known to human being since dawn of civilization for which references available in Vedic Hindu Literature "Sushruta Samhita" written around 600 B.C. as 'Kushtrog' (Dharmshakyu 1990). The disease rilled with so many myths and carries grave social stigma and ostracism which compels the patients to hide disease resulting in manifestation of deformities which results in multidimensional problems not only to patient and family but also to community and nation. National Leprosy Eradication Programme (NLEP) launched by Govt. of India in year 1983 with goal of elimination of Leprosy by 2000 AD i.e. to reduce prevalence rate (PR) of leprosy to less than 1/10000 population (Kishore 2000). Multi-Drug Treatment (MDT) was introduced in July 1990 and subsequently Modified Leprosy Elimination Campaign (MLEC) was introduced in year 1998, for further identification of hidden cases of leprosy in community and brought them under treatment. In year 2000, integration of leprosy control activities into general health services (GHS) particularly at primary care level has been advocated to provide better coverage of the population and considered as best option to sustain leprosy control (Feenstra and Visschedijk 2002, McDougall 1995). Today, in most countries endemic for leprosy, the disease control activities are now performed by primary health care workers and these staff has generally received training of varied duration before starting this work. In year 2004, Leprosy services were further strengthened with Block Leprosy Awareness Campaigns (BLAC) mainly focused on highly leprosy endemic blocks.

National level, PR of leprosy was 57.7/10000 population in March 1981-82 which was reduced to 0.99/10000 population by end of year 2005. Though India has achieved leprosy elimination,

yet 42 districts and 552 blocks showed PR of leprosy more than 3/10000 population. Similar situation was also observed in Maharashtra state that out of 340 blocks in urban area and 1776 primary health centers (PHCs) in rural area, 117 blocks and 861 PHCs did not achieve leprosy elimination by year March 2005 (JDHS 2007). Leprosy was highly endemic in Satara district with PR 61/10000 population in 1990. The NLEP was started in Satara district during July 1990, subsequently MLEC was started in year 1998 with objectives to carry out intensive awareness campaign about leprosy in community and detection of hidden cases with MDT coverage through voluntary reporting centers. Later on due to high burden of leprosy in urban area, BLAC was started in year 2004 to overcome the disease burden which resulted in decreased PR of leprosy to <1/10000 population and at district level Satara achieved leprosy elimination by the end of December 2005 (Mohite and Durgawale 2011).

Though leprosy elimination achieved at district level by the end of year 2005, but still disease burden was high in urban area as compared to rural area and role of performance of NLEP was again questionable. Proper evaluation of programme is needed to ensure that the desired change has taken place or is happening to avoid false conclusions. So present study aimed to assess the differential trend of leprosy at rural and urban area of Satara district and to find out any difference at both areas.

## Material and Methods

Record based retrospective time series study was conducted in Satara district, western area of Maharashtra state, India during year 2009. Reference population includes all registered leprosy cases from whole district during study period of March 2003-04 to March 2007-08 includes as study subjects so sample size becomes 1607 registered leprosy cases. At the time of study

there were 11 blocks in Satara district with 6 Urban Leprosy Control Units (ULCs) which provides services to urban area while 71 PHCs provided services to rural area and these centers acts as study units. With prior permission of competent authority District Health Officer and Add. Director Leprosy Control Unit Satara, data was collected by researcher from study units i.e. ULCs and PHCs on NLEP evaluation indicators using structured proforma. NLEP evaluation indicators used to assess the trend of leprosy in both rural and urban area includes;

#### Prevalence Rate (PR)

Total number of leprosy cases on record at a given point of time in an area per 10000 estimated March population.

#### Annual New Case Detection Rate (ANCDR)

Total number of cases newly detected (and never treated before) at a given point of time in an area.

#### Proportion of Female Cases among new cases

Proportion (%) of new female patients.

#### Proportion of Grade-II Disability among new cases

Proportion (%) of new leprosy patients with visible deformity.

#### Proportion of Child cases among new cases

Proportion (%) of new leprosy patients upto 14 years of age among newly detected patients.

#### Proportion of Multi Bacillary (MB) cases among new cases

Proportion (%) of new leprosy patients diagnosed as multi bacillary.

#### Percentage of cases Released From Treatment (RFT)

Percentage (%) of leprosy cases for PB with 6 blister packs of MDT to be taken in 6 months and for MB, 12 blister packs of MDT in 12 months. At the completion of this period, cases should be released from treatment. (JDHS 2004, Kulkarni and Baride 1998, Suryakanta 2010).

According to NLEP evaluation indicators, data was tabulated into urban and rural area and trend of leprosy was analysed in both areas over period of five years. Chi-square test was applied to determine any statistical significance difference in trend of both areas over study period by using software InStat.

#### Results

According to table 1, Leprosy elimination i.e. PR < 1/10000 population was seen in rural area in

**Table 1 : Prevalence (PR) and New Case Detection Rate (NCDR) of Leprosy in rural and urban area.**

Year	Total cases	Prevalence Rate@				Total new cases	New Case Detection Rate#			
		Urban		Rural			Urban		Rural	
		cases	PR	Cases	PR		New cases	NCDR	New cases	NCDR
2003-04	718	168	5.8	550	2.2	1009	460	7.9	549	2.1
2004-05	359	58	1.9	301	1.2	755	134	4.5	621	2.4
2005-06	169	31	1.0	128	0.5	322	57	1.9	265	1.0
2006-07	160	23	0.7	137	0.6	252	36	0.1	216	0.8
2007-08	201	44	1.3	157	0.5	248	36	1.1	212	0.7

@  $\chi^2$  trend = 3.25, p=0.071

#  $\chi^2$  trend = 37.26, p<0.001\*

\* Significant p value at 0.05 levels

March 2005-06 and continued declined trend was observed where as leprosy elimination was achieved in urban area in March 2006-07 but again increased trend was noticed in March 2007-08 with PR >1/10000 population indicates that leprosy is still endemic in urban area (column @). Similarly NCDR was also decreased to < 1/ 10000 population in both urban and rural area in March 2006-07 and continued declined trend in rural area, however NCDR was again increased to 1.1/10000 population in urban area in March 2007-08 and trend was statistically significant in both areas ( $\chi^2$  trend = 37.26,  $p < 0.001^*$ ) (column #).

In table 2, Proportion of female cases among new cases increased from 39.6% to 52.8% in urban area where as proportion was decreased in rural area from 63% to 46.7% over a period of study time, however total no. of cases decreased in both areas from 91 to 19 and 346 to 99 respectively and proportion shows significant statistical trend ( $\chi^2$  trend=5.42,  $p=0.01^*$ ) (column @). Not a single case of grade II disability was reported in rural area during study period but declined trend was observed in urban area with not a single case of grade II disability reported since 2006-07 onwards (column #).

**Table 2 : Proportion of Female and Grade-II Disability cases among New Cases**

Year	Proportion of female cases @ among new cases						Proportion of grade-II disability #among new cases in urban area					
	Urban			Rural			Urban			Rural		
	cases	%		cases	%		cases	%		cases	%	
2003-04	460	91	39.6	549	346	63.0	460	11	2.3	549	0	0.0
2004-05	134	52	38.8	621	293	47.2	134	5	3.7	621	0	0.0
2005-06	57	20	35.1	265	117	44.2	57	1	1.8	265	0	0.0
2006-07	36	19	52.8	216	99	45.8	36	0	0.0	216	0	0.0
2007-08	36	19	52.8	212	99	46.6	36	0	0.0	212	0	0.0

@  $\chi^2$  trend = 5.42,  $p = 0.01^*$

**Table 3 : Proportion of Child and MB cases among new cases.**

Year	Proportion of child cases @ among new cases						Proportion of M.B. cases #among new cases in urban area					
	Urban			Rural			Urban			Rural		
	cases	%		cases	%		cases	%		cases	%	
2003-04	460	37	8.04	549	130	23.7	460	136	29.5	549	313	57.0
2004-05	134	18	13.4	621	97	15.6	134	67	50.0	621	248	39.9
2005-06	57	4	7.0	265	32	12.1	57	36	63.2	265	133	50.1
2006-07	36	8	22.2	216	22	10.1	36	16	44.4	216	119	55.0
2007-08	36	8	22.2	212	22	10.3	36	16	44.4	212	117	55.1

@  $\chi^2$  trend = 15.90,  $p = 0.0001^*$

#  $\chi^2$  trend = 29.82,  $p < 0.001^*$

**Table 4 : Percentage of cases Released From Treatment (RFT).**

Year	Percentage of cases released from treatment					
	Total cases*	Urban		Total cases*	Rural	
		RFT	%		RFT	%
2003-04	272	252	92.6	805	780	96.8
2004-05	244	203	83.1	870	765	87.9
2005-06	84	69	82.1	428	386	90.1
2006-07	44	38	86.3	217	199	91.7
2007-08	54	38	70.3	207	199	91.7

$\chi^2$  trend = 19.38,  $p < 0.001^*$

(\* No. of existing cases in the previous year + New cases detected during the given year.)

In table 3, Proportion of child cases among new cases increased from 8.04% to 22.2% in urban area however total no. of cases decreased from 37 to 4 in March 2005-06 but again increased up to 8 in March 2007-08. But continuous declined trend was found in rural area from 23.7% to 10.4% with no. of cases decreased from 130 to 22 with significant proportion existed in both areas ( $\chi^2$  trend=15.90,  $p=0.0001^*$ ) (column @). Proportion of MB cases among new cases increased from 39.9% to 55.10% since March 2004-05 in rural but fluctuating trend was observed in urban area from March 2003-04 to March 2007-08, however number of cases decreased in both areas with significant difference in proportion of both areas ( $\chi^2$  trend=29.82,  $p < 0.001^*$ ) (column #). Table no 4 shows that during study period, more than 90% cases were released from treatment in rural area while proportion was decreased up to 70% in urban area in March 2007-08 and the difference was significant in percentage of cases released from treatment in rural and urban area ( $\chi^2$  trend=19.38,  $p < 0.001^*$ ).

### Discussion

Present study revealed declined trend of PR of leprosy from 2.2/10000 population to 0.5/10000 population, NCDR from 2.1/10000 to 1.7/10000

population, child cases among new cases from 23.70% to 10.40%, proportion of female cases among new cases from 63% to 46.7% with not a single case of grade II - disability in rural area during study period March 2003-04 to March 2007-08. More than 90% cases were released from treatment and very little fluctuation has been observed among MB cases due to effective implementation, monitoring and supervision of NLEP services. Training and retraining of peripheral health care functionaries, adequate and proper placement of workers, periodic evaluation of their work, MLEC, intensified IEC activities also play important role in reducing the burden of disease in rural area.

Similar trend was observed in rural Kunrathur area of Chennai (Subramanin 2006), as PR decreased from 95/10000 population to 0.21/10000 population and achieved leprosy elimination. NCDR decreased from 13.6/10000 population to 4.2/10000 population with proportion of female cases among new cases increased from 45% to 60% may be due to effective implementation, monitoring and supervision of NLEP services through primary health care centers, IEC activities and MLEC.

Similar trend also observed in rural Gudiyathalu taluka of Vellor, Tamil Nadu (Norman 2006) as PR decreased from 125/10000 population to 0.83/10000 population, NCDR from 14.3/10000 population to 0.8/100000 population, proportion of child cases among new cases from 46% to 19%. While proportion of multi-bacillary among new cases increased up to 54.8%. The proportion of MB cases among new cases increased may be due to decreased PR of leprosy and programme showed favorable impact in rural area proper supervision and monitoring of NLEP activities.

A study carried out in DLC-Veganaram rural area of Andhra Pradesh (Rao 2006) showed favorable impact of NLEP as PR of leprosy was declined from 77/10000 to 0.94/10000 population from year 1988 to 2005. The number of new cases of leprosy was decreased from 543 to 95; the proportion of MB cases among new cases was increased from 17% to 32.6%, the percentage of child cases among new cases decreased from 44% to 4.7% due to effective implementation of NLEP services. However, study carried out in rural area of Agra (Kumar et al 2006) has depicted that PR of leprosy was decreased from 55.5/10000 to 10.9/10000 population, NCDR also decreased from 46/10000 to 10.4/10000 population, proportion of multi bacillary cases decreased from 30.5% to 18.2%, child proportion increased from 11% to 15.2% and proportion of grade II disability decreased from 14.9% to 2.9% from the year 1999 to 2004 and not achieved elimination may be due to poor implementation of leprosy services under NLEP, failure of sensitization of health care workers towards leprosy and poor IEC activities.

The present study revealed PR of leprosy decreased from 5.8/10000 population to 1.3/10000 population in urban area. Though PR of leprosy decreased but Leprosy elimination not achieved may be due to lack of adequate public

health care facilities and health man power in urban area, neglected or unauthorized slum population and migrating population. High PR of leprosy in year 2007-08 may be due to intensified BLACs. However, NCDR decreased from 7.9/10000 to 1.1/10000 population since March 2003-04 to 2007-08 may be due to non detection of leprosy cases in urban area. Proportion of child cases among new cases increased from 16.10% to 22.20%, proportion of female cases among new cases increased from 39.6% to 52.8 may be due to non detection or BLAC activities under taken in urban areas. Trend of grade II - disability cases among new cases decreased from 4.8% to 0%. Proportion of cases released from treatment decreased from 93.01% to 70.3% may be due to early case detection under NLEP services. Proportion of multi-bacillary cases among new cases also decreased from 59.10% to 44.4% which may be due to prevalence of leprosy or non detection of cases.

Similar trend has been observed in Nkhotakota district of Malawi (Chaisi 2003) as PR of leprosy decreased from 3.17/10000 population to 1.3/10000 population and not achieved leprosy elimination. Proportion of female cases among new cases also increased from 30.43% to 36.66% may be due to ineffective implementation of leprosy services in urban area. Similar trend also observed in urban area of Surat (Chaudasama et al 2008) as PR of leprosy decreased from 1.83/10000 population to 1.44/10000 population and not achieved leprosy elimination. NCDR little decreased from 3.37/10000 population to 2.25/10000 population, but proportion of child cases among new cases decreased from 21.5% to 12.8% and proportion of multi-bacillary cases increased from 38.03% to 53.60% may be due to migration of cases or may be due to BLAC activities. However, study carried out in Jamnagar area of Gujarat (Yadav 2007) showed leprosy

elimination with PR of leprosy decreased from 1.84/10000 population to 0.34/10000 population, NCDR from 1.28/10000 population, Proportion of child cases among new cases from 9.2% to 8.0%, proportion of grade II disability from 6.7% to 1.6 % with progressive increased release of cases from treatment due to effective implementation of NLEP services in urban area, information education and communication activities, voluntary reporting of cases and intensified BLAC activities play important role in reducing disease burden but reverse trend of cases released from treatment was seen in this study in urban area may be due to migration or neglected unauthorized slums and urban poor coverage by ULCs.

### Conclusion

Based on the observations and analysis of NLEP indicators, it was concluded that NLEP making a favorable impact in leprosy elimination in rural area as compared to urban. Neglected slum population, migration problem, lack of adequate health care facilities and health man power may lead to high burden of diseases in urban area. So need effective implementation of NLEP services, increased health man power, increased health infrastructure, and intensified IEC activities, slum leprosy elimination activities which will decrease disease burden in urban area. Although elimination aimed but the disease have long incubation period as well as chronicity of disease need continuous support from government as well as voluntary health organizations.

### Limitations

Record based data was collected and analyzed from rural and urban health centers run by state government, so results and conclusions obtained from the present study can be comparable only with Government statistics.

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