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CASE STUDY - PUBLIC HEALTH

ELIMINATION IS FEASIBLE IN TAMIL NADU, INDIA- LEPROSY CASE STUDY

Selvavinayagam T S [(1)], Amutha S [(2)], Sudharshini Subramaniam [(3)], Somasundaram A,[(1)] Bhaskaran K [(2)]

(1) Directorate of Public Health and Preventive Medicine

(2) Directorate of Medical and Rural Services (Leprosy)

(3) --

Abstract

BACKGROUND : The goal of public health is eradication and elimination of diseases. Tamil Nadu aims at eliminating 7 diseases namely leprosy, lymphatic filariasis, tuberculosis, malaria, dog mediated rabies, measles, rubella by the year 2025. This article would focus on the status of leprosy in Tamil Nadu and the interventions that are adopted towards eliminating these diseases. Tamil Nadu aims at achieving elimination of leprosy with 90% reduction of new Child cases and 90% reduction of new Grade II deformity cases by the year 2030. Districts are categorized and prioritized based on Annual new case detection rate and grade 2 deformity. District wise leprosy status and the interventions carried out are elaborated in this article. Close monitoring will lead to elimination status in Tamil Nadu.

KEYWORD : Leprosy, elimination, Tamil Nadu

INTRODUCTION

The goal of public health is eradication and elimination of diseases. The Dalhem Workshop's hierarchy of public health interventions for combating communicable diseases includes elimination, eradication, and extinction top in its ladder.[1] Investing in disease elimination should be prioritized because there is mounting evidence demonstrating the socio-economic benefits of eliminating communicable diseases as well as the cost effectiveness of such interventions as a viable solution. Ever since smallpox was eradicated, there have been numerous attempts to eliminate or eradicate various communicable diseases. After evaluating 60 potential diseases, the International task force for disease eradication (ITDFE) shortlisted six diseases for eradication in 1993.[2]

In 1997, WHO passed resolution to eliminate lymphatic filariasis, leprosy, onchocerciasis and Chagas disease as a public health problem.[3]

The history reminds that disease elimination and eradication has not always been successful. The Dahlem workshop on eradication of disease conducted in 1997 developed certain criteria to define indicators of eradicability of disease. The definition of control, elimination as a public health problem, elimination and eradication adapted from Generic framework for control, elimination, and eradication of Neglected Tropical Diseases by WHO is given below (Table 1).[4]

Source - Generic framework for control, elimination, and eradication of Neglected Tropical Diseases

The principal indicators of eradicability are the availability of effective intervention tool to interrupt the transmission of the disease; availability of a valid and practical diagnostic tool which marks the detection of transmission of disease in the community. Elimination of a disease indicates that the intervention is effective. Elimination does not always translate to eradication, as all the intervention which worked in one place may not be effective across everywhere.[1]

Table 1 : Concept of control, elimination and eradication

Concept	Public Health Implications	Acknowledgement process	Risks	Intervention requirement
Control	Reduction of morbidity	None	Increased morbidity and/or mortality	Yes
Elimination as a public health problem	Elimination of morbidity and/or reduction of transmission	Validation	Reintroduction, recrudescence	Yes
Elimination	Interruption of transmission at the national level	Verification	Reintroduction	Yes
Eradication	Global transmission disruption	Certification	Reintroduction	No
Extinction	Complete eradication of a pathogen in nature and in the laboratory		Possibly None	No

Tamil Nadu aims at eliminating 7 diseases namely leprosy, lymphatic filariasis, tuberculosis, malaria, dog mediated rabies, measles, rubella by the year 2023. This article would focus on the current status of leprosy in Tamil Nadu and the interventions that are adopted towards eliminating these diseases.

Leprosy caused by Mycobacterium, is a non- fatal disease, usually affects the skin, peripheral nerves, mucosa of the

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Corresponding Author : Sudharshini Subramaniam
e-mail: sudharshini.subramaniam90@gmail.com

upper respiratory tract, and the eyes. but may be severely disfiguring and disabling. In 1991, WHO set the goal of eliminating leprosy as a public health problem (defined as incidence less than 1/10,000 population) worldwide by 2000, which India achieved by December 2005.[5] All the countries except Brazil has achieved this status. Now WHO has set the Global Leprosy Strategy 2016-2020 with the goal of eliminating leprosy. This strategy coined the term "Towards Zero leprosy" with a long term vision of achieving zero new cases, zero disability and zero stigma due to leprosy across the world, however the target timeframe is not specified.6 The global target for leprosy elimination aims at zero children diagnosed with leprosy and visible deformities; rate of newly diagnosed leprosy patients with visible deformities of less than 1 per million; and absence of legislation allowing discrimination on the basis of leprosy.[6] India has highest leprosy burden (52% of new cases) in the world.[7] The national goal for leprosy elimination is prevalence rate <1 /10000 at block level, newly diagnosed leprosy patients with visible deformities of less than 1 per million; and zero leprosy transmission in the community. Tamil Nadu contributes to 4% of the total cases in India. The epidemiological indicators of leprosy in India and Tamil Nadu is given in Table 2.

Table 2 : Epidemiological indicators for leprosy in India and Tamil Nadu 2021-22

Indicator	India [1]	Tamil Nadu [2]
Prevalence rate (per 1 lakh population)	0.45	0.29
Annual New Case Detection Rate (per 10000 population)	5.52	2.92
Proportion with Multi bacillary leprosy	61%	58.8%
Proportion of leprosy patients who are children	5.76%	9.37%
Proportion of leprosy patients who are women	40%	39.05%
Grade 2 leprosy (per million population)	1.36	1.16
Proportion of leprosy patients with Grade 2 disability	2.48%	4.95%

Source –1- National Strategic Plan and Roadmap for leprosy 2023-2027.; 2. State Leprosy Office, Directorate of Public Health and Preventive Medicine, Tamil Nadu.

The elimination goals for Tamil Nadu to be achieved by 2030 are as follows:

- Elimination of Leprosy with an aim to prevent the occurrence of fresh Leprosy cases in the community.
- 90% reduction of new Child cases
- 90% reduction of new Grade II deformity cases

The epidemiological trend of leprosy in Tamil Nadu is shown in Table 3. The current performance of the State shows that, we have potential to reach elimination. In Tamil Nadu, the indicators are not uniform across the district.

Table 3 : Epidemiological trend of leprosy in Tamil Nadu

Event	Time	Cases under treatment	Prevalence Rate
Start of MDT	May 1983	580281	118
Fully covered by MDT	April 1991	173027	31
Integrated with PHC	August 1997	44289	7
State level Elimination	March 2005	5503	0.85
Dist. Level Elimination	March 2006	3919	0.60
Current Status	March 2023	2310	0.29

Table 4a : Leprosy essential indicators of Tamil Nadu – April -May 2023.

	High ANCDR	Low ANCDR
High Grade 2 deformity	7 **Highest Priority**	10 **High Priority**
Low Grade 2 deformity	4 **Moderate Priority**	17 **Low Priority**

Table 4b : Classification of districts based on priority and interventions carried out

	Highest Priority Districts	High Priority Districts	Moderate Priority Districts	Low Priority Districts
List of districts	Kanchipuram Erode Thiruvallur Villupuram Salem Krishnagiri Chengalpattu	Tuticorin Ranipet Namakkal Cuddalore Pudukottai Kallakurichi Vellore Nagapattinam Thirupathur Trichy	Perambalur Thiruvannamalai Mayiladuthurai Thirupathur	Dharmapuri Theni Virudhunagar Thanjavur Sivagangai Tenkasi Dindigul Ramanathapuram Madurai Karur Ariyalur Kanniyakumari Coimbatore Thiruvarur Thirunelveli Chennai Udagamandalam
Interventions	• LCDC (Twice a year) • PEP • SLAC • G2D Investigation • High intensity IEC • Intensified Surveillance for hidden cases • DPMR	• LCDC (Twice a year) • PEP • SLAC • G2D Investigation • High intensity IEC • Intensified Surveillance for hidden cases and backlog cases • Collaboration for case detection under other programmes • DPMR	• Targeted Active Case Detection • Focussed Leprosy Campaign • PEP • Focused IEC • Sustained Surveillance • DPMR • Validate G2D status	• Targeted Active Case Detection • Focussed Leprosy Campaign • Sustained Surveillance • DPMR • Collaboration for case detection under other programmes • Validate G2D and ANCDR status

Source –State Leprosy Control Unit, Tamil Nadu

LCDC- Leprosy Case detection Campaign; PEP – postexposure prophylaxis; SLAC- Sparsh Leprosy Awareness Campaign; G2D – Grade 2 disability; DPMR- Disability Prevention and Medical Rehabilitation; ANCDR- Annual New Case detection Rate; IEC – Information Education Communication.

India is also now targeting at zero transmission of Leprosy by 2027 through Leprsoy Mukth Bharath (Leprosy Eliminated India) under National Leprosy Eradication Program(NLEP).[5]

It is a centrally sponsored Health Scheme of the Central

Ministry of Health & Family Welfare. NLEP strategies and plans are formulated centrally; the program is implemented by the State Government since 1955. The program is also supported by partners like World Health Organization, International Federation of Anti leprosy Associations (ILEP) and certain Non - Government organizations. The other organizations supporting the program are World Bank., DANIDA, NOVARTIS . The leprosy control in the country as well as globally has gone through a tremendous change over years. When the world had no idea about the disease, the control measure adopted was isolation and restriction of movement. A breakthrough in leprosy control happened when sulfones were discovered in 1940s and Dapsone was found to be effective against leprosy. With the introduction of Dapsone, the country had its program for leprosy called "National Leprosy Control program" since 1955. The strategy then was "Survey, Educate and Treat" (SET strategy) to detect and initiate treatment for leprosy early, through formation of leprosy control units and SET centres with help of paramedical workers.[8] While the world was beginning to celebrate its victory against leprosy, a downfall as resistance to Dapsone monotherapy was observed and there was a resurgence in the 1970's. Multidrug therapy (MDT) with Dapsone, Rifampicin and Clofazamine for leprosy was introduced, which became the cornerstone of leprosy treatment. MDT was introduced in phased manner in India since 1983 and donation of MDT by global agencies was a game changer. With the advent of MDT, the country rechristened the name of the program to National Leprosy Eradication program since 1983. World Health Organization (WHO) distributes MDT Drugs for Free to worldwide Patients. By the year 1991, the state was fully covered with MDT. Five different phases of Modified Leprosy Elimination Campaign were conducted from 1998 to 2004 and India achieved the goal of eliminating leprosy as a public health problem by 2005. The other key change which happened was merging of leprosy program with the general primary health services since 2005. The concept of District Nucleus team was introduced in 2006. There were no separate leprosy units, the existing staff had to take up case finding and follow up along with their regular duties.[8] The current organogram of NLEP in Tamil Nadu is given in Figure 1.

District Nucleus Team (DNT) is the main coordination center for NLEP activities. The District Leprosy Officer is the nodal officer & the team Consisting of Health Educator, Non-Medical Supervisor, Health Inspector, Physiotherapy technician & Lab. Technician. DNT is responsible for overall program planning, implementation, monitoring, supervision, and training. They are also entrusted with the responsibility of validating new child cases and those with deformity. They are responsible for indenting of supplies for MDT, managememt of reaction and complications. They will coordinate cases for RCS and look after transportation and payment of incentives. They are responsible for collection and compilation of reports in the district.

Figure 1 : Organogram of Leprosy program in Tamil Nadu.

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EFFORTS TAKEN IN TAMIL NADU AS PART OF THE NLEP TO ELIMINATE LEPROSY

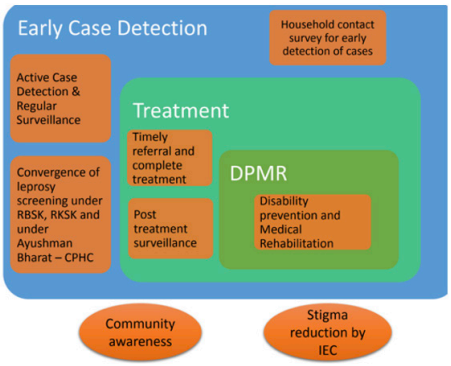

Figure 2 : Strategy to eliminate leprosy

CASE DETECTION

Early case detection through active case detection and regular surveillance- leprosy is now converged with routine health care under Ayushman Bharath and is one of the component of comprehensive primary health care services. Hence screening among children is done as part of Rashtriya Bal Swasthya Karyakram and Rashtriya Kishore Sakthi karyakram. Case detection for leprosy is done through 3 different strategies as mentioned in Table 5.

Table 5 : Case Detection strategy under National Leprosy Eradication Program

Passive Case detection	Public and private facilities should be able to diagnose presumptive leprosy cases
Active Case Detection	Active case detection activities ongoing in NLEP are under following names LCDC (Leprosy Case Detection Campaign), ACDRS (Active Case Detection Campaign), ABSULS (Asha Based Surveillance for Leprosy Suspects), FLC (Focussed Leprosy Campaign), SAP (Special Action Plan) etc. Integrated Case Detection for leprosy cases is also conducted in partnership with other active case finding campaigns under programmes for Tuberculosis / NCD-Non-communicable Diseases / LF lymphatic filariasis / Kala-azar/ COVID-19 etc.
Intensified Case detection	Every patient seeking health services, especially in the high endemic areas should be screened for sign & symptoms of leprosy. To start with, general OPD and Dermatology OPD may initiate this approach

Leprosy Case Detection Campaign (LCDC) is one of the main strategies to achieve Leprosy elimination envisaged by Central Leprosy Division, New Delhi. This will help us in identifying all hidden cases in the community to prevent the transmission of Leprosy in the community. Districts with high G2D cases and high ANCDR are prioritized for LCDC. For the year 2023, LCDC will be conducted in 66 blocks and 12 urban areas in 21 districts of Tamil Nadu.

The current strategy for early case detection involves a multipronged approach, to ensure that cases are not missed out. However the case detection in its present form is highly dependent on clinical suspicion, due to lack of rapid diagnostic technique for diagnosis of leprosy. Slit Skin Smear which supports the diagnosis of leprosy often fails to detect the bacilli when the concentration of bacilli is below 104 bacilli/ml and hence not reliable in patients with low bacillary load. Skin biopsy which is highly reliable is not feasible in field settings. While investing on research and development for newer rapid and valid diagnostics is a global priority, capacity building of all stakeholders involved in screening should be targeted. All stakeholders should be trained on confirmation of diagnosis and classification through nerve function assessment by voluntary muscle testing and sensory testing (VMT/ST). Under the program, every year Medical officers and field health workers are trained through State leprosy Control Program.

MANAGEMENT OF LEPROSY

All patients with leprosy are given free of cost treatment with Multidrug therapy to prevent development of disabilities and deformities. In the year 2021-22, among the patients who were on MDT, the completion rate was 98% for Paucibacillary and 96% for multibacillary in Tamil Nadu. Under disability prevention and medical rehabilitation, reconstructive surgeries(RCS) are performed, protective/ micro-cellular (MCR) rubber footwear, aids and appliances are provided to patients. To provide RCS, 2 government institutions and non-governmental institutions have been recognised in Tamil Nadu. The following aid and appliances are provided to the needy patients: Goggles, Wheel chairs, Walking Sticks, Walkers, Exercise Balls, Plastic Basins, Elbow / Auxiliary Crutches, Artificial Limbs, Upper / Lower limb Splints, Self-care kits, Slings, Hand Gloves, Immobilizers & Hand Grip aid Kits.

All cases during treatment, PB or MB, should be followed up at least once in a month by a health staff through home visit. This home visit should not only ensure the complains to treatment but also screen the case for side effects and incidence of lepra reaction. This home visit will also provide an opportunity for the health provider to screen the household contacts of the leprosy case repeatedly every month.

Institutional services for rehabilitation is provided through Government rehabilitation homes. The state has 10 such rehabilitation homes. The services that are provided through these homes are Medical care, Surgical care, Ulcer Management, Physiotherapy and vocational rehabilitation like Kitchen gardening, Bandage, Tailoring, Mat weaving, Chappal repairing, Broom stick making etc. Apart from such rehabilitation homes, there are 6 Government leprosy Hospitals which provides institutional services for leprosy patients like Outpatient services, in patients admission, referrals in, physiotherapy, ulcer management, treatment for general illness, treatment for leprosy complications and distribution of MCR footwear.

REDUCING INCIDENCE OF LEPROSY

MDT is beneficial for people with the disease, however MDT has reached its peak potential warranting further strategies to reduce the incidence of leprosy. Chemoprophylaxis (Post exposure Prophylaxis) for leprosy contacts with Single Dose Rifampicin(SDR) is the current strategy in place for leprosy elimination. Contact survey should be done for all newly detected cases. In rural areas, the entire village population where new case was detected is covered under screening. In Urban areas, 100 houses on either side of the patient's house is covered. Contacts age ≥ 2 years who have been living

/ working / having social activities for more than 3 months & 20 hours / week with a newly detected case of leprosy in the last 1year are eligible for SDR. As shown in Table 6, for every 1 new case detected, almost 500 contacts are screened and almost 10 contacts were given SDR in Tamil Nadu.

Table 6 : Contact survey among leprosy cases in Tamil Nadu

Year	No of new cases	No of contacts screened	No of new cases detected among contacts	No of contacts eligible for SDR	No SDR administered
2019-20	4252	2731255	211	32011	30124
2020-21	1769	785703	101	14829	13693
2021-22	2434	953605	86	22905	20934
2022-23	3090	1285260	123	31171	29030

Source - State Leprosy Office, Directorate of Public Health and Preventive Medicine, Tamil Nadu

To reduce incidence, post exposure prophylaxis with single dose Rifampicin –hence all contacts are under surveillance. Contact tracing for leprosy is done through different strategies –All types of contacts should be screened within a week of diagnosis of the index case. The other strategies are repeat contact tracing, retrospective contact tracing, reverse contact tracing.

The other strategy under consideration is vaccine against leprosy. Several vaccine options have been under trial in the past 4 decades, of which only BCG is found to be effective. The other vaccines under trial are MIP and LepVax.[9] Vaccine trials are not successful because of the inability to culture M. leprae in artificial media.

SOCIAL SUPPORT FOR LEPROSY PATIENTS

Welfare allowance of Rs 12,000 is given to patients for their reconstructive surgery. Access to social support and rehabilitation including reconstructive surgery, monetary support in the form of monthly pension of Rs 2000 as leprosy cured Maintenance Grant is given for those who have completed treatment but has deformity. The grant is given through differently abled department and locomotor aids is provided to patients with deformity.

PREVENTION OF STIGMA, DISCRIMINATION AND VIOLATION OF HUMAN RIGHTS

SPARSH leprosy awareness campaign is observed fortnightly from January 30 – February 13 to increase awareness and reduce stigma related to disease. To created awareness among school students, leprosy is included as a topic in Science textbook of Class IX. Different media are used for spreading awareness about leprosy and to reduce stigma against leprosy.

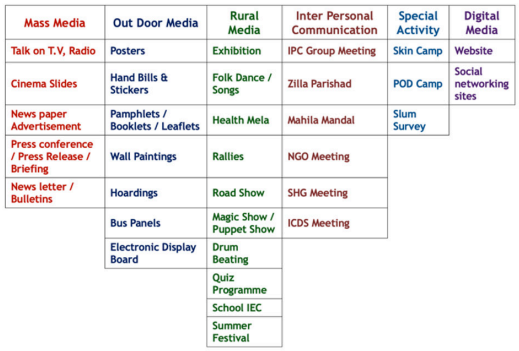

Figure 3 : Various media used for awareness creation in leprosy

Counselling and mental health services is an integral part of Leprosy management. Patients are counselled for Acceptance of disease, Regular Treatment and follow up; family members are counselled to alleviate fear about leprosy and scientific facts about leprosy.

All discriminatory laws, both at the national and sub-national level were repealed. In Tamil Nadu, around 13 acts have been identified which are discriminatory in nature, out of which 8 have been amended and the rest amendment is in process (Table 7).

Table 7 : List of laws amended in Tamil Nadu

Sl.No	Title of the act	Action Taken
Laws Setting up Universities		
1	Alagappa University Act, 1985	Amended
2	Mother Teresa Women's University Act, 1984	
3	Bharathiyar University Act, 1981	
4	Tamil University Act, 1982	
5	Bharathidasan University Act, 1981	
6	Madurai Kamaraj University Act, 1965	
7	Madras University Act, 1923	Under Process
Municipal Laws including Panchayat Raj acts		
8	Coimbatore City Municipal Corporation Act, 1981	
9	Madras Panchayat Act, 1958	
Laws relating to Transport		
10	Chennai Metro Railway (Carriage and Ticket) Rules, 2014	
Beggary laws		
11	Tamil Nadu Prevention of Begging Act, 1945	Under Process
Laws regarding representation in religious institutions		
12	Tamil Nadu Hindu Religious and Charitable Endowments Act, 1959	Under Process
Excise Laws		
13	Tamil Nadu Excise Act, 1971	Amended

STRENGTHENING OF SURVEILLANCE

In Tamil Nadu under Section 62 of Tamil Nadu State Public Health Act, leprosy was declared as a notified disease. Under section 64, every medical practitioner who in the course

of their practice, becomes, cognizant of the existence of any notified disease, give information of the same with the least practicable delay to the local health authority (i.e) Deputy Director of Health services in districts, City Health Officers and Municipal Health Officers or executive authority in Corporations and Municipalities concerned. Under section 134 (1) of Tamil Nadu Public Health Act, 1939 also informed that, failing to notify Leprosy will be liable for a penalty.

Introduction of NIKUSTH - A real time leprosy reporting software across India was introduced as a digital surveillance mechanism under Ayushman Bharat Digital Health Mission. All patients diagnosed with leprosy are continuously under follow up and those released from treatment are under surveillance for a period of 5 years. The contacts of these patients are also under surveillance.

CURRENT CHALLENGES

There are certain impediments which may hinder the process towards elimination of leprosy. The challenges are absence of a fast and point of care diagnostic tool leading to delay in detection of the disease; limited clinical expertise at all levels requiring training and retraining continuously; limited research on newer drugs or vaccine; stigma and discrimination; longer incubation period which requires a long duration follow up for contacts. Urbanization and Migration further poses a challenge for screening and follow Patients are considered cured and released from treatment if they had completed their course of treatment. Since the bacteremia is not tested, there is no assurance if the patient is free from disease and makes the possibility of relapse higher. Longer duration of treatment and adverse effects leading to poor compliance; antimicrobial resistance; potential animal reservoirs making zoonotic transmission a possibility; paper based reporting challenges reporting and surveillance; and stigma & discrimination associated with the disease makes leprosy a poor candidate for eradication.

CONCLUSION

Despite these challenges, leprosy has shown a declining trend. A strong political and other stakeholders commitment with efficient strategies in place, elimination of leprosy with zero new transmission by 2030 is a definite possibility in Tamil Nadu.

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