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REVIEW ARTICLE

Leprosy Elimination in Bihar, India: Progress, Policy Innovations, and Future Strategies

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Abstract

India's ongoing efforts to eradicate Hansen's disease (leprosy) are examined, with a specific focus on progress and challenges in Bihar. Initiatives at the federal and state levels, such as the National Leprosy Eradication Program and focused treatments, are evaluated critically for efficacy. The ongoing obstacles to eradication are examined even in light of notable successes in lowering prevalence. Bihar has effectively achieved the WHO eradication target at the state level, and key findings show a significant decline in leprosy cases nationwide. However, obstacles like enduring endemic regions, widespread social stigma, and developing antibiotic resistance keep eradication from being fully achieved. A key framework for improving surveillance, reducing stigma, and speeding up case detection is the National Strategic Plan and Roadmap for Leprosy (2023-27). To achieve Leprosy Mukt Bharat by 2027, the results highlight the need for multisectoral action and consistency.

Keywords: Hansen's Disease, Leprosy, National Leprosy Eradication Program, Disease Elimination,

BACKGROUND/INTRODUCTION

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Leprosy sometimes referred to as Hansen's disease is a persistent bacterial infection brought on by Mycobacterium leprae (M. leprae) a gram-positive obligatory intracellular bacillus that is acid-fast and mainly targets Schwann cells in peripheral nerves and phagocytes in the skin [1,2]. M. leprae is primarily cultivated in mouse footpads for laboratory research although the 9-banded armadillo is a wild host in the southern United States [3]. By the end of the 20th century the World Health Organization (WHO) aimed to eradicate leprosy worldwide as it has historically been common in tropical developing and underdeveloped countries [4]. Despite international efforts total disease control is still elusive. The use of multidrug therapy (MDT) dramatically decreased registered cases and prevalence between 1900 and 2000 highlighting improved healthcare quality globally even though new case numbers stabilized or slightly increased as a result of intensified detection [5]. India Brazil and Indonesia reported the most new cases (10000) in 2020. The highest detection rates worldwide were found in Southeast Asia (SEAR) and Africa (AFR) with SEAR accounting for 62% of all new child cases [6]. In response, the WHO introduced The Global Leprosy Strategy 2016-2020: Accelerating toward a leprosy-free world which aims to reduce the number of new cases of grade 2 disability to less than one per million enact anti-discrimination laws and eradicate new child cases with visible deformities [7]. Leprosy is still endemic in many developing nations despite control efforts and the extensive use of MDT as of the end of 2019 202256 patients were receiving treatment representing a prevalence rate of 22 points per million including 14893 children under the age of 14 [4,8,9]. Cases are still occurring in many parts of the world and the high incidence in children under the age of 15 suggests early exposure high rates of transmission and possibly insufficient control measures [4,9,16]. Leprosy is difficult to spread mainly through respiratory droplets from prolonged continuous contact with untreated people even though it is frequently misunderstood [2,13]. The main goals of prevention are to reduce close contact with untreated cases give early detection and treatment top priority and take into account BCG vaccination [5,14]. Importantly amputations were historically performed to treat injuries resulting from the inability to feel pain leprosy does not cause flesh decomposition or digit loss [1,12]. The disorder which affects the skin peripheral nerves, and mucous membranes impairs patients' social and mental health in addition to their physical health and causes significant physical limitations and social stigma if left untreated [3,9]. Although the World Health Organization met its global goal of less than one case per 10000 people in 2005 leprosy is still a major issue in India with Bihar being one of the states most affected [6,15]. In response three years before the Sustainable Development Goals deadline of 2027 the Indian government initiated the ambitious National Leprosy Eradication Program to eliminate leprosy in India [5,19]. In light of the diagnostic difficulties and paucity of scientific research on patient outcomes, this review attempts to address the neglect of

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childhood leprosy which is a reflection of early exposure to M. leprae by outlining recent developments in its epidemiology clinical diagnosis and management.

Review of literature

India has demonstrated notable progress in leprosy elimination, with national prevalence rates decreasing from 0.69 per 10,000 people in 2014–15 to 0.45 in 2021–22, and the Annual New Case Detection Rate (ANCDR) dropping from 9.73 to 5.52 per 100,000 during the same period. Bihar, a historically impacted state, achieved the WHO eradication goal at the state level by 2015 through sustained efforts to lower both prevalence and ANCDR via targeted interventions [4,5,19]. Key programmatic interventions have included the Leprosy Case Detection Campaign (LCDC) since 2016, focusing on hidden cases in hard-to-reach areas, and the ASHA-Based Surveillance for Leprosy Suspects (ABSULS) program, which has enhanced community-level surveillance and early detection through Accredited Social Health Activists (ASHAs) [22,23]. Additionally, Focused Leprosy Campaigns (FLC) have prioritized high-risk neighborhoods, and increased funding for reconstructive surgery (from Rs 8,000 to Rs 12,000) alongside free multidrug therapy (MDT) has improved treatment outcomes and rehabilitation [4,19]. The clinical manifestation of leprosy often includes distinct skin lesions, such as those seen in tuberculoid leprosy and Lepromatous leprosy, characterized by well-defined borders and sensory loss (Figure 1 and Figure 2).

Figure 1- Tuberculoid leprosy: lesion with a single, stable, hairless plaque, and well-defined borders (photograph courtesy of Eichelmann, et al.) [25]

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Figure 2- Lepromatous leprosy: skin lesions resembling guttate psoriasis, prurigo nodularis, or hypertrophic lichen planus (photograph courtesy of Kundakci, et al.) [26]

Despite this progress, significant challenges persist. Bihar still contends with endemic areas in districts like Muzaffarpur, Vaishali, and Samastipur, where prevalence rates in some blocks exceed two per 10,000, exacerbated by poverty and population growth limiting healthcare access [4,5,19]. Social stigma and discrimination remain major barriers, with studies indicating that up to 60% of patients in Bihar delay seeking care due to fear of social exclusion, thereby hindering early diagnosis and treatment adherence [3,21]. Furthermore, emerging antimicrobial resistance (AMR), particularly to rifampicin, poses a new threat, leading to the publication of the National Guidelines for AMR Surveillance in Leprosy in 2023 to enhance drug-resistant case management [19,20]. The Union Health Ministry emphasizes that the "last mile" of elimination is the most arduous, necessitating intensified efforts, innovation, and cross-sectoral collaboration [19].

In response to these challenges, the National Strategic Plan & Roadmap for Leprosy (2023-27) outlines several policy innovations. These include accelerated case detection through active surveillance in high-burden and hard-to-reach areas, strengthened surveillance utilizing digital tools (Nikusth 2.0), ABSULS, and FLCs for real-time monitoring [19]. Robust guidelines and laboratory networks are being implemented for AMR surveillance, and there is greater funding for medical rehabilitation and reconstructive surgery [4,19,20]. National awareness initiatives, such as educational videos and community involvement, are crucial for stigma reduction [19,21]. The Ministry stresses that collaboration between government organizations and civil society is essential to achieve "Leprosy Mukt Bharat" by 2027 [19,24]. Bihar's future approach will involve expanding LCDC and FLCs to cover all high-risk blocks, utilizing digital tools and mobile health units for instant case tracking [19]. Community involvement will be enhanced through educational campaigns featuring former patients, local leaders, and ASHAs, alongside school-based anti-discrimination initiatives [19,22]. Consolidation of AMR monitoring and surveillance will include completing Nikusth 2.0 for data-driven interventions

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and establishing rapid response and AMR surveillance sentinel sites [19,24]. Ensuring easy access to reconstructive surgery and vocational training, combining legal protection against discrimination with disability-inclusive development, and syncing with rural health systems by leveraging Ayushman Bharat and other primary care programs for comprehensive leprosy treatments, and educating medical professionals on early detection, complication management, and patient counseling, are also vital components [19,24].

Treatment

Multidrug therapy a highly effective combination of antibiotics is the cornerstone of leprosy treatment and has significantly decreased the disease's global burden. Leprosy classification determines the precise antibiotic regimen and duration: multibacillary (MB) leprosy requires rifampicin dapsone and clofazimine for twelve months whereas paucibacillary (PB) leprosy is usually treated with rifampicin and dapsone for six months [15,20]. Through the National Leprosy Eradication Program MDT is offered free of charge in India, guaranteeing accessibility for all patients. Reconstructive surgery, which has seen increased funding, is part of the comprehensive care that goes beyond antibiotic therapy to address deformities and disabilities brought on by nerve damage [16,22]. In addition, patients might need physiotherapy, wound care, immunological reaction management and in the event of emerging antimicrobial resistance (AMR) alternative medication regimens based on national surveillance guidelines.

Prevention

Although there are many different approaches to preventing leprosy, the main goals are to reduce risk factors and stop transmission. Since this makes people non-infectious and stops the disease from spreading, early detection and timely MDT treatment of new cases are crucial [8,15]. For this initiative, such as the Leprosy Case Detection Campaign (LCDC) and ASHA-Based Surveillance for Leprosy Suspects (ABSULS) are essential. Contact tracing and single-dose rifampicin post-exposure prophylaxis for close contacts of confirmed cases are complementary approaches [13,24]. The BCG vaccine, which is used to prevent tuberculosis, has some protective effects against leprosy even though it is not a direct vaccine. In addition, transmission rates can be indirectly decreased by addressing underlying socioeconomic determinants like poverty and overcrowding [14]. Public awareness campaigns are an important part of prevention because they fight discrimination and social stigma, which frequently postpone diagnosis and treatment. These programs encourage people to seek care as soon as possible and include community involvement and educational videos [20,23]. Lastly, real-time monitoring and data-driven interventions for a more successful preventive strategy are

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guaranteed by improved surveillance employing digital tools and rapid response teams.

DISCUSSION

Bihar met the WHO's leprosy eradication target at the state level in 2015, but there are still obstacles in the way of achieving Leprosy Mukt Bharat by 2027. Initiatives like LCDC and ABSULS have made significant strides toward lowering the national prevalence [17]. But in districts like Muzaffarpur Vaishali and Samastipur, endemic areas continue to exist, made worse by poverty and a lack of access to healthcare. A significant obstacle is still social stigma, which causes many patients to put off treatment out of fear of being excluded, worsening the effects on their bodies and their relationships. A new threat is the rise of antimicrobial resistance (AMR), especially to rifampicin, which calls for attentive monitoring and flexible approaches [22]. Achieving the final phase of elimination demands intensified, multisectoral efforts, sustained political will, public participation, and data-driven innovation, as outlined in the National Strategic Plan & Roadmap for Leprosy (2023-27) [4,17]. Bihar's continued commitment to addressing these complex challenges will be crucial for national and global eradication success.

CONCLUSION

The elimination of leprosy in Bihar has been made possible by proactive case detection, community-focused approaches, and strong policy initiatives. A few of the contemporary problems include resistant endemic areas, social stigma, and antibiotic resistance. It will take multisectoral action and unrelenting innovation in monitoring to achieve "Leprosy Mukt Bharat" by 2027. If there is sustained political will public involvement and evidence-based approaches Bihar could serve as a model for the national and global eradication of leprosy.

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