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DIGITALIZATION AND SOCIAL SUPPORT: A PROGRAMME REVIEW OF INDIA'S NATIONAL TB ELIMINATION STRATEGY

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ABSTRACT India's National Tuberculosis Elimination Programme (NTEP) has evolved from a treatment-centric to a prevention-driven approach over the past decade. Guided by the National Strategic Plan for TB Elimination (2017–2025) and TB Mukt Bharat vision, the programme now integrates preventive therapy, digital surveillance, and social protection to accelerate progress toward ending TB.[1] **Objectives:** To review national TB prevention strategies under NTEP, document the evolution of programme components, analyse key implementation challenges, and recommend approaches to strengthen prevention delivery systems. **Methods:** A mixed-methods review was undertaken comprising: (a) analysis of official NTEP and Ministry of Health and Family Welfare guidelines, TB Mukt Bharat campaign documents, and Ni-kshay operational modules; (b) secondary review of national indicators from reports.nikshay.in on TB notifications, contact tracing, and TB Preventive Therapy (TPT) initiation and completion and (c) synthesis of published evidence from the Central TB Division and WHO.[2,4] **Results:** India's prevention framework now includes universal household contact investigation, programmatic TPT using shorter regimens (3HP/3RH/6H), intensified campaigns (100-Day ACF, Ni-kshay Shivirs), and social protection through Ni-kshay Poshan Yojana.[5] Digital tools such as TPT and contact tracing registers have enhanced data visibility. However, gaps remain in ensuring full contact coverage, adherence to TPT, and linkage with private sector care. Socio-structural barriers such as undernutrition, diabetes, and stigma continue to affect prevention outcomes.[6]

KEYWORDS : Tuberculosis prevention, NTEP, TB Mukt Bharat, Ni-kshay, TB preventive therapy, India.

INTRODUCTION

Tuberculosis (TB) continues to be a major public health challenge in India, contributing the highest number of cases globally. In 2022, India accounted for approximately 2.82 million new TB cases (199 per 100 000 population) and 331 000 deaths (23 per 100 000 population), representing nearly 26% of the global burden.[1,2] Despite sustained efforts under NTEP, the rate of decline in TB incidence and mortality remains modest, indicating the need for intensified and integrated prevention efforts.[3] The Government of India has set an ambitious target to eliminate TB by 2025, five years ahead of the global 2030 SDG target.[4] The national strategy aims for an 80% reduction in TB incidence, a 90% reduction in mortality, and the elimination of catastrophic costs for TB-affected households compared to 2015 levels.[5] These goals are being pursued through strengthened case finding, universal drug-susceptibility testing, expanded preventive therapy, and multisectoral action addressing social determinants. Prevention remains the cornerstone of TB elimination. Comprehensive prevention includes contact investigation, LTBI screening and treatment, infection prevention and control (IPC) in healthcare settings, BCG vaccination, and nutritional/social support. Addressing risk factors such as undernutrition, overcrowding, and limited healthcare access is equally crucial. This manuscript presents a comprehensive review of TB prevention in India summarizing epidemiological trends, mapping prevention strategies, examining recent policy changes, and identifying persistent challenges essential to achieving TB elimination targets.

OBJECTIVES

The primary objective of this review is to describe the major tuberculosis prevention strategies adopted by the Government of India under the National Tuberculosis Elimination Programme (NTEP) and their evolution over time, while the secondary objective is to identify key implementation challenges encountered in the delivery of TB prevention interventions under the programme.

METHODS

Desk review: NTEP guidelines (NSP 2017–25), TPT guidance (2021/2023), TB Mukt Bharat strategy, Ni-kshay technical notes, National Strategic Plan updates, PMTBM initiatives, Ni-kshay dashboards. Program data analysis: Ni-kshay aggregate indicators for years 2018–2025: notified cases, contact tracing coverage, TPT initiation & completion, private notifications, undernutrition support disbursed. Synthesis: Map strategies to pillars (case finding, TPT, social support, digitalization, campaign/ACF, multisectoral action, private sector engagement, research/innovation).

RESULTS

Evolution of the programme, Independent nation India launched various regional and national programmes to address TB menace.

Table – 1 TB Programme In India

Mile Stone/Initiative	Key Shift
National Tuberculosis Control Programme (NTCP 1962)	Focus on domiciliary treatment and BCG vaccination; limited diagnostic and follow-up systems.[1]
Revised National Tuberculosis Control Programme (RNTCP) introduced (1997)	Adoption of WHO's DOTS strategy; phased national expansion completed by 2006.[2]
Launch of Ni-kshay digital portal (2012)	Case-based TB surveillance and mandatory notification from public and private sectors.[3]
National Strategic Plan (NSP) for TB Elimination (2017–2025) launched	Strategic shift from TB control to TB elimination; pillars: Detect–Treat–Prevent–Build (DTPB).[4]
Jan 2020 RNTCP renamed as National Tuberculosis Elimination Programme (NTEP)	Programme rebranding to align with India's target of TB elimination by 2025.[5]
Rollout of TB Preventive Treatment (TPT) policy (2018–2019)	Expansion of LTBI screening in high-risk groups; shorter preventive therapy regimens introduced.[6]
Sept 2022 Launch of Pradhan Mantri TB Mukt Bharat Abhiyan (PMTBMBA)	Community and private sector engagement through Ni-kshay Mitra initiative; focus on nutritional and social support.[7]
(Ongoing) Ni-kshay portal upgrades & multisectoral integration. (2023–2025)	Strengthened digital monitoring, contact tracing, and real-time patient support systems.[2,3]

Programme Outcome Snapshot: Key Indicators of NTEP

Table-2 TB Key Indicators

Indicator	Latest National Estimate
Total TB cases notified	≈ 26 lakh cases (2024)[1]
TB incidence rate	~195 per 100 000 population (2023)[2]
TB mortality rate	~22 per 100 000 population (2023)[2]
Vulnerable population screened (100-Day ACF campaign)	≈ 12.97 crore individuals[3]
Private sector TB notifications	≈ 8.44 lakh cases (~33% of total notifications)[4]
Reduction in "missing" TB cases	Decline from ~15 lakh (2015) to ~2.5 lakh (2023)[2]

Note: Data reflect national level trends reported by MOHFW, DGHS, and Ni-kshay platform; figures are rounded for clarity.[1,4]

Implementation Challenges And Mitigation Strategies: Implementation of tuberculosis prevention under the National Tuberculosis Elimination Programme (NTEP) faces several operational and systemic constraints.

Operational And Programme Challenges: Limited human resources, high workload at peripheral facilities, and intermittent supply of preventive therapy drugs affect contact investigation and TB Preventive Therapy (TPT) coverage. Incomplete household contact listing and variable TPT initiation and completion remain programmatic gaps.[1,4] Strengthening district-level planning, routine use of Ni-kshay for contact enumeration, and structured follow-up mechanisms may improve programme performance.

Social-Structural Challenges: Undernutrition, poverty, and stigma continue to influence care-seeking behaviour and adherence to preventive interventions.[5,6] Strengthened nutritional support, counselling services, and community-based engagement are essential to address these barriers.

Technical and policy challenges

Data quality issues, delayed notifications, and limited integration of private-sector reporting affect surveillance accuracy. Uneven financing and suboptimal multisectoral coordination further constrain scale-up.[7,8] Improved digital validation systems, regular data audits, and dedicated financing for TB prevention activities can support sustained implementation.

Innovations And Promising Practices Under NTEP: India's National Tuberculosis Elimination Programme (NTEP) has introduced several programmatic and technological innovations to accelerate progress toward TB elimination. The Ni-kshay digital platform has evolved into an integrated national surveillance and patient-management system, linking TB notification, contact tracing, TB preventive therapy (TPT), adherence monitoring, and Direct Benefit Transfer (DBT), thereby improving real-time programme monitoring and accountability.[1,2] The expansion of shorter rifamycin-based TPT regimens such as 3RH and 3HP has improved treatment adherence and completion among high-risk contacts.[3,4] Community participation has been strengthened through the Ni-kshay Mitra initiative under the Pradhan Mantri TB Mukt Bharat Abhiyan, addressing nutritional and social vulnerabilities alongside biomedical care.[5,6] Decentralisation of drug-resistant TB services, supported by molecular diagnostics and digital clinical support, has reduced treatment delays and improved access.[7] Differentiated, patient-centred care models aligned with WHO guidance further optimise resource use while improving continuity of care.[8]

DISCUSSION

India's tuberculosis (TB) response has evolved considerably over the past two decades, transitioning from a primarily treatment-driven programme to an integrated framework emphasizing prevention, digital surveillance, and social protection. The early years of the Revised National TB Control Programme (RNTCP) centered on expanding Directly Observed Treatment, Short-course (DOTS) and strengthening diagnostic capacity. With the launch of the National Strategic Plan (NSP) for TB Elimination (2017–2025), prevention emerged as a central theme, incorporating infection control, contact tracing, and tuberculosis preventive treatment (TPT) within the continuum of care. This marked a fundamental reorientation-from curing disease to breaking transmission chains and protecting high-risk populations.[1]

Digital platforms such as Ni-kshay have been pivotal in operationalizing this preventive focus. The integration of contact tracing modules, TPT registers, and beneficiary tracking systems has enabled near–real-time monitoring of case finding and preventive therapy initiation.[2] Complementary social schemes, notably Ni-kshay Poshan Yojana and the TB Mukt Bharat Abhiyan, have linked nutritional support and community participation to biomedical care, acknowledging the social and economic dimensions of TB vulnerability.[3] Together, these shifts indicate that India's elimination strategy now encompasses biomedical, digital, and socio-structural interventions within a unified policy vision.

In comparative perspective, India's preventive framework aligns closely with the World Health Organization (WHO) End TB Strategy, which recommends scaled-up TPT among high-risk contacts and routine Active Case Finding (ACF) in vulnerable populations.[6] However, India's adaptation has distinctive features-shorter TPT regimens such as 3RH and 3HP introduced under national operational guidance, and the use of digital tools for contact and treatment tracking that demonstrate contextual innovation within global norms.[11] India's approach has also leaned toward mass community drives and special campaigns (e.g., the 100-Day ACF and Ni-kshay Shivirs), which enable wide outreach but require sustained human resource and logistical support.[10]

Despite these advancements, several implementation gaps persist. Operational challenges include uneven human resource deployment, logistical delays in preventive drug supply, and limited coverage of household contact screening.[13] Programmatic gaps relate to incomplete TPT initiation and poor adherence documentation, emphasizing the need for robust follow-up mechanisms.[12] Socio-structural barriers such as undernutrition, poverty, and stigma remain powerful determinants that undermine treatment completion and health-seeking behaviour.[16] The private sector, which accounts for a significant proportion of care-seeking, continues to exhibit under-reporting and variable linkage with national systems despite digital enablers.[18] These bottlenecks collectively weaken the impact of prevention strategies even where policies are well designed.

From a policy standpoint, four strategic directions appear essential. First, human resource strengthening through dedicated TB prevention coordinators at district and sub-district levels to ensure consistent TPT and ACF coverage.[14] Second, supply-chain assurance mechanisms using predictive tools within Ni-kshay-to prevent stock-outs of preventive regimens.[21] Third, enhanced social protection integrating nutrition, livelihood, and stigma-reduction interventions to address structural risk factors.[17] Finally,

private-sector stewardship via simplified digital integration, prescription audits, and community-based engagement can expand notification and follow-up reach.[18] Consolidating these measures within India's multisectoral TB framework will help convert the current prevention emphasis into measurable epidemiological impact, aligning national progress with global elimination targets.

In sum, the expansion of prevention-supported by digital and social innovations marks a decisive phase in India's TB response. Sustaining these gains through integrated programmatic action and community partnership will be key to realizing the national goal of a TB-free India by 2025.

CONCLUSION

India's tuberculosis elimination journey has entered a decisive phase marked by a comprehensive integration of prevention, care, and social protection. The scale-up of tuberculosis preventive therapy (TPT) under national guidelines, together with strengthened digital surveillance through Ni-kshay and nutrition-linked support mechanisms such as Ni-kshay Poshan Yojana, has reinforced the programme's preventive foundation.[1,4] Yet, to sustain progress and achieve national targets, the programme must consolidate these gains through systematic expansion of TPT among all eligible contacts, robust monitoring of contact screening, and strengthened private-sector engagement to ensure comprehensive case notification.[11,18]

Addressing persistent social determinants - including undernutrition, poverty, and stigma remains central to ensuring equitable outcomes and improving adherence.[7,16,24] Parallel investments in real time data quality, uninterrupted supply chain mechanisms, and digital tracking platforms are essential to closing operational gaps in the preventive and care cascades.[2,15] Most importantly, continued community participation through national initiatives such as TB Mukt Bharat Abhiyan and Ni-kshay Mitra has the potential to transform TB elimination from a programmatic effort into a nationwide social movement.[5,17,24]

With sustained multisectoral action, strong community ownership, and consistent implementation of evidence-based preventive strategies aligned with global WHO guidance, India can continue progressing toward its goal of a TB-free nation and contribute significantly to global TB elimination efforts.[6,26]

Recommendations:

Strengthening TB prevention in India requires standardised household contact investigation with clearly defined targets and real-time monitoring through Ni-kshay modules to ensure complete identification and evaluation of exposed individuals.[1,13] Expanding access to shorter and better-tolerated TPT regimens such as 3RH and 3HP, supported by uninterrupted drug supply, counselling, and adherence mechanisms, remains essential[11 12 25]. Improving data quality through consistent use of Ni-kshay's TPT and contact-tracing tools, along with publicly accessible dashboards, is critical for transparency and accountability.[2,3,15] Integrating TB prevention with nutrition, diabetes management, and social protection-especially through strengthened monitoring of Ni-kshay Poshan Yojana and DBT systems can reduce vulnerability and improve treatment completion.[7,16,24] Deepening private-sector engagement via digital linkages, incentives, and quality-assurance mechanisms will expand notification and follow-up reach[18] while addressing TB-related stigma through continuous community based communication and Ni-kshay Mitra mobilisation can strengthen local support and improve health-seeking behavior.[17,24]

Limitations:

While this manuscript aims to provide a comprehensive review of tuberculosis prevention strategies under the National TB Elimination Programme (NTEP), several limitations must be acknowledged.

Data Constraints:

Programmatic data were primarily obtained from Ni-kshay dashboards and official reports of the Central TB Division (CTD), Ministry of Health and Family Welfare.[1,2,3] These data rely on timely state-level reporting and validation, which may introduce delays or underreporting.

Heterogeneity In Implementation:

The pace and quality of TB prevention activities such as contact tracing and TB Preventive Therapy (TPT) vary across states due to differences in infrastructure, workforce, and resource allocation.[11,13] This variability may affect the generalisability of national-level interpretations.

Reliance On Secondary Sources:

The review draws on publicly available documents, programme guidelines, published literature, and national digital portals.[2,6] Primary field-level evaluations, qualitative studies, and district-level audits were not included.

Dynamic Policy Environment:

Guidelines on TPT regimens, digital modules, DR-TB service decentralisation, and community engagement continue to evolve under the National TB Elimination Programme.[11,12,22,24] As a result, some recent updates may not be fully captured in this manuscript.

Broader Determinants:

Socioeconomic, nutritional, and structural determinants significantly influence vulnerability and outcomes but are incompletely reflected in routine programme data.[7,16] Despite these constraints, the review synthesises the most credible and updated programmatic and published evidence to support policy discussions and strengthen TB prevention in India.

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Data Availability: All data used in this manuscript are available through publicly accessible sources, including Ni-kshay dashboards and official publications of the Ministry of Health and Family Welfare.

Author Contribution: The author conceived the policy review, conducted the literature and document review, analyzed and synthesized the evidence, and drafted the manuscript.

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