REVIEW ARTICLE

Recent Updates of the National Tuberculosis Elimination Program in India

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Abstract

India bears one of the highest tuberculosis (TB) burdens globally, accounting for approximately 26% of the world's TB cases. The National Tuberculosis Elimination Program (NTEP), formerly known as the Revised National Tuberculosis Control Program (RNTCP), has undergone significant transformations in recent years to align with global End TB strategies and India's ambitious goal to eliminate TB by 2025, five years ahead of the global target. This review examines the recent updates and strategic shifts in NTEP, including diagnostic innovations, treatment regimen modifications, digital health initiatives, private-sector engagement strategies, and community participation models. The program's response to the COVID-19 pandemic and its recovery strategies are also discussed. While NTEP has made substantial progress in enhancing case detection, treatment success rates, and reducing catastrophic costs to patients, challenges remain in reaching missing cases, addressing drug resistance, ensuring sustainable financing, and integrating with broader health system reforms. The review concludes with reflections on future directions needed to achieve TB elimination in India by 2025.

Keywords: Drug resistance, NTEP, Tuberculosis.

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Introduction

Tuberculosis (TB) continues to be a major public health challenge in India, with an estimated 2.64 million cases occurring annually, representing over a quarter of the global TB burden.[1] Recognizing the urgent need to accelerate TB control efforts, the Government of India rebranded and revitalized its national TB program in 2020, renaming the Revised National Tuberculosis Control Program (RNTCP) to the National Tuberculosis Elimination Program (NTEP) to reflect its commitment to eliminating TB by 2025, five years ahead of the global Sustainable Development Goals target.[2]

This ambitious goal has necessitated substantial programmatic updates, policy shifts, and innovative approaches to address both long-standing and emerging challenges in TB control. The NTEP has focused on strengthening five key pillars: detect, treat, prevent, build, and research.[3] Recent years have witnessed significant transformations in diagnostic capabilities, treatment regimens, digital health integration, private sector engagement, and community involvement, all aimed at accelerating progress toward TB elimination.[4]

This review examines the recent updates and innovations in NTEP, highlighting both achievements and persistent challenges in India's journey toward TB elimination. As the COVID-19 pandemic significantly impacted TB services globally, the review also addresses NTEP's pandemic response and recovery strategies that have been critical in maintaining progress in TB control efforts.

Governance and Policy Updates

National Strategic Plan (2017-2025)

The National Strategic Plan (NSP) for TB Elimination 2017-2025 has been the blueprint guiding NTEP's transformation. The NSP articulates the ambitious goal of eliminating TB by 2025 and outlines key strategic pillars: "Detect, Treat, Prevent, Build, and Research". In a significant policy update in 2023, the NSP was revised to address gaps identified during mid-term reviews and to incorporate lessons learned from the COVID-19 pandemic. The updated NSP emphasizes enhanced surveillance, sub-national certifications for TB elimination, and greater integration with Ayushman Bharat and other health schemes.[5]

Administrative Restructuring

NTEP has undergone administrative restructuring to enhance coordination between central and state TB control entities. The Central TB Division (CTD) now functions with enhanced authority for program oversight, while State TB Cells have been strengthened with additional human resources and technical capacity.[6] A notable addition has been the

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establishment of the National TB Elimination Board (NTEB) in 2021, chaired by the Union Health Minister, which provides high-level political oversight and multisectoral coordination for TB elimination efforts.[7]

Diagnostic Updates

Expansion of Molecular Diagnostic Network

One of the most significant updates in NTEP has been the rapid expansion of molecular diagnostic capabilities. As of 2023, India has established over 3,760 molecular diagnostic facilities with nucleic acid amplification test (NAAT) technologies, including CB-NAAT (Cartridge Based Nucleic Acid Amplification Test, also known as GeneXpert) and Truenat.[8] The country has moved toward a decentralized testing approach, with Truenat machines deployed at block-level healthcare facilities, bringing rapid molecular testing closer to patients. This expansion has substantially reduced the initial diagnostic delay and improved the detection of drug-resistant TB cases.[9]

Universal Drug Susceptibility Testing (UDST)

NTEP has successfully scaled up universal drug susceptibility testing (UDST) for all TB patients, a critical component for appropriate treatment initiation and management of drug resistance. The program now ensures that all bacteriologically confirmed pulmonary TB patients undergo first-line and second-line drug susceptibility testing before treatment initiation.[10] Recent updates include the expansion of line probe assay (LPA) testing facilities for rapid detection of resistance to isoniazid, rifampicin, fluoroquinolones, and second-line injectable drugs. As of 2022, India had established 79 LPA laboratories across the country.[8]

AI-Enabled X-ray Screening

A significant innovation in NTEP's diagnostic approach has been the introduction of artificial intelligence (AI) for X-ray screening. The program has deployed AI-based software for automated interpretation of chest X-rays at over 500 sites to enhance TB case finding. The AI tools serve as screening tools to identify presumptive TB cases requiring confirmatory molecular testing. Early evaluations show that this approach has increased case detection by approximately 30% in active case finding activities.[11]

Treatment Regimen Updates

Shorter MDR-TB Treatment Regimens

NTEP has adopted the shorter MDR-TB (Multi-Drug-Resistant TB) treatment regimens recommended by WHO, reducing treatment duration from 18–24 months to 9–11 months for eligible patients. The all-oral shorter MDR-TB regimen introduced in 2020 has eliminated the need for injectable agents, reducing adverse effects and improving adherence.[12] In 2022, NTEP further updated its guidelines to include the BPaLM regimen (Bedaquiline, Pretomanid, Linezolid, and Moxifloxacin) for extensively drug-resistant TB (XDR-TB) patients, reducing treatment duration to just six months with significantly improved outcomes.[13]

Fixed-Dose Combinations and Daily Dosing

The program has completely transitioned to daily fixed-dose combination (FDC) formulations for drug-sensitive TB treatment, replacing the earlier intermittent therapy. This shift has improved adherence, reduced pill burden, and decreased the risk of acquired drug resistance.[14] Recent updates also include weight-band-based dosing for pediatric TB patients, with child-friendly formulations introduced across the program to improve palatability and adherence among children.[15]

Introduction of New TB Drugs

NTEP has successfully scaled up access to newer TB drugs including Bedaquiline, Delamanid, and Pretomanid for drug-resistant TB patients. As of 2023, these drugs have been made available across all states, with over 70,000 patients having received Bedaquiline-containing regimens since its introduction.[16] Conditional access to Delamanid for pediatric patients (aged 6–17 years) with drug-resistant TB has been another important update, addressing a critical gap in therapeutic options for children.[15]

Digital Health Initiatives

Nikshay Ecosystem

A transformative update in NTEP has been the evolution of the Nikshay platform from a simple case notification system to a comprehensive digital ecosystem for TB management. Nikshay 2.0, launched in 2018 and further enhanced in 2022, now serves as an end-to-end digital platform for patient registration, treatment monitoring, contact tracing, incentive disbursements, and program management.[17] Recent enhancements include integration with other digital health initiatives such as the Ayushman Bharat Digital Mission (ABDM) and the establishment of unique health IDs for TB patients to enable longitudinal tracking and integrated care.[18]

Nikshay Poshan Yojana and Direct Benefit Transfers

The Nikshay Poshan Yojana (NPY), providing nutritional support of ₹500 per month to TB patients, has been fully digitized with direct benefit transfers (DBT) through the Nikshay platform. This integration has improved the efficiency of disbursements and reduced delays. As of 2023, NTEP has expanded the scope of DBT to include transportation support for patients and incentives for healthcare providers, community volunteers, and private practitioners, all managed through the Nikshay ecosystem.[19]

Digital Adherence Technologies

NTEP has progressively adopted digital adherence technologies to improve treatment compliance. The 99DOTS initiative, which uses simple mobile phone-based

confirmation of medication intake, has been scaled up nationally for drug-resistant TB patients. More recent additions include video-observed therapy (VOT) pilots in selected urban areas and the introduction of medication event reminder monitoring systems (MERM) for patients with adherence challenges.[20]

Private Sector Engagement

Joint Effort for Elimination of TB (JEET)

The Joint Effort for Elimination of TB (JEET) initiative has been significantly expanded, focusing on systematic engagement with private healthcare providers. The program now operates in 406 districts across 23 states through contracted agencies that serve as intermediaries between NTEP and private providers. Recent updates include performance-based incentives for private providers, simplified notification processes, and free diagnostic and treatment support to patients treated in the private sector.[21]

Public-Private Support Agency Model

Building on lessons from JEET, NTEP introduced the Public-Private Support Agency (PPSA) model in 2022. This model creates a more sustainable framework for private-sector engagement with clearly defined key performance indicators and greater integration with public health systems. The PPSA model has incorporated digital vouchers for diagnostics and medications, allowing private patients to access these services free of cost while enabling providers to maintain their standard practices.[22]

Ayushman Bharat Integration

A notable update has been the integration of TB care packages within the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY). This integration provides comprehensive coverage for TB diagnostics and treatment, including management of complications and comorbidities through the national health insurance scheme. This approach addresses catastrophic costs associated with TB treatment, particularly for drug-resistant TB patients who often require prolonged hospitalization and management of adverse events.[18]

Community Engagement and Awareness Initiatives

TB Mukt Bharat Abhiyaan

The TB Mukt Bharat Abhiyaan (TB-Free India Campaign) launched in 2021, has been a cornerstone of NTEP's community engagement strategy. This initiative promotes a "whole of society" approach by involving elected representatives, civil society organizations, community leaders, and TB champions. A key innovation has been the Ni-kshay Mitra (Friend of Ni-kshay) platform, which enables individuals, organizations, and corporations to "adopt" TB patients and provide additional nutritional, vocational, or diagnostic support beyond government provisions.[23]

Community-Led Monitoring

NTEP has institutionalized community-led monitoring (CLM) of TB services, empowering affected communities to participate in program oversight. TB survivor networks and civil society organizations now conduct regular assessments of service quality, accessibility, and respect for patient rights. Findings from CLM activities are integrated into district and state program reviews, creating a feedback loop that has led to tangible improvements in service delivery and patient experience.[24]

Stigma Reduction Campaigns

Recognizing stigma as a major barrier to TB care, NTEP has launched targeted communications campaigns featuring TB survivors and celebrities as ambassadors. These efforts aim to normalize discussions around TB and portray it as a curable disease. Recent campaigns have specifically addressed workplace discrimination, with guidelines issued for employers to support employees diagnosed with TB and prevent termination or discrimination.[25]

COVID-19 Impact and Mitigation Strategies

Bidirectional TB-COVID Screening

In response to the COVID-19 pandemic, NTEP implemented bidirectional screening for TB and COVID-19. All COVID-19 patients with persistent cough are now systematically screened for TB, while TB patients are evaluated for COVID-19 symptoms. This approach has helped recover some of the case detection losses experienced during the pandemic and identified a higher-than-expected co-infection rate in certain regions.[26]

Integrated Airborne Infection Control

The pandemic accelerated NTEP's focus on airborne infection control measures in healthcare facilities. Updated guidelines now address integrated control measures for both TB and COVID-19, with enhanced emphasis on facility ventilation, personal protective equipment, and patient flow management. NTEP has leveraged COVID-19 resources to strengthen 247 TB laboratories with biosafety enhancements, benefiting both disease control programs.[27]

Digital Health Solutions for Pandemic Adaptation

NTEP rapidly scaled up digital health solutions to maintain TB services during pandemic-related restrictions. Teleconsultation services, digital medication refill requests, and home delivery of TB medications were implemented across all states. These adaptations have been retained and expanded post-pandemic, representing a valuable legacy of the crisis that has enhanced the program's resilience.[28]

HIV-TB Co-infection

HIV-TB co-infection poses a significant challenge to TB

elimination efforts in India, as TB remains the leading cause of hospitalization and death among people living with HIV (PLHIV). The NTEP, in collaboration with the National AIDS Control Programme (NACP), implements integrated services for early detection and management of co-infected cases. This includes intensified TB case finding (ICF) among PLHIV using a four-symptom screening algorithm (cough, fever, weight loss, night sweats) and routine HIV testing for all diagnosed TB patients. Prompt initiation of antiretroviral therapy (ART) for PLHIV, ideally within two weeks of starting TB treatment, is crucial to improve outcomes and reduce mortality. Additionally, TB preventive treatment (TPT) is offered to PLHIV after ruling out active TB, further contributing to prevention efforts.[7]

Diabetes-TB Co-infection

India faces a dual burden of TB and diabetes, with diabetes being a significant risk factor for developing active TB and potentially worsening TB treatment outcomes. The NTEP emphasizes bi-directional screening, meaning all registered TB patients are screened for diabetes, and individuals with diabetes are screened for TB using the four-symptom complex. This collaborative approach aims to strengthen referral mechanisms between TB and diabetes care centers, ensuring comprehensive management of both conditions. Studies have indicated that pulmonary TB patients with diabetes may experience lower cure rates and poorer treatment outcomes, highlighting the importance of integrated care to achieve better results and prevent complications. Addressing this co-morbidity is vital for India to achieve its ambitious goal of eliminating TB by 2025.[22]

Research and Innovation

India TB Research Consortium

The India TB Research Consortium (ITRC) has been strengthened under NTEP, coordinating research efforts across multiple institutions. The consortium focuses on indigenous development of diagnostics, drugs, vaccines, and implementation research. Recent achievements include the validation of indigenous molecular diagnostic tools, evaluation of host-directed therapies, and development of shorter treatment regimens for specific patient populations.[29]

TB Vaccine Research

NTEP has prioritized TB vaccine research, with two candidate vaccines currently in advanced clinical trials in India. The VPM1002 and Immuvac (Mycobacterium indicus pranii) vaccines are being evaluated for both prevention of disease and as immunotherapeutic adjuncts to drug treatment. The program has developed a comprehensive roadmap for TB vaccine introduction, including plans for phased implementation once an effective vaccine becomes available.[30]

Implementation Research for Program Optimization

NTEP has institutionalized implementation research within program operations, with each state now required to conduct operational research projects addressing local challenges. This approach has generated context-specific evidence for program optimization. A dedicated funding stream for implementation research has been established, with technical support provided through partnerships with academic institutions and the National TB Institute.[31]

Challenges and Future Directions

Addressing Missing Cases

Despite significant progress, India continues to have an estimated 390,000 "missing" TB cases that remain undiagnosed or unreported annually.[1] Future strategies must focus on innovative active case finding approaches, particularly in vulnerable populations such as urban slum dwellers, tribal communities, elderly individuals, and people with diabetes.[32]

Tackling Drug Resistance

Drug-resistant TB remains a significant challenge, with India reporting approximately 124,000 drug-resistant TB cases annually.[1] Expanding access to newer drugs and regimens, strengthening adherence support, and addressing the social determinants of drug resistance will be critical priorities.[32]

Sustainable Financing

While domestic funding for NTEP has increased substantially, with approximately 70% of the program budget now funded by the Government of India, funding gaps remain, particularly for nutritional support, private sector engagement, and research activities. The program needs to develop innovative financing mechanisms, including social impact bonds, corporate social responsibility partnerships, and integration with broader health financing reforms to ensure sustainability.[33]

Health System Integration

The success of TB elimination efforts ultimately depends on the strength of the underlying health system. Future updates to NTEP must focus on deeper integration with Ayushman Bharat Health and Wellness Centers, the National Digital Health Mission, and other health system strengthening initiatives.[34]

Conclusion

The transformation of India's TB control program into NTEP represents a paradigm shift from controlling TB to eliminating it as a public health problem. Recent updates have substantially strengthened the program's capacity across all domains, from diagnosis and treatment to digital health, private sector engagement, and community participation. While the COVID-19 pandemic created

significant challenges, it also catalyzed innovations and adaptations that have positioned the program for accelerated progress. However, achieving the ambitious goal of TB elimination by 2025 will require sustained politico-administrative commitment, adequate financing, continued innovation, and successful integration with broader health system reforms.

As NTEP moves forward, success will increasingly depend on addressing the social and economic determinants of TB, aggressive implementation of NTEP through enhanced advocacy and awareness among all stakeholders including medical, paramedical and students in a truly comprehensive response to the TB challenges. The program's evolution in recent years provides hope that with continued adaptation and innovation, India's vision of a TB-free nation can become a reality.

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