

PATHWAYS TO END TB- CHALLENGES

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Abstract:

Tuberculosis (TB) remains a major global health challenge, with India being one of the high-burden countries. Despite significant progress in TB control efforts, there are still challenges to be addressed, such as underdiagnosis, drug resistance, treatment outcomes influenced by socioeconomic factors, and the impact of the COVID-19 pandemic. Efforts to achieve TB elimination by 2025 require intensified research, innovation, and significant investment. A multi-sectoral approach involving all stakeholders is essential to end TB. India's National Tuberculosis Elimination Program has made significant strides, but challenges persist. It is crucial to maintain political commitment, utilize rapid diagnostic tests and effective treatment regimens, and ensure consistent supervision and monitoring. Collaboration and collective efforts are needed to achieve the TB elimination target by 2025.

Although Tuberculosis (TB) is considered preventable and curable. In the year 2022, it was the world's second leading cause of death from a single infectious agent, after coronavirus disease (COVID-19), and it caused almost twice as many deaths as HIV/AIDS. More than 10 million people continue to fall ill with TB every year [1]. One-fourth of the global population is estimated to have been infected with TB [2]. Without treatment, the death rate from TB disease is high (about 50 %) [3]. It poses major health challenges across the globe.

The WHO released a list of 30 high-burden countries worldwide for TB, HIV_TB, and MDR/RR-TB, with India being listed in all the above categories, requiring improved diagnosis, treatment, and clinical management [1]. Universal health coverage (UHC) is necessary to ensure that everyone can obtain the health services they need without suffering financial hardship. India has committed to ending TB by 2025. India's National TB elimination program is one of the largest public health programs. It has scaled up access to free rapid molecular diagnostics, treatment, and nutritional support to patients.

The Government of India is making significant efforts in introducing new tools for quality diagnosis and therapeutics, as well as revised plans for their implementation to improve standards for TB care. Pathways to end TB require seeking out and screening patients with the help of diagnostic algorithms and providing them with appropriate treatment and medical care.

Despite these outstanding achievements, there is still a long way to go to achieve a significant reduction in TB incidence and prevalence. The path to reach the TB elimination goal is full of challenges at the administrative and community level. The End TB Strategy aims to end the global TB epidemic by 2030. However, the rate of decline of TB burden has been slow, at a rate of 1.5–2% per year [4]. The large TB infection pool, along with risk factors for active disease, ageing, slow and insufficient case detection, low cure rates, and drug resistance, favors the slow decline in incidence.

TB treatment outcomes are also influenced by socioeconomic factors such as poverty, overcrowding, poorly ventilated spaces, vulnerable populations, including those living with HIV, diabetes, malnutrition, alcohol abuse, and drug and tobacco use, as well as migrants, refugees, and prisoners. Poverty and TB often go hand in hand. Without adequate nutrition, we will be unable to improve TB outcomes. There should be strong, reliable, multi-sectoral interventions and a global health approach to reach the End TB Target.

One challenging issue in TB diagnosis is the wide gap between the estimated number of people who develop TB each year (incident cases) and the number of people newly diagnosed and officially reported as a TB case. Therefore, many people are underdiagnosed with TB and underreported, which may be attributed to lack of awareness, human resources, and poor health infrastructure. Drug-resistant TB poses a significant challenge. Detecting drug resistance requires confirming the presence of TB bacteria through bacteriological testing and conducting drug resistance tests using rapid molecular diagnostics, culture methods, or sequencing technologies.

A current challenge in drug susceptibility testing is that Fluoroquinolone (FQ) resistance on drug susceptibility testing (DST) does not correlate with actual resistance, resulting in patients not benefiting from shorter regimen treatment [5]. Patients in need of longer, individualized regimens require a more comprehensive DST profile for proper regimen construction. Limited DST results may lead to the inclusion of ineffective and more toxic drugs and the exclusion of effective ones. Delayed DST results can also lead to the development of additional drug resistance mutations and the transmission of Drug Resistance TB (DRTB).

Although the efficacy of drug regimens has improved over time, challenges related to side effects, adverse drug reactions, longer treatment duration, low tolerability, and treatment adherence persist, posing ongoing challenges in treating patients with drug-resistant TB. Therefore, there is a need for treatment regimens with minimal drug combinations for a shorter duration, such as the BPaL regimen [6].

Newer technologies, such Whole Genome Sequencing, which can identify all known resistance mutations simultaneously, can overcome some limitations of culture-based DST. However, implementing this technology as a point-of-care test at primary centers is expensive and requires technical expertise.

TB preventive treatment(TPT) also plays a crucial role in achieving the goal of ending TB. There are interventions available to reduce the risk of TB infection progressing to active TB disease. The current scenario requires an intensification of TPT efforts and increased investment to expand its coverage. Achieving universal health coverage, including financial risk protection and access to quality essential healthcare services, affordable essential medicines, and vaccines for all, remains another significant challenge. The economic burden of tuberculosis on households is known to be high and poses one of the major challenges. The national strategic plan for the elimination of TB 2017 to 2025 aims to ensure zero catastrophic cost for affected families [7].

This is especially devastating for people with low income, causing delays in diagnosis as these patients often do not seek treatment until they are severely ill.

Meeting the targets of the End TB Strategy requires intensified research, innovation such as the development of new vaccines, and significant investment. A multi-sectoral approach involving all stakeholders, government departments, the private sector, community engagement, and survivor groups is essential to end TB.

Progress in reducing the burden of TB was reversed due to the global COVID-19 pandemic, causing a major setback that undid previous gains. In conclusion, India has a robust and well-functioning TB program, the National Tuberculosis Elimination Program (NTEP). The program includes defined guidelines for identifying presumptive TB cases, rapid and sensitive molecular diagnostic tests, efficient diagnostic algorithms, well-established treatment regimens with newer anti-TB drugs, and a large network of service delivery infrastructure. However, implementing all these initiatives has presented numerous challenges. Nonetheless, it's essential to acknowledge the unprecedented highest-level political commitment, rapid molecular diagnostics, effective treatment regimens, consistent supervision and monitoring, and the continuous supply of high quality medicines throughout the history of TB control programs. Therefore, if we cannot now stop and reverse the TB epidemic, we should not hope to achieve this in the future. Let's work together to achieve the TB elimination target of 2025.

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References

1. World Health Organization (WHO). Global Tuberculosis Report 2023. Geneva: WHO; 2023.

2. Houben RM, Dodd PJ. The global burden of latent tuberculosis infection: a re-estimation using mathematical modelling. PLoS Med. 2016;13(10), e1002152.
3. Tiemersma EW, van der Werf MJ, Borgdorff MW, Williams BG, Nagelkerke NJ. Natural history of tuberculosis: duration and fatality of untreated pulmonary tuberculosis in HIV negative patients: a systematic review. PLoS One. 2011;6(4), e17601.
4. World Health Organization (Who). Global Tuberculosis Report 2021. Geneva:WHO; 2021. www.who.int/publications/i/item/978924003702.
5. Arora a VK, Jindal b SK, Katiyar C SK, et al. Nikam m n, anirvan chatterjee O, and agam vora. "Genomic revolution: transforming tuberculosis diagnosis and treatment with the use of Whole Genome sequencing - a consensusstatement. Indian J Tubercul. 2023;70(4):383–389. <https://doi.org/10.1016/j.ijtb.2023.10.002>. ISSN 0019-5707.
6. van de Berg SEJ, Pelzer PT, van der Land AJ, et al. Acceptability, feasibility, and likelihood of stakeholders implementing the novel BPaL regimen to treat extensively drug-resistant tuberculosis patients. BMC Publ Health. 2021;21:1404.
7. National Strategic Plan for Tuberculosis Control. CentralTB Division, Ministryof Health and Family Welfare, GoI; 2017. Availableat