

Review Article

National Tuberculosis Elimination Programme in Nepal: A Review of Progress, Challenges, and Future Directions

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A B S T R A C T

Tuberculosis (TB) remains a major public health challenge in Nepal despite the availability of effective diagnostic and treatment services. Nepal has made important progress through its National Tuberculosis Programme, including expansion of diagnostic capacity, active case-finding, drug-resistant TB management, community engagement and integration of newer diagnostic technologies. The national TB prevalence survey conducted in 2018–2019 provided important evidence on the country's disease burden and demonstrated that a substantial proportion of people with TB may be asymptomatic, highlighting the importance of chest X-ray-based screening and active case finding. More recent programme activities have focused on improving access to diagnosis and treatment, strengthening services for drug-resistant TB and reaching vulnerable and hard-to-reach populations. WHO reported that Nepal had an estimated 68,000 incident TB cases in 2023, while only about 54% were enrolled in treatment, indicating a substantial gap between estimated disease burden and notified/treatment-enrolled cases. In 2024, Nepal expanded the use of the all-oral BPaLM regimen for drug-resistant TB. This review summarizes the evolution, current situation, diagnostic and treatment approaches, drug-resistant TB response, TB-HIV services, active case finding, programme challenges and future priorities of TB control in Nepal.

Keywords: Tuberculosis, National Tuberculosis Programme, Nepal, NTEP, Drug-Resistant Tuberculosis, Active Case Finding, TB-HIV

Introduction

Tuberculosis remains one of the most important infectious diseases worldwide and continues to impose a considerable public health burden in South-East Asia. Nepal has made sustained efforts to reduce TB morbidity and mortality through a national programme coordinated by the National Tuberculosis Control Centre under the Ministry of Health and Population. The country's TB response has

evolved from conventional case detection and treatment approaches towards more comprehensive strategies emphasizing early diagnosis, treatment adherence, drug-resistance management, contact investigation, community participation and equitable access to services.

The National TB prevalence survey conducted in Nepal in 2018–2019 was the first nationally representative survey designed to estimate the prevalence of bacteriologically

confirmed pulmonary TB among people aged 15 years and above. The survey screened more than 54,000 participants and identified 225 TB cases. Importantly, more than 70% of identified cases showed abnormal chest radiographs without relying on prolonged cough symptoms, demonstrating the limitations of symptom-only screening and the value of chest X-ray-based approaches.¹

WHO reported that Nepal had an estimated 68,000 incident TB cases in 2023, while approximately 54% were enrolled in treatment. The difference between estimated incidence and treatment enrolment indicates the continuing challenge of identifying and linking people with TB to care.² In 2026, WHO reported that Nepal continued to have an estimated annual burden of approximately 67,000 new TB cases, with around 40% remaining undiagnosed or unreported.³

Journey of Tuberculosis Control in Nepal

Nepal's TB control response has developed through successive national programme initiatives supported by the Ministry of Health and Population, the National Tuberculosis Control Centre, provincial and local health systems, development partners and community organizations. The programme has progressively incorporated standardized diagnosis and treatment, laboratory strengthening, directly observed treatment approaches, drug-resistance surveillance and management, TB-HIV collaborative activities and decentralized service delivery.

The national TB prevalence survey represented a major milestone because it generated nationally representative evidence on the gap between disease prevalence and routine notification. Its findings reinforced the need for active case finding, improved diagnostic access and greater attention to populations that may not present with classical symptoms.¹

National Tuberculosis Programme in Nepal

The National Tuberculosis Programme in Nepal is coordinated nationally through the National Tuberculosis Control Centre and implemented through the country's health service network. Programme priorities include early diagnosis of TB, prompt initiation and completion of treatment, prevention of transmission, management of drug-resistant TB, TB preventive treatment, contact investigation and strengthened surveillance.

A major programme priority is to identify missing TB cases. WHO's 2023 review of Nepal's national TB programme recommended strengthening leadership at all levels, scaling up active case finding, ensuring universal access to diagnosis and treatment, securing sustainable financing and increasing multisectoral engagement.⁴ These recommendations remain relevant because the gap between estimated

incidence and treatment enrolment continues to be a major obstacle to TB elimination.

Methodology

This review is based on secondary literature and programme documents concerning TB control in Nepal. The source material included WHO reports, Nepal's National Tuberculosis Control Centre publications, national TB prevalence survey findings and programme-review documents. Relevant information was synthesized under the major themes of TB burden, programme organization, case finding, diagnosis, treatment, drug-resistant TB, TB-HIV services, innovations, challenges and future directions. The review emphasizes Nepal-specific evidence rather than state-level data from India.

Current Scenario of Tuberculosis in Nepal

Nepal continues to experience a substantial TB burden. WHO estimated approximately 68,000 incident TB cases in 2023, with only 54% enrolled in treatment, demonstrating a considerable case-detection and treatment-access gap.² In 2026, WHO described TB as a significant public health challenge in Nepal and estimated approximately 67,000 new cases annually, with around 40% remaining undiagnosed or unreported.³

The national prevalence survey also demonstrated that TB is widely distributed across Nepal's ecological and demographic settings. The survey covered mountain, hill, Kathmandu Valley and Terai strata and found higher prevalence in men than women and increasing prevalence in older age groups.¹ These findings indicate the need for geographically appropriate screening and targeted approaches for vulnerable populations.

Infrastructure and Diagnostic Services

Nepal's TB diagnostic network has increasingly incorporated rapid molecular testing and digital chest radiography. The national prevalence survey demonstrated the value of digital chest X-ray and Xpert MTB/RIF testing for identifying bacteriologically confirmed disease.¹ More recent active case-finding activities have combined X-ray-based computer-aided detection with GeneXpert testing. In February 2025, WHO reported community screening in flood-affected municipalities in Kavrepalanchowk, Lalitpur, Sindhupalchowk and Sindhuli, where more than 3,200 people were screened and individuals diagnosed with TB were linked to free treatment.⁵

Expansion of molecular diagnostic capacity is particularly important for identifying rifampicin resistance and ensuring that patients receive an appropriate regimen without unnecessary delay. Strengthening specimen transport,

laboratory quality assurance and access to diagnostics in remote areas remains an important programme priority.

Active Case Finding

Active case finding is increasingly important in Nepal because a substantial proportion of people with TB may not report classical symptoms. The national prevalence survey found that more than 70% of identified TB cases had abnormal chest X-rays without relying on typical symptom-based screening.¹ Consequently, active screening of high-risk groups, household contacts, vulnerable communities and populations affected by emergencies can complement routine passive case detection.

Nepal has also demonstrated the feasibility of community-based screening using digital chest X-ray, artificial intelligence-supported interpretation and GeneXpert confirmation. The 2025 flood-affected-area initiative illustrates how active case finding can be integrated with disaster-response activities and community health volunteer engagement.⁵

Drug-Resistant Tuberculosis

Drug-resistant TB remains a major challenge for Nepal. WHO estimates around 2,400 MDR/RR-TB cases annually, while only 633 patients received treatment in 2024, indicating a substantial diagnosis and treatment gap.⁶ Nepal has expanded its DR-TB service network and introduced shorter all-oral regimens.

In 2024, Nepal introduced the WHO-recommended all-oral BPaLM regimen for DR-TB. The programme was initially launched in selected centres and subsequently scaled nationally in July 2024. WHO reported that DR-TB services were available through 31 treatment centres and 98 sub-centres, with additional facilities supporting patients.⁶ Continued training, laboratory capacity, pharmacovigilance and decentralized access will be essential for improving outcomes.

TB and HIV

TB-HIV co-infection requires coordinated diagnosis, treatment and prevention services because HIV increases the risk of developing active TB and may complicate clinical management. Nepal's TB programme therefore requires continued integration between TB and HIV services, routine HIV testing among eligible TB patients, timely initiation of antiretroviral therapy and appropriate preventive interventions. Programme monitoring should continue to focus on testing coverage, treatment initiation, adherence and outcomes among people affected by both conditions.

Innovations and Emerging Approaches

Nepal's TB response is increasingly incorporating community-based active case finding, digital chest

radiography, computer-aided detection, molecular diagnosis and shorter all-oral treatment regimens. These innovations can help address geographical barriers and the large proportion of missing TB cases. Community health volunteers also provide an important bridge between health services and communities, particularly during targeted screening campaigns.⁵

The 2023 national programme review emphasized sustainable leadership, active case finding, universal access to diagnosis and treatment, financing and multisectoral engagement.⁴ Together, these priorities indicate a shift from a predominantly facility-based model towards a more people-centred and community-responsive approach.

Challenges

Major challenges include underdiagnosis and underreporting, geographical barriers to health services, delayed health-care seeking, social and economic determinants, stigma, nutritional vulnerability, drug-resistant TB and the need for sustained financing. The estimated gap between incident TB cases and treatment enrolment demonstrates that routine notification alone is insufficient to achieve elimination targets.^{2,3}

Remote and hard-to-reach populations require additional diagnostic outreach, reliable specimen transportation and strengthened referral systems. Disaster events can further disrupt access to health services, making flexible and integrated active case-finding strategies important. The increasing use of digital X-ray and molecular testing provides opportunities to improve detection, but these technologies require appropriate infrastructure, trained personnel, quality assurance and sustainable financing.

Future Directions

Future TB control in Nepal should prioritize systematic active case finding among high-risk populations, expansion of quality-assured molecular diagnostics, wider use of digital chest radiography and computer-aided detection where appropriate, stronger contact investigation and preventive treatment, and improved linkage between diagnosis and treatment. Special attention should be given to remote communities and populations experiencing social or economic barriers to care.

For drug-resistant TB, Nepal should continue expanding access to shorter all-oral regimens, strengthen drug-susceptibility testing and ensure high-quality monitoring of adverse events and treatment outcomes. Greater integration of TB services with primary health care, HIV services, nutrition programmes, community organizations and local governments can improve continuity of care.

Sustainable domestic financing and multisectoral coordination are also essential. The continuing gap between

estimated disease burden and treatment enrolment means that elimination will depend not only on clinical interventions but also on stronger surveillance, community engagement, social protection and improved access to services.

Discussion

The findings of this review indicate that Nepal has made important progress in strengthening its national tuberculosis response, but the country continues to face a substantial gap between the estimated burden of disease and the number of people diagnosed and enrolled in treatment. The National TB Prevalence Survey 2018–19 was particularly important because it provided nationally representative evidence that the burden of TB was considerably higher than previously estimated. The survey estimated that more than 117,000 people were living with TB disease and that approximately 69,000 people developed TB during 2018–19. The estimated incidence was approximately 1.6 times higher than previously thought, demonstrating that routine programme notification alone was insufficient to describe the true burden of disease.

A major implication of the prevalence survey is the need to reconsider symptom-based approaches to TB detection. More than 72% of TB cases identified during the survey showed abnormal chest radiographs without relying on typical TB symptoms. This finding is particularly important for Nepal because people living in remote, mountainous and geographically difficult areas may have limited access to diagnostic facilities and may not seek care until disease is advanced. The survey therefore provides a strong epidemiological rationale for integrating chest X-ray screening with rapid molecular confirmation rather than relying exclusively on passive presentation and prolonged cough as triggers for investigation.

The distribution of disease observed in the national survey also suggests that TB control in Nepal requires differentiated strategies. TB prevalence was higher among men and older adults, while the prevalence was higher in hill and Terai populations than in the mountain and Kathmandu Valley strata. At the same time, the prevalence-to-notification ratio was particularly high in hill and mountain areas, suggesting that notification data may underestimate the underlying burden in geographically challenging settings. These findings support geographically targeted active case finding, mobile diagnostic services, community-based screening and improved referral and specimen-transport mechanisms.

The continuing case-detection gap remains one of the most important barriers to TB elimination. WHO reported that in 2018, only 32,474 of an estimated 69,000 people

who developed TB were reported, meaning that a large proportion of people with TB were not diagnosed or linked to treatment. More recent programme assessments continue to emphasize active case finding and universal access to diagnosis and treatment as central priorities. The 2023 WHO-supported review of Nepal's National TB Programme specifically recommended strengthening leadership at all levels, scaling up active case finding, ensuring universal access to diagnostic and treatment services, mobilizing additional resources and increasing multisectoral engagement.

Nepal's increasing use of active case finding represents an appropriate response to this diagnostic gap. Recent screening activities demonstrate how digital chest X-ray, computer-aided detection and GeneXpert testing can be combined in community settings. In 2025, WHO reported that screening camps in four flood-affected districts used X-ray-based computer-aided detection followed by GeneXpert testing for people with abnormal findings; more than 3,200 people were screened and individuals diagnosed with TB were immediately linked to free treatment. This model is particularly relevant for Nepal because it combines technological innovation with outreach to populations whose access to conventional facility-based services may be disrupted.

The use of computer-aided detection should nevertheless be viewed as an enabling technology rather than a substitute for a complete diagnostic pathway. Screening systems need appropriate referral mechanisms, confirmatory molecular testing, trained health workers, quality assurance and reliable treatment linkage. Without these components, increased screening could identify abnormalities without ensuring that people receive definitive diagnosis and treatment. Thus, the success of technology-assisted case finding should be evaluated not only by the number of people screened but also by the proportion receiving confirmatory testing, treatment initiation, treatment completion and documented outcomes.

Another important issue is the geographic organization of TB services. Nepal's terrain and dispersed settlements create structural barriers to accessing health facilities, especially for people living in mountainous and remote communities. The high prevalence-to-notification ratio observed in hill and mountain populations suggests that geographical accessibility may contribute to missed cases. Decentralization of services, mobile diagnostic units, community health volunteers, specimen transportation systems and referral networks can reduce these barriers. Such approaches are likely to be more effective when incorporated into routine primary healthcare rather than implemented only as short-term campaigns.

Drug-resistant TB represents a second major challenge. Nepal has continued to strengthen diagnostic and treatment services for drug-resistant disease, but the burden cannot be addressed through treatment expansion alone. Early detection of resistance, rapid molecular testing, access to appropriate all-oral regimens, management of adverse events, adherence support and treatment outcome monitoring must operate as a coordinated continuum of care. The introduction of newer shorter regimens provides an opportunity to improve patient acceptability and reduce the prolonged treatment burden associated with older approaches. However, programme success will depend on maintaining uninterrupted drug supplies, laboratory quality and trained clinical teams.

The relationship between TB and social determinants is also central to the Nepalese context. Poverty, nutritional vulnerability, migration, crowded living conditions, occupational exposure and stigma can influence exposure, health-seeking behaviour, treatment adherence and outcomes. Consequently, TB elimination cannot be achieved solely through biomedical interventions. The national programme needs to work with local governments, community organizations, social protection mechanisms and other sectors to address barriers that prevent people from reaching diagnostic and treatment services. WHO's review of Nepal's programme similarly emphasized multisectoral engagement and sustainable financing as strategic priorities.

The COVID-19 pandemic further demonstrated the vulnerability of TB services to disruptions in routine health-system functioning. Although the national prevalence survey predates the pandemic, its findings provide a useful baseline for understanding the magnitude of the missing-case problem. The subsequent emphasis on active case finding, community outreach and decentralized services can help make the TB programme more resilient to future emergencies. The use of mobile screening and integrated outreach in flood-affected areas demonstrates how TB services can be incorporated into broader emergency and disaster-response mechanisms.

A further consideration is the role of the private sector. Earlier WHO reporting from Nepal identified private-sector engagement as one of the approaches being pursued to improve case notification and treatment access. Because patients may seek care outside government facilities before entering the national programme, effective public-private collaboration is essential for ensuring that diagnosis, notification, drug susceptibility testing, standardized treatment and outcome reporting are connected to the national surveillance system.

The evidence also supports stronger use of surveillance data for programme decision-making. Routine notification data

should be interpreted alongside prevalence-survey findings, laboratory information, treatment outcomes, contact-investigation data and geographic information. The large difference between estimated incidence and notified cases demonstrates why programme monitoring should measure the entire diagnostic cascade—from people screened, to people tested, to people diagnosed, enrolled, retained and successfully treated. This approach would allow provincial and local programme managers to identify precisely where patients are being lost from the care pathway.

From a public-health perspective, Nepal's progress should therefore be assessed not simply by increases in the number of cases notified but by whether the programme is finding people earlier, reaching populations that have historically been missed, reducing transmission and ensuring successful treatment. The national prevalence survey showed that TB is widely distributed and that some high-burden groups may not present with classical symptoms. Recent active case-finding initiatives demonstrate that the programme is responding to this evidence. The next stage should be to institutionalize these approaches, ensuring that active case finding becomes systematic, risk-based and sustainable rather than dependent on individual projects or temporary campaigns.

Overall, the evidence suggests that Nepal is moving from a predominantly facility-based model of TB control towards a more proactive, technology-enabled and community-oriented elimination strategy. The strongest opportunities lie in combining targeted active case finding, digital chest X-ray, rapid molecular diagnostics, decentralized treatment, improved drug-resistant TB management, private-sector engagement and social support. At the same time, sustainable domestic financing, programme leadership and reliable health-system infrastructure remain essential. The 2023 national programme review's recommendations—strengthening leadership, expanding active case finding, ensuring universal diagnosis and treatment, securing resources and improving multisectoral collaboration—provide a coherent framework for addressing the remaining gaps.

Conclusion

Tuberculosis remains a significant public health challenge in Nepal, with a substantial gap between estimated disease burden and cases enrolled in treatment. Nepal has nevertheless made important progress through national prevalence assessment, expansion of molecular diagnostics, active case finding, community engagement and strengthening of drug-resistant TB services. The introduction and national scale-up of the all-oral BPaLM regimen represents an important advance in DR-TB management.⁶

The evidence indicates that Nepal's TB elimination efforts should increasingly focus on finding missing cases, particularly among vulnerable and hard-to-reach populations, while ensuring rapid diagnosis, effective treatment and long-term patient support. Continued investment in digital screening, molecular diagnostics, community-based interventions, preventive treatment and programme financing will be essential for accelerating progress towards TB elimination.

Abbreviations

TB – Tuberculosis; NTCC – National Tuberculosis Control Centre; MDR/RR-TB – Multidrug-resistant/Rifampicin-resistant tuberculosis; BPaLM – Bedaquiline, Pretomanid, Linezolid and Moxifloxacin; HIV – Human immunodeficiency virus; WHO – World Health Organization.

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