Perspectives

Commit, Invest and Deliver: Towards Achieving End Tuberculosis Strategy Goals Through Active Case Finding and Preventive Treatment in China

Caihong Xu[1]; Yanlin Zhao[1,#]

ABSTRACT

This paper addresses the World Tuberculosis (TB) Day 2025 theme, "Yes! We can end TB! Commit, Invest, Deliver". Through comprehensive analysis of China's TB epidemic landscape and associated challenges, we align with the "National TB Prevention and Control Plan (2024–2030)" which emphasizes that building Zero-TB communities through the integration of "active case finding" and "TB preventive treatment (TPT)" represents a viable pathway toward ending the TB epidemic. Active case finding serves as a critical intervention for early detection and transmission reduction, while TPT constitutes an essential strategy for decreasing latent TB infection incidence. By facilitating the rapid expansion of Zero-TB communities through governmental commitment, strategic resource allocation, and coordinated implementation, we anticipate achieving the ultimate goal of TB epidemic elimination.

CHALLENGES AND OPPORTUNITIES IN TB PREVENTION AND CONTROL

Tuberculosis (TB) remains one of the most significant global public health challenges. China continues to bear a substantial TB burden, with approximately 741,000 new cases reported in 2023, representing 6.8% of global cases and an incidence rate of 52 per 100,000 population (*1*). The TB epidemic in China exhibits marked geographic and demographic heterogeneity. In 2023, 289 counties — approximately 10% of all counties nationwide — reported high incidence rates exceeding 80 per 100,000 population, with these hotspots predominantly concentrated in western regions. The disease disproportionately affects the youth and middle-aged workforce, while incidence rates progressively increase with age among elderly populations. Despite significant advances in TB control efforts in recent years, achieving the World Health Organization's (WHO) goal of "ending TB epidemic by 2030" faces considerable challenges. These include insufficient and delayed case detection — with 95% of TB patients in China identified through passive surveillance, leaving nearly 20% of cases undetected and half experiencing diagnostic delays (*2*). Additionally, the implementation of TB preventive treatment (TPT) remains inadequate, and the adoption of innovative technologies is suboptimal. At the current rate of TB incidence decline in China, the trajectory is insufficient to achieve the 2030 target of ending the TB epidemic.

To address these challenges proactively, the National Bureau of Disease Prevention and Control, in collaboration with eight other ministries and commissions, has issued the "National TB Prevention and Control Plan (2024–2030)" (*3*) (hereinafter referred to as the "Plan"), which establishes strategic priorities for TB control in China. Complementing this national initiative, the WHO has designated the theme for World TB Day 2025 as "Yes! We can end TB! Commit, Invest, Deliver," emphasizing the critical importance of governmental commitment, financial investment, and effective service delivery. Active case finding and TPT represent cornerstone interventions for achieving these ambitious goals. Active case finding — the systematic screening of high-risk populations — facilitates early TB detection and reduces diagnostic delays, while TPT significantly diminishes TB risk among vulnerable populations. The integration of these approaches within Zero-TB communities creates a comprehensive framework that can accelerate TB incidence reduction.

CONDUCT COMMUNITY-AND FACILITY-BASED ACTIVE SCREENING TO ENHANCE TB CASE DETECTION

Early detection of tuberculosis is crucial for controlling the spread of the epidemic. However,

currently, a substantial proportion of TB patients worldwide remain undetected in a timely manner. It is estimated that approximately 20% of TB patients are undiagnosed or unreported each year (2). This not only adversely affects treatment outcomes for the patients themselves but also significantly increases the risk of epidemic transmission. In high-burden regions, effective active case finding faces numerous challenges due to insufficient medical resources, limited public awareness of TB, and constraints in detection methodologies. China needs to strategically enhance its active case finding approaches through precise targeting of high-risk populations, implementation of innovative screening methods, and optimization of screening protocols.

Scientifically and Accurately Identify the Targets for Active Case Finding

Despite China's TB detection rate in 2023 achieving approximately 82.7%, which is notably higher than the global average of 75.9%, a significant proportion of patients — nearly 20% — remain unidentified, highlighting substantial gaps in the current detection framework (2). Notably, a significant proportion of these undetected cases are asymptomatic TB. At the current stage, active case finding should prioritize key populations including close contacts of TB patients, people living with HIV/AIDS (PLWHA), previously treated TB patients, the elderly, and individuals with diabetes. Previous studies have demonstrated that TB detection rates through active screening among close family contacts of smear-positive and smear-negative TB patients are approximately 3.6% and 1.3% respectively, both substantially higher than those observed in the general population. Implementing active case finding strategies can increase patient detection by 2.5-fold and reduce mortality rates by 40% (4). PLWHA face an 18-fold higher risk of tuberculosis, yet there exists a 44% detection gap (2). A systematic review found that TB is the cause of death for 37.2% of PLWHA. The risk of TB reinfection in previously treated patients is 4 times higher than in other populations, with a 10.2-fold increased risk of developing drug-resistant TB. Due to declining immune function and physiological deterioration, the elderly constitute a high-risk group for tuberculosis, with prevalence rates approximately 2–3 times higher than other age groups (5-6). Facility-based active case finding should be implemented among PLWHA, previous tuberculosis patients, the elderly, and individuals with diabetes. For close contacts of TB patients, disease control and prevention institutions should organize community-based active screening initiatives.

Schools, correctional facilities, social welfare institutions, juvenile rescue and protection agencies, psychiatric hospitals, and industrial and mining enterprises are designated as key settings for TB screening. The rationale behind this designation lies in the fact that within these densely populated environments, TB cases can rapidly lead to widespread transmission and potentially trigger public health emergencies. Previous studies have demonstrated that the risk of TB among individuals in correctional facilities is 23 times higher than in the general population (7). In certain industrial and mining enterprises, particularly among miners exposed to silica in the workplace, silicosis is prevalent. The relative risk of TB in silicosis patients varies by disease severity, ranging from approximately 2.8 to 39-fold higher than the general population. Moreover, TB patients with silicosis face a 3-fold increased mortality risk. Furthermore, medical resources in these settings are often limited, increasing the likelihood of diagnostic and treatment delays following TB onset. Therefore, it is recommended to incorporate TB examination as a mandatory component of enrollment physical examinations for these facilities and to include TB screening in annual health assessments. Depending on the epidemiological situation and available resources, regions with appropriate capabilities should also consider implementing infection screening protocols. For high-risk individuals who have been confirmed not to have active TB, TPT should be administered to further advance disease prevention. The implementation of active case finding in key settings requires coordinated cooperation across multiple departments, with particular attention to protocols governing class suspension, work suspension, resumption of classes, and resumption of work.

WHO recommends that in regions where the estimated TB prevalence rate is 0.5% or higher, active case finding should be conducted among the general population (8). This approach holds significant implications for both individual and community health outcomes. The "Plan" indicates that approximately 10% of counties in China remain high-prevalence areas (reporting incidence >80/100,000). In these highly prevalent TB regions, it is essential to establish evidence-based protocols regarding target populations and screening frequency. Comprehensive evaluation

should be initiated after a minimum of three consecutive years of screening implementation. Once prevalence levels decline to moderate levels, it would be prudent to consider transitioning from community-based general population screening to facility-based screening focused on high-risk populations. Furthermore, in high-incidence areas with resource constraints, facility-based active case finding targeting high-risk groups represents a viable alternative approach.

Innovating Active Screening Methods

WHO recommends rapid molecular diagnostic techniques as the initial diagnostic tool for TB to enhance both sensitivity and specificity of diagnosis. Current screening methodologies primarily encompass symptom screening, chest imaging examinations, C-reactive protein (CRP) testing, and molecular testing. Symptom screening — a preliminary assessment that identifies long-term (chronic) cough, cough of any duration, or any TB symptoms — offers implementation simplicity but demonstrates limited sensitivity and specificity, necessitating combination with complementary screening approaches. Chest X-ray examination represents the predominant technical modality for tuberculosis screening, exhibiting high sensitivity and specificity. For large-scale population screening initiatives, integration with computer-aided detection (CAD) technology is recommended to optimize diagnostic efficiency and accuracy. CRP testing is predominantly utilized in PLWHA, demonstrating superior accuracy compared to symptom screening, with optimal sensitivity achieved using a 5 mg/L threshold. Molecular diagnostic platforms, including Xpert MTB/RIF® and sputum Truenat® methodologies, facilitate rapid diagnosis with high sensitivity and specificity, albeit at relatively higher cost.

Optimizing the Active Screening Process

Implementation of active case finding requires development of cost-effective screening protocols tailored to local epidemiological patterns and available resources, with specific consideration for diverse high-risk populations and settings. In high-incidence regions, continuous dynamic evaluation of community epidemic levels should inform timely adjustments to screening strategies and processes. For populations already integrated into basic public health service management, such as the elderly and individuals with diabetes, chest imaging examinations can be strategically incorporated into scheduled annual and quarterly health assessments to achieve multi-disease screening, thereby enhancing cost-effectiveness and implementation feasibility. For high-risk TB groups, including PLWHA and individuals with prior TB history, facility-based active case finding should be systematically implemented. Concurrently, efforts should focus on enhancing TB risk identification awareness among clinicians in general medical institutions while strengthening their tuberculosis screening capabilities. Active measures should be taken to increase the proportion of high-risk TB groups screened among outpatients and inpatients in general hospitals, thereby improving facility-based early detection rates.

PROMOTE TB PREVENTIVE TREATMENT THROUGH PREVENTIVE TREATMENT CLINICS

Latent TB infection (LTBI) represents a state of persistent immune response to Mycobacterium TB (MTB) antigens without clinical manifestations or radiographic evidence of active disease. Approximately one-quarter of the global population is infected with MTB, with 5%–10% of these individuals progressing to active TB during their lifetime, predominantly within the first five years post-infection. This substantial reservoir of latently infected individuals continuously contributes to the emergence of new TB cases. TPT for high-risk LTBI populations constitutes a critical intervention endorsed by the WHO to achieve the strategic objective of "ending TB epidemic." At the second United Nations High-level Meeting in 2023, a global commitment was established to provide TPT to at least 45 million individuals between 2024 and 2027. China's "Plan" similarly mandates that the TPT coverage rate for close contacts of TB patients should reach 60% by 2025.

Identification of TPT Targets via TB Incidence Risk Assessment

While TPT represents a cornerstone of the WHO's End TB Strategy, the efficacy of current preventive regimens varies from 60% to 90%. Consequently, TPT implementation necessitates careful risk-benefit assessment. Defining appropriate TPT target populations requires consideration of multiple factors, including progression risk in vulnerable groups, local

TB epidemiology, disease burden, and resource availability. From an individual protection perspective, TPT should primarily target those at elevated risk of progression following MTB infection, particularly recent infections and immunocompromised individuals. From a community incidence reduction standpoint, the proportion of the target population receiving TPT must also be considered. Based on these principles, China has clearly defined high-risk groups for TB, encompassing close contacts of TB patients, PLWHA, and those with immunosuppressive conditions, reflecting a targeted approach to disease surveillance and control. The risk of TB among PLWHA is 18 times higher than in the general population, with approximately one-third of PLWHA mortality attributable to TB. A systematic review has demonstrated that TPT reduces overall TB risk in PLWHA by 33%, with this protective effect increasing to 64% in tuberculin skin test (TST)-positive individuals. Additionally, TPT reduces all-cause mortality by 35%, with protective effects persisting beyond five years. Close contacts of TB patients, regardless of age, demonstrate significantly higher active TB risk compared to the general population, warranting TPT recommendation irrespective of local TB burden.

Research, Development and Promotion of Short-course Treatment Regimens

Currently, the recommended TPT regimens in China primarily include the 6-to-9-month isoniazid monotherapy regimen (6-9H), the 3-month isoniazid and rifapentine combined intermittent regimen (3HP), the 3-month isoniazid and rifampicin combined regimen (3HR), the 4 month rifampicin monotherapy regimen (4R), and the immunotherapy regimen. Studies have demonstrated that the protective efficacy of these TPT regimens ranges from approximately 60% to 90% (*9*). Acceptance rates among individuals with LTBI are strongly correlated with treatment duration. The acceptance rates for the 3HP and 6H regimens are only 76.3% and 63.9% (*10*), respectively, with corresponding compliance rates of 89.2% and 61.5% (*11*). Notably, research has shown that the 3HP regimen exhibits significantly reduced hepatotoxicity (*12*), suggesting that continued promotion of short-course regimens should be prioritized to enhance acceptance and compliance among patients with latent infection. Although randomized trials have confirmed the effectiveness and safety of the 1HP regimen compared to the 9H regimen, this approach has not yet been incorporated into national guidelines due to insufficient research evidence within China. Currently, several Chinese researchers are conducting relevant investigations in this area.

Standardized Establishment of TB Preventive Treatment Clinics

The Plan recommends that localities establish TPT clinics according to regional conditions and resources. From a systems perspective, effective TPT implementation requires integration within the comprehensive TB prevention and control service framework of "Center for Disease Control and Prevention (CDC) – Hospital – Primary Medical Institutions." Through optimized resource allocation and enhanced information sharing mechanisms, both active case finding and TPT initiatives should be strengthened. Within this framework, TPT clinics enable CDCs to fulfill their core functions of providing technical guidance, quality control, and outcome evaluation. Concurrently, the role of primary medical institutions in TB infection screening and TPT supervision must be clearly defined and supported. TPT should be incorporated into health management projects within the basic public health services framework, establishing a precision intervention model based on risk stratification built upon comprehensive health records. This approach should be integrated with the pilot deployment of public health practicing physicians, fully leveraging their capabilities in identifying TPT candidates, enhancing diagnostic and treatment competencies, and implementing standardized management protocols.

THE CONSTRUCTION OF "ZERO-TB COMMUNITIES" REPRESENTS THE BEST PRACTICE THAT INTEGRATES ACTIVE CASE FINDING AND PREVENTIVE TREATMENT

The Zero-TB Community initiative designates communities (such as townships, streets, schools, military units, long-term care institutions, large-scale enterprises, or public institutions) where tuberculosis incidence among permanent residents falls below 10 cases per 100,000 population, aligning with the World Health Organization's pre-elimination threshold for TB. The core framework of Zero-TB Communities

can be conceptualized as "three screenings, two managements, and one mobilization." The "three screenings" encompass active case finding in high-incidence areas and among high-risk populations; systematic TB infection testing in high-risk groups; and enhanced screening for drug-resistant TB. The "two managements" involve providing prompt, standardized anti-TB treatment with comprehensive case management for diagnosed TB and drug-resistant TB patients to minimize transmission risk, and implementing TB preventive treatment with robust monitoring for individuals with LTBI to reduce disease progression. The "one mobilization" component focuses on strengthening governmental advocacy and public health education to enhance population-wide health literacy. Since China initiated the Zero-TB Community construction in 2022, the program has expanded to 468 districts across 24 provinces. This initiative has demonstrated significant clinical and social benefits, achieving rapid reductions in TB incidence rates, protecting population health, and generating substantial societal value.

COMMITMENTS AND INVESTMENTS SERVE AS STRONG GUARANTEES FOR THE IMPLEMENTATION OF TB PREVENTION AND CONTROL ACTIONS

Strengthening Government Commitments and Policy Guarantees

Governments at all levels should incorporate tuberculosis prevention and control into comprehensive public health strategies and foster multi-sectoral collaboration, engaging departments including healthcare, finance, and medical insurance to collectively implement TB control initiatives. TB prevention and control measures should be integrated into major and basic public health programs with clearly defined goals and action plans, and subsequently incorporated into local performance evaluation frameworks. Authorities must rigorously enforce the requirements stipulated in the Law on the Prevention and Control of Infectious Diseases, while concurrently undertaking timely revisions of relevant tuberculosis-specific regulations, such as the Administrative Measures for TB.

Increase Financial Support

A multi-channel financing approach should be maintained, utilizing diverse funding streams including allocations for major infectious disease control, basic medical insurance, local government finances, civil affairs assistance, and charitable contributions to mitigate the economic burden on TB patients. The national essential drugs list and basic medical insurance coverage should be dynamically adjusted to incorporate eligible anti-tuberculosis medications within the medical insurance framework. Implementing centralized procurement strategies and price negotiations is essential for cost reduction. For high-cost novel anti-tuberculosis therapeutics, further price reductions should be pursued through medical insurance negotiations and provincial-level centralized procurement platforms. An integrated model combining medical insurance coverage, civil affairs subsidies, and government guarantees should be promoted to substantially reduce patients' out-of-pocket expenditures.

CONCLUSION AND PROSPECTS

The 2025 World TB Day theme, "Yes! We can end TB! Commit, Invest, Deliver," establishes a clear strategic framework for tuberculosis prevention and control efforts. To achieve the goal of ending TB in China, active case finding and TB preventive treatment must serve as complementary driving forces within this comprehensive approach. By operationalizing the "Commit-Invest-Deliver" framework through evidence-based policies, scientifically rigorous prevention strategies, and efficient implementation mechanisms, China can foster meaningful integration across policy innovation, technological advancement, and community mobilization domains. Only through this multifaceted, coordinated approach can the ambitious vision of ending TB by 2030 be realized.

Conflicts of interest: No conflicts of interest.

doi: 10.46234/ccdcw2025.068

[#] Corresponding author: Yanlin Zhao, Zhaoyl@chinacdc.cn.

[1] National Key Laboratory of Intelligent Tracking and Forecasting for Infectious Diseases, Chinese Center for Disease Control and Prevention, Beijing, China.

Submitted: March 04, 2025
Accepted: March 22, 2025
Issued: March 28, 2025

REFERENCES

1. World Health Organization. Global tuberculosis report 2024. Geneva: World Health Organization; 2024 Oct. https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2024.
2. Li T, Du X, Kang JJ, Luo D, Liu XQ, Zhao YL. Patient, diagnosis, and treatment delays among tuberculosis patients before and during COVID-19 epidemic - China, 2018-2022. China CDC Wkly 2023;5(12):259-65. http://dx.doi.org/10.46234/ccdcw2023.047.
3. National Health Commission of the People's Republic of China. National Development and Reform Commission of the People's Republic of China. Ministry of Education of the People's Republic of China. et al. National TB Prevention and Control Plan (2024-2030). https://www.gov.cn/zhengce/zhengceku/202412/content_6991217.htm. (In Chinese).
4. Fox GJ, Nhung NV, Sy DN, Hoa NLP, Anh LTN, Anh NT, et al. Household-contact investigation for detection of tuberculosis in Vietnam. N Engl J Med 2018;378(3):221 – 9. https://doi.org/10.1056/NEJMoa1700209.
5. Donald PR, Marais BJ, Barry III CE. Age and the epidemiology and pathogenesis of tuberculosis. Lancet 2010;375(9729):1852-4. https://www.thelancet.com/retrieve/pii/S0140673610605806.
6. Pratt RH, Winston CA, Kammerer JS, Armstrong LR. Tuberculosis in older adults in the United States, 1993-2008. J Am Geriatr Soc 2011;59(5):851–7. https://doi.org/10.1111/j.1532-5415.2011.03369.x.
7. Baussano I, Williams BG, Nunn P, Beggiato M, Fedeli U, Scano F. Tuberculosis incidence in prisons: a systematic review. PLoS Med 2010;7(12):e1000381. https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000381.
8. World Health Organization. WHO consolidated guidelines on tuberculosis: module 2: screening: systematic screening for tuberculosis disease. Geneva: World Health Organization; 2021 Mar. https://www.who.int/publications/i/item/9789240022676.
9. World Health Organization. Appendix to the guidelines on the management of latent tuberculosis infection. Evidence to decision framework. Geneva: World Health Organization; 2015 Jan. https://iris.who.int/bitstream/handle/10665/158915/WHO_HTM_TB_2015.01_eng.pdf;sequence=1.
10. Zu XW, Yao YX, Gong DH, Wang QY, Ren ZW, Cheng J, et al. Acceptability of 6-month prophylactic isoniazid therapy in latently infected close contacts of tuberculosis patients. Chin J Public Health 2020;36(3):369 – 74. https://doi.org/10.11847/zgggws1127769.
11. Yao X, Wu CG, Gong DH, Yao YX, Zhang CY, Xu CH, et al. Analysis of treatment completeness and its influencing factors of 12-week preventive therapy among close contacts of pulmonary tuberculosis patients. Chinese Journal of Antituberculosis. 2021,43(03):233-239. https://doi.org/10.3969/j.issn.1000-6621.2021.03.008.(In Chinese).
12. Martinson NA, Barnes GL, Moulton LH, Msandiwa R, Hausler H, Ram M, et al. New regimens to prevent tuberculosis in adults with HIV infection. N Engl J Med 2011;365(1):11 – 20. https://doi.org/10.1056/NEJMoa1005136.