

Policy gaps in addressing market failures and intervention misalignments in tuberculosis control: prospects for improvement in China, India, and Indonesia

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Summary

India, Indonesia, and China are the top three countries with the highest tuberculosis (TB) burden. To achieve the end TB target, we analyzed policy gaps in addressing market failures as well as misalignments between National TB Programs (NTP) and health insurance policies in TB control in three countries. In India and Indonesia, we found insufficient incentives to engage private practitioners or to motivate them to improve service quality. In addition, ineffective supervision of practice and limited coverage of drugs or diagnostics was present in all three countries. The major policy misalignment identified in all three countries is that while treatment guidelines encourage outpatient treatment for drug-sensitive patients, the national health insurance scheme covers primarily inpatient services. We therefore advocate for better alignment of TB control programs and broader universal health coverage (UHC) programs to leverage additional resources from national health insurance programs to improve the effective coverage of TB care.

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Keywords: Tuberculosis; Market failure; Policy misalignments

Introduction

Tuberculosis (TB) remains a critical challenge for low- and middle-income countries (LMICs), having caused 1.4 million deaths in 2021 globally,¹ with staggering economic costs and loss of human capital. The global community has galvanized efforts to address this challenge: ending the TB epidemic by 2030 is a target under Goal 3 of the United Nations' Sustainable Development Goals (SDGs), and the End TB Strategy of the World Health Organization (WHO) specified targets of "75% reduction in TB deaths compared with 2015, 50% reduction in TB incidence rate, and no affected families facing catastrophic costs due to TB".^{2,3} India, Indonesia, and China are the top three countries with the highest TB burden, accounting for 44.6% of the global TB burden in 2023.¹ Global TB elimination, therefore, will heavily rely on successful TB control in these three

countries. Since 2015, there has been growing and bolder leadership by policymakers in China, India, and Indonesia towards tackling TB as a public health concern. Meanwhile, the three countries have made uneven progress in implementing Universal Health Coverage (UHC) reforms aimed at responding to the dual challenges of demographic and disease transitions, and to tackle high out-of-pocket expenditures. TB diagnosis and treatment have been integrated into UHC reforms to varying degrees in all three countries.

Despite remarkable improvement over the past decade, TB deaths and incidence in all three countries can hardly reach the targets set by WHO if the trends in recent years remain unchanged (Fig. 1). Furthermore, there has been a worrying increase in the estimated TB incidence and mortality in India and Indonesia in 2021 due to the disastrous impacts of the Covid pandemic on not only the health system, but also the whole society. While policymakers have intensified vertical interventions to tackle TB, the bottlenecks and challenges in TB elimination facing the high-burden countries require systematic solutions based on a comprehensive understanding of the current challenges and policies.

Ensuring access to quality TB healthcare is essential to achieving TB elimination targets. The United Nations

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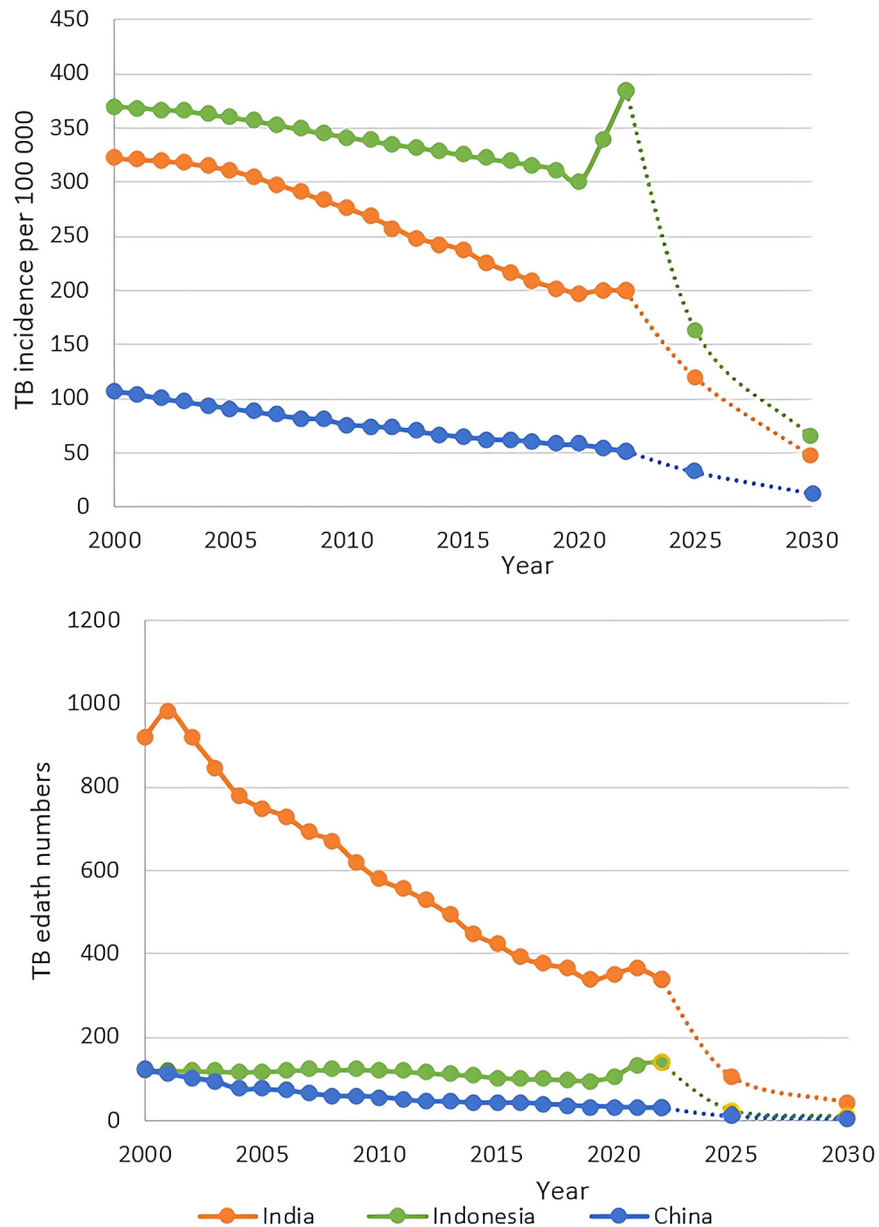


Fig. 1: TB incidence and deaths in China, India, and Indonesia. (Data source: WHO Global Tuberculosis Programme data, <https://www.who.int/teams/global-tuberculosis-programme/data>).

High-Level Meeting on the Fight Against Tuberculosis committed to “providing diagnosis and treatment with the aim of successfully treating 40 million people with tuberculosis from 2018 to 2022, and 1.5 million people with drug-resistant tuberculosis”.⁴ China, India, and Indonesia have all developed and implemented dedicated national TB programs (NTPs) rooted in their healthcare service delivery and financing systems which aim to provide healthcare coverage for TB patients.

India and Indonesia have large numbers of private providers. Therefore, under the Revised National Tuberculosis Control Programme (RNTCP) in India (renamed as the National TB elimination program (NTEP) in 2020) and NTP in Indonesia, the public-private mix (PPM) model was adopted for TB care delivery.^{5,6} Private service providers are often the first point of care and preferred providers for many TB patients, and therefore play a vital role in TB control.^{7,8} In China,

where the public health sector plays a dominant role in infectious disease management, TB treatment is centralized and delivered in designated public hospitals, usually one per county/district. Primary healthcare centers (PHCs) are responsible for screening and transferring TB suspects identified primarily through symptom checks and chest X-ray examinations for symptomatic patients (only in PHC with X-ray equipment, not required for all), and cannot diagnose TB through etiological tests.⁹ PHCs in China also provide TB patient management services, including regular follow-up visits to ensure treatment adherence. In addition to NTP, the national health insurance system, another critical component of UHC, has also been established in the three countries and is expected to finance the TB services not directly covered by NTP, such as hospitalizations.^{10–12}

The vertical NTP programs and health insurance systems have contributed to the substantial progress in TB control in the three countries. In Indonesia, studies found that case detection increased during the initial phase of PPM implementation and fluctuated later.¹³ In India, evidence suggests that the engagement between the public sector and private providers led to a sharp year-to-year increase in TB notifications in 2018 and 2019. Private sector engagement continues to be a critical pathway for India to improve case detection and reduce diagnostic and treatment delays.¹⁴ In China, TB incidence and deaths have been declining since 2000. Nevertheless, a considerable proportion of incident cases are still unnotified in the three countries according to WHO estimation (China: 25%; India: 33%; Indonesia: 55% in 2021),¹ and there remain barriers to accessing high quality TB care for a large number of TB patients who seek care in the healthcare markets. To clarify the situation in China, though being “public” in nature, public hospitals have been relying on revenues from medical services in operation, and market-oriented behaviors still exist despite major reforms for public hospitals to move away from a financing model that promotes overtreatment.¹⁵

Previous studies have explored the reasons and manifestations of market failures in TB control.^{16,17} Prompt diagnosis and effective treatment of the individual TB patient have positive externalities for households and communities. However, many TB patients live in poverty and lack the financial resources to afford TB care. Despite the free TB treatment policy under the NTPs and financial protection provided by national health insurance, TB patients often must pay for healthcare services not covered, such as medicines for side effects or expensive second-line TB drugs. In some instances, TB patients often incur substantial out-of-pocket (OOP) costs seeking diagnostic care in the private sector before diagnosis.^{18,19} Evidence suggests such OOP expenditures complicate patient access to timely TB care and eventual treatment journeys.²⁰ Besides,

compared to diseases that afflict people in high-income countries, there is much less profit incentive for the industry to develop new diagnostics, therapeutics, and vaccines aimed at preventing or treating TB. The difficulties in diagnosis, the long treatment period (6–8 months for drug-sensitive cases and 1–2 years for MDR/RR-TB), and the side effects of anti-TB medicines have also aggravated other manifestations of market failures, for example, excessive or improper services provided to TB patients due to incomplete or asymmetry of information.^{21,22} These market failures reinforce the rationale for active government intervention in preventing, diagnosing, and treating the disease.

Up to now, many market failures are still insufficiently addressed by government TB programs, leading to relatively inefficient and ineffective TB healthcare service delivery. Furthermore, TB programs must be aligned with broader UHC efforts to achieve synergies and leverage additional resources to ensure access to TB care. However, due to the fragmented vertical disease approach, some policy misalignments between TB programs and health insurance policies still hinder effective TB control and broader health system integration, which have rarely been covered in the literature.

This paper analyses policies around TB service delivery and financing in India, Indonesia, and China by reviewing published and grey literature as well as communications with key informants. The stakeholders we approached included senior researchers and practitioners in TB control in domestic research centers and international organizations like the WHO or the World Bank in the three countries. Our analysis focused on 1) whether the policies and government programs sufficiently addressed the market failures in TB control and 2) misalignments and loopholes between the TB program and UHC policies. Specifically, this paper aims to investigate the current situations of TB service delivery and financing; analyze the policy gaps and discordances between NTP and public health insurance; explore options for eliminating or mitigating the identified gaps; and develop recommendations on how to improve the coherence of policies and programs for more effective TB control in these countries through system-wide approaches.

Findings

Policy gaps and inadequate responses to market failures

Financing and providing essential healthcare in developing countries has been a significant challenge because of market failures, limited fiscal space of the national government, and inadequate human resources for health, among others. In India, Indonesia and China, NTP is financed through annual budgetary appropriations by the Treasury through the Ministry of Health as a vertical program for TB control with earmarked funds. The funding sources for NTPs in India and Indonesia

are usually a mix of domestic fiscal revenue and international funding, such as the Global Fund, while China mainly relies on domestic funding currently. The Ministry of Health or designated agency in each country leads annual budgeting, disbursement, and program reviews, working closely with sub-national structures mandated with the implementation of TB interventions. In all three countries, NTPs are supposed to define and guarantee the supply of essential TB healthcare services, including equipping NTP-linked providers for diagnostic tests and providing anti-TB drugs and human resources capacity building for service delivery. NTPs are also responsible for enabling and supervising TB service providers to perform public health responsibilities such as mandatory case notification and patient follow-up in the information system. Ideally, NTPs seek to address some market failures mainly through subsidizing and supervising service providers and reducing user fees significantly to encourage TB case detection and treatment completion. Nevertheless, policy gaps still need to address the market failures of the under-provision of healthcare services or sub-standard service quality, especially for public health services, due to insufficient incentives or inadequate supervision.

Gaps in case detection and initiation of standard TB treatment

In India and Indonesia, both our literature review and key-informant communications reveal that the large and dispersed private sector had to a large extent been attributed to low TB case detection rate.^{23,24} In both countries, the geographic accessibility and healthcare quality of NTP-linked private providers where TB diagnostic tests, standard treatment services and information system are available, largely determines the notification of TB cases and the initiation of standard treatment. In India, beginning in 2018, the NTEP provided direct benefit transfer (DBT) to private providers for TB case notification (Rs.500/USD 6.45) and reporting outcomes (Rs.500/USD.6.45) in the electronic TB reporting system, the Nikshay system.²⁵ The NTEP's engagement with private providers in India using the Nikshay system is credited to have improved the transparent management of TB care by private providers. However, the payment for physician incentives is sometimes delayed. Currently, there is insufficient evidence on whether the financial incentive motivates private providers to improve the quality of care. Besides, there is a lack of incentives for non-NTEP providers to transfer patients to NTEP-linked providers where standard services are provided. TB drugs are often available in non-NTEP providers despite some restrictive policies, and they have the financial incentive to retain patients and provide sub-standard healthcare services.

In Indonesia, NTP assigns public Primary Healthcare Centers (PHCs, called Puskesmas in Bahasa)

through the District Health Office (DHO) to manage private TB service providers contracted with NTP in their catchment areas. These private providers, licensed by DHO as the local health authority every five years, have the capability of TB confirmatory diagnosis and access to publicly provided TB drugs. The agreement between PHCs and private providers requires the private providers to report their TB activities to the public healthcare system. The implementation, however, needs more supervision as often NTP has limited resources (i.e., a budget for public PHC and personnel to monitor the performance of the providers as well as the quality of service provided). Supervision from DHO and PHCs is often not implemented according to the guidelines. In addition to the limited budget, high turnover of healthcare workers at PHCs, complex and multiple reporting mechanism, and non-adherence to supervision guidelines contributes to less-than-optimal supervision. Besides, the current system does not provide sufficient incentives for non-NTP private primary providers to join NTP as a formal TB service provider, which undermines the accessibility of TB diagnostics and healthcare services.

In China, the TB department in the Center for Disease Control and Prevention (CDC), a public agency affiliated with the Health Commission, is supposed to supervise TB clinical performance in designated hospitals. However, CDCs in China are often lower at the administrative level than hospitals and they lack the administrative power or clinical professionals to supervise hospitals and influence their practices. For primary healthcare centers with no capacity for TB diagnosis, there is a lack of incentive or approach for them to improve the skills of TB screening. The misdiagnosis and delayed detection/treatment of TB at the primary healthcare level has become a big challenge. One recent study found that 57.3% of the patients have experienced long diagnostic delay (LDD, initial care to TB diagnosis > 14 days), and patients who first seek care in private clinic or community health centers had a much higher likelihood of experiencing LDD compared to those who initiated care in secondary or tertiary level facilities.²⁶

In sum, proper incentives and supervision from the government are both crucial to ensure effective case detection, timely case report and standard treatment initiation for those diagnosed patients. Policy gaps in these two areas are mostly attributed to the insufficient budget and deficiencies in the managerial system. Currently, case detection relying on patient care-seeking has been missing a remarkable proportion of patients. Proactive case detection strategies, such as screening for high-risk population, can be included in the NTP service package to improve case notification. Besides, increasing the accessibility of rapid diagnostic tools can also improve the quality of TB diagnosis. In India, a non-profit consortium of private laboratories supported by international funders, the Initiative for Promoting

Affordable and Quality Tuberculosis Tests (IPAQT), was launched in 2013 as a market-based approach to negotiate lower price for higher volume of testing, and resulted in a 30%–50% decrease in price and 10-fold increase in X-pert tests.²⁷ Nevertheless, according to the WHO report, the percentage TB notified cases with rapid diagnostics as the initial diagnostic test was only 22% in India, followed by 50% in Indonesia and 57% in China,²⁸ suggesting huge gaps for government and market efforts.

Gaps in the completion of TB treatment

Completion of standard TB treatment is crucial for ensuring TB treatment success and preventing TB relapse. The financing arrangement of TB care needs to reduce OOP expenditure to ensure that patients can afford the full course of treatment. While the vertical financing and implementation mechanisms have contributed to substantial progress in TB control, broader health financing reforms are going on in the three countries where TB financing and elimination should also be a core part of the priority areas. Under the current TB financing systems in the three countries, another major policy gap is the limited coverage of drugs or diagnostics, which may cause a high financial burden for TB patients. For example, in China, medicines often prescribed to TB patients, like liver-protection drugs and some second-line anti-TB drugs, are neither covered by health insurance nor NTP funds. In Indonesia, medicines to treat side effects of TB drugs or comorbidities are covered by the JKN Program/national health insurance. However, if the patient has severe side effects to NTP-covered TB drugs and requires other anti-TB prescription drugs, the insurance only covers these anti-TB prescription drug costs for seven days a month. Thus, patients must pay OOP for the prescribed TB drugs for the rest of the 21 days a month. These problems can be more severe for MDR-TB patients, who are often in poorer conditions with comorbidities. The relatively low treatment success rate for MDR-TB patients also suggests the need to mitigate the policy gaps for MDR-TB patients in accessing quality care.²⁹

Policy misalignments of NTP programs and national health insurance schemes

The major policy misalignment in India, Indonesia and China is that while NTP treatment guidelines encourage outpatient treatment for drug-sensitive patients without severe conditions, each country's national health insurance scheme covers primarily inpatient services. The delivery mode of TB healthcare services and specific insurance policies in each country also created policy discordances. In India, the national health insurance program—Prime Minister's Jan Aarogya Yojana (PMJAY)—provides protection for the poorest 40% of the population since September 2018. It covers only the

TB inpatient service packages in empaneled public and private facilities, but not routine diagnostics nor medication required during the entire treatment duration. NTEP has placed intermediary agencies, Patient Provider Support Agencies (PPSA), to network with empaneled private providers who provide outpatient services and ensure that these doctors and patients access government-funded diagnostics and drugs for free. However, these private providers continue to charge user fees to TB patients. Consequently, TB patients who have not been hospitalized may enjoy neither health insurance coverage nor NTEP benefits during treatment.

In Indonesia, NTP delivers free TB drugs and supplies to public PHCs, and public PHCs further distribute them to the NTP-linked private providers in their sub-districts. These drugs and supplies are provided to patients without user fees in all NTP-linked service providers. Recent statistics showed that though the National Health Insurance program, the Jaminan Kesehatan Nasional (JKN), reached about 95% of the Indonesian population by 2023, only 79.9% are actively paying premiums.³⁰ The government paid premiums for the unemployed or informally employed poor households, around 60% of those enrolled.¹⁰ The near-poor population working in the informal sector are often left uncovered as they must pay the premium out-of-pocket. The JKN covers the TB-related costs if a patient accesses TB-related services in secondary and tertiary level health facilities (e.g., hospitals), mainly inpatient services. In primary-level facilities, free TB drugs are only provided in NTP-linked facilities and free TB services are only provided in JKN-contracted facilities. However, JKN-contracted primary care facilities receive capitation payment in which there is no fee for service payment, or additional incentives, for providing care to TB patients. The JKN and NTP systems are also not closely connected, which means that a JKN-contracted service provider may not be linked with the NTP system.³¹ Therefore, patients have to pay treatment costs out of pocket if they visit a non-NTP provider outside the JKN network, or if a JKN member opts not to use the JKN referral requirements for specialist services (i.e., self-referred). The discordances between the NTP and JKN systems have created barriers for healthcare patients to access free TB services to which they are entitled. Studies in Indonesia revealed that 37%–38.5% TB-affected household accessing private providers experienced catastrophic expenditure (total costs \geq 20% of annual household income).^{19,32}

In China, NTP also offers patients essential TB-related diagnostic tests and first-line anti-TB drugs free of charge. The two public health insurance schemes in China, which are for rural and urban residents (URRBMI) and the urban employees (UEBMI), have also reached a total population coverage of over 96%. Almost all TB patients are covered by these health

insurance schemes when seeking care.¹⁵ Beyond these basic insurance schemes, critical disease illness insurance can provide additional financial protection for patients with high out-of-pocket expenditures. Nevertheless, outpatient services not covered by NTP can hardly be reimbursed for URRBMI enrollees, and patients often prefer short-term inpatient services in order to get high diagnostic costs reimbursed during the early phase of treatment. In addition, one unique challenge for China is that the health insurance system adopts a hierarchical reimbursement mechanism in which the reimbursement rate is lower in higher-level hospitals. However, the centralized TB service delivery system requires that TB patients be treated in county-level designated hospitals and above, where the reimbursement rate is lower than in PHCs. For example, the actual inpatient reimbursement rate can be over 85% in PHCs and township-level hospitals but usually around 65%–70% in county-level hospitals.³³ This policy discordance between NTP treatment guidelines and health insurance schemes has also caused a high financial burden for TB patients. A recent study including 41 counties in China showed that the median direct medical cost of TB was 1041 USD, reaching 20% of annual disposable income of Chinese residents in 2020.¹⁸

Discussion

Developing and implementing a coherent system for TB programs to leverage additional resources

As shown in the previous analysis and summarized in Table 1, the policy gaps and policy misalignments in TB control require multi-sector collaboration and existing and additional resources to be invested into TB

to solve the current problems. First, stronger leadership and government commitment are needed to establish cross-department coordination to integrate TB diagnostic and treatment services into national packages of services financed by health insurance schemes and to streamline policy implementation procedures. For example, to extend the coverage or improve the reimbursement of TB-related healthcare services, the health departments need to communicate and collaborate with the health insurance department and propose policy recommendations through a formal channel. Such policy proposals need support from higher leadership for approval. The additional resources necessary to implement the policy reforms require multi-channel financing. In China, TB screening for people aged over 65 or with diabetes have been included in the National Basic Public Health Service Package, with secured funding from the government.³⁴ In India, NTP funding has come mainly from domestic budgets and contributions by international donors. Since 2016, the government has quadrupled the financing for TB, but more is needed to sustain the implementation of interventions planned under the National Strategic Plan 2017–2025 at scale.³⁵ In Indonesia, NTP mostly relied on international donors before 2017, and then domestic funding gradually increased to around 20% of the total funding needed in 2021, while a funding gap of 66% remains.²⁹ Furthermore, the sustainability of funding is a concern, especially considering the economic crisis caused by the COVID-19 epidemic. In sum, strong leadership and multi-sector collaboration are critical to ensure that these resources be invested in and properly used to address challenges in TB control.

| | China | India | Indonesia |
|---|---|--|--|
| Policy gaps in TB control | | | |
| Under-provision of healthcare services or sub-standard service quality due to insufficient incentives or ineffective supervision. | CDCs in China are assigned to, but lack the administrative power or clinical profession to supervise hospitals and influence their practices | Delay in the distribution of financial incentives for private providers to notify and manage TB cases, and the effectiveness of such incentives remain unclear Lack of incentives for non-NTP providers to transfer patients to NTP-linked providers where standard services are provided | Public PHCs are assigned to, but have a limited budget, high turnover staffs, nor enough authority to supervise the TB services provided by private providers Lack of incentives for non-NTP primary providers to join NTP and deliver TB healthcare services |
| Limited coverage of drugs or diagnostics used by TB patients | Liver-protection drugs, some types of second-line anti-TB drugs, rapid molecular tests and CT scan exam are not covered or only partially covered by health insurance nor NTP funds | Medicines for side-effects or comorbidities need to be paid out of pocket | |
| Policy misalignments | | | |
| NTP recommended outpatient treatment, while national health insurances cover inpatient services | National health insurance provided very limited coverage for outpatient services not covered by NTP for URBMI (urban residents without formal job) and NRCMS (rural residents) enrollees. | Patients often pay user-charges for outpatient services at the private service provider and cannot be reimbursement through PM-JAY scheme | The payment for TB cases at the hospital level creates perverse incentives for hospitals to retain/hospitalize TB patients |
| Country specific policy misalignments between NTP and national health insurance policies | Reimbursement rate of the national health insurance is lower in high-level hospitals that are designated for TB care, compared with PHCs and township hospitals | | JKN and NTP systems are not connected; (i) Patients have to pay mostly out-of-pocket if they visit a non-NTP, outside of JKN provider. (ii) Disconnect in TB case notification. |

Table 1: Policy gaps and policy misalignments in TB control: an overview.

Encourage innovations to strengthen NTPs for better TB outcomes

In all three countries, there are efforts to innovate TB diagnosis and TB care delivery. Innovations in TB management within the NTPs are crucial to improving TB case notification and treatment outcomes. Both innovations in the diagnostic and treatment technologies/regimen and in administrative strategies should be considered, piloted, and promoted based on scientific evidence. During the past years, India has been piloting some game-changing innovations, for example, bedaquiline (BDQ) short-course treatment in a few states.³⁶ By April 2022, the country has completely transitioned to the shorter oral (BDQ)-containing regimen.³⁷ Regarding NTP management, India has scaled-up private provider engagement, including using output-based financing for private providers. Indonesia has also shown increased interest in engaging private providers, including at the primary level of care. These innovations in medical technology and managerial system, such as new medicine and financing schemes, can be widely adopted by NTPs globally based on evidence of effectiveness as well as local resource settings and priorities.

While innovations in private provider engagement have been initiated, there is generally a lack of policy innovations to motivate private providers to improve service quality, and evidence on new incentives remains insufficient. For example, in India, the impacts of financial incentives for private service providers to notify TB patients and record TB outcomes in the electronic management system still need to be examined in detail. In Indonesia, the existing payment mechanisms need to be improved to increase the accountability of DHO and to provide sufficient incentives to engage private providers at the primary level. The enabling mechanism must also be in place to ensure the feasibility of private providers in providing comprehensive TB care. Nevertheless, the piloting and roll-out of innovations also call for government commitment to evaluate and scale up the innovations to achieve lasting impacts to reduce the burden of TB.

Conclusion

Market failures in TB control have not yet been adequately addressed under the current health system in China, India, and Indonesia. Policy misalignments of the NTP programs with national health insurance schemes have also impeded the delivery of accessible and high-quality TB healthcare services in the three countries. While the three countries have made some progress in TB diagnosis and care through vertically driven programs, there is scope to further improve on this momentum through a more integrated approach for TB care as part of UHC investments. Achieving the national targets of ending TB in these three countries

requires effective health system solutions to tackle incoherencies between the vertical NTP and national insurance policies and promote innovations to improve access to TB care, particularly by private primary care providers. Successful integration of TB control and UHC reforms and financing in the three countries is not only about saving lives but also smart economics, given TB's disproportionate economic costs to the countries. Successful control of TB in the three countries is also critical to the disease transition underway in each country. In addition, there are substantial opportunities for the three countries to learn from each other and, more importantly, for other high-burden TB countries to learn from innovations and reforms in UHC and TB financing implemented in these three countries.

Contributors

Weixi Jiang and Di Dong conducted literature search and wrote the manuscript. Ronald Mutasa,

Olusoji Adeyi, Sapna Surendran, Shenglan Tang helped design the analysis framework of the study and revise the manuscript. Sapna also contributed to the writing of the analysis in India.

Esty Febriani and Ahmad Fuady contributed to the writing of the analysis in Indonesia, and reviewed and revised the manuscript.

Declaration of interests

All authors declare no conflict of interests.

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