Private Sector Engagement in Tuberculosis Care

21 May 2025

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1. Executive Summary

While global progress has been made in the fight against tuberculosis (TB), significant challenges remain, particularly in regions where the disease has widespread impact. In many of these settings, private providers play a critical role—accounting for approximately 75% of healthcare.[1] Engaging the private sector is therefore critical to expanding the reach and effectiveness of TB services.

This report presents an analysis of private sector engagement (PSE) in TB prevention, diagnosis and treatment in six high-burden countries—Bangladesh, Indonesia, Nigeria, Pakistan, the Philippines and Tanzania. It examines various approaches to engaging the private sector and identifies key opportunities to strengthen TB services and improve patient outcomes through better collaboration between public health systems and private healthcare networks. An in-depth assessment focusing on specimen transportation models for improving diagnostic accessibility, financial and non-financial incentives and data systems was completed for five of the six countries.

Findings from the analysis reveal that engaging private primary healthcare providers has improved access to TB care, while larger facilities continue to play a critical role due to their diagnostic capacity. Deployment of molecular diagnostic tools in the private sector is progressing, but requires better integration and linkages for specimen referrals to address access and distribution gaps. Specimen transportation models are identified as a key strategy to enhance diagnostic access by reducing costs and turnaround times. Data systems for TB reporting show variability across countries, and while digital tools offer promise, they remain hindered by ongoing challenges in data capture and reporting efficiency. Both financial and non-financial incentives have proven essential for engaging private providers, with access to diagnostics, simplified reporting systems and government recognition playing a critical role. Findings highlight the importance of country-specific strategies to optimize private sector engagement, strengthen diagnostic and data systems and adopt innovative approaches for advancing TB care and prevention. Notably, direct correlations have been observed between the effectiveness of the TB response and the active engagement of private actors across the TB care continuum.[2]

Overall, the analysis underscores the impact of PSE in improving TB notifications and the growing role of private providers in TB care and prevention. It highlights their integration as crucial for use as a strategic resource for key stakeholders (i.e., policymakers, public health officials, program managers, private healthcare providers and donors) to inform policy decisions, optimize resource allocation and foster collaboration between public health systems and private healthcare networks to accelerate progress in TB control.
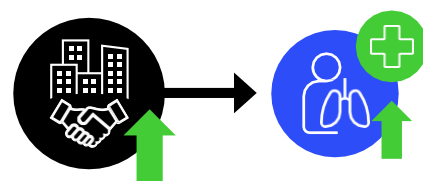
Private sector engagement is critical to advancing TB control and guiding effective health policy.

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[1] Quality of tuberculosis care in the private health sector (https://www.sciencedirect.com/science/article/pii/S2405579420300358)
[2] Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)

2. Introduction

Background

Significant progress has been made in the global response to tuberculosis (TB), with an 8.3% reduction in incidence rates and a 23% decrease in TB-related deaths from 2015 to 2023. The gap between estimated and reported TB cases has narrowed from 4 million in 2020 to 2021 to 2.7 million in 2023, below pre-pandemic levels. Treatment success rates remain high, at 88% for drug-susceptible TB, with notable improvements for multidrug-resistant TB/rifampicin-resistant TB (MDR-TB/RR-TB), which reached 68%.[3]

Despite this progress, TB remains a critical global health challenge, especially in high-burden countries where the disease poses a significant public health threat. Ending the global TB epidemic is a major focus of international health efforts, spearheaded by the World Health Organization's (WHO) End TB Strategy.[4] Moreover, the Global Fund Strategy for 2023-2028[5] prioritizes enhancing private sector engagement in TB care by scaling up successful models that provide accessible, affordable and high-quality TB services seamlessly integrated into public health systems. These strategies aim to significantly reduce TB cases and deaths by 2030, aligning with the Sustainable Development Goals (SDGs) set by the United Nations. Achieving this ambitious target requires a concerted and coordinated effort across various sectors including government, communities, civil society and the private sector.

In seven high TB burden countries,[6] private provides account for approximately 75% of initial care-seeking.[7] However, private for-profit notifications account for only an average of 28% of total TB notifications, ranging between 14% and 32%.[8] Given the extensive role of private healthcare providers in these settings, and the clear potential for further TB service coverage, engaging the private sector is pivotal to enhancing the reach and effectiveness of TB services.

This report presents an analysis of private sector engagement (PSE) in TB prevention, care and management across six high-burden countries: Bangladesh, Indonesia, Nigeria, Pakistan, the Philippines and Tanzania. The six countries account for approximately 25% of the global TB burden, with an estimated combined incidence of 3.52 million in 2023, or

> **Box 1: WHO Public-Private Mix Roadmap for TB Prevention and Care**
>
> WHO's roadmap for public-private mix in TB prevention and care identifies seven countries that account for 60% of the TB burden—Bangladesh, Indonesia, India, Myanmar Nigeria, Pakistan, and the Philippines—all of which have a large private healthcare sector.
>
> The roadmap outlines 10 key actions for scaling up engagement of TB care. These include: 1) understanding patient preferences and private sector dynamics; 2) setting ambitious PPM targets; 3) advocating for political commitment, action and investment in PPM; 4) allocating adequate funding; 5) partnering with and building the capacity of key stakeholders; 6) establishing supportive policies; 7) adapting flexible engagement models; 8) harnessing digital technologies; 9) delivering financial and nonfinancial incentives; and 10) monitoring progress.
>
> Source: Public–private mix for TB prevention and care: a roadmap. WHO. 2018

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3 WHO Global TB Report 2024 (https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2024)
4 The End TB Strategy (https://www.who.int/teams/global-tuberculosis-programme/the-end-tb-strategy)
5 Fighting Pandemics and Building a Healthier and More Equitable World - The Global Fund Strategy (2023-2028) (https://www.theglobalfund.org/media/11612/strategy_globalfund2023-2028_narrative_en.pdf)
6 India, Indonesia, Philippines, Pakistan, Nigeria, Bangladesh, Myanmar
7 Quality of tuberculosis care in the private health sector (https://www.sciencedirect.com/science/article/pii/S2405579420300358)
8 Engaging private health care providers in TB care and prevention: a landscape analysis (https://iris.who.int/bitstream/handle/10665/351023/9789240027039-eng.pdf?sequence=1)

321.67 per 100,000 population.[9] From 2021 to 2023, a total of US$816.4 million was allocated for TB efforts in these countries through Global Fund grants, with US$109.9 million (13%) specifically designated for PPM models in TB.[10] Of the six selected countries included in this analysis, five are among the seven high TB burden countries with large private healthcare sectors identified in the WHO PPM roadmap.

The overall objectives of the analysis were to: (1) gather deeper insights into ongoing PSE activities; and (2) identify lessons learned, successes and obstacles faced by national TB programs (NTP) and partners involved in PSE. Insights and lessons can enhance learning and collaboration and support countries to develop more effective TB service delivery strategies tailored to their healthcare landscapes.

Methodology

This analysis presented in this report was part of a broader project funded by the Global Fund and the Bill and Melinda Gates Foundation which aimed to assess Global Fund investments and innovative service delivery mechanisms in private sector engagement in TB service delivery in high-burden countries.

TB program and financial data on the six countries was collected from Global Fund program documents and reports, the WHO PPM data dashboard 2024[11] and published and grey literature. Additional qualitative data was collected through key informant interviews (KIIs) with country implementing and funding partners, Global Fund country teams, private healthcare providers and field visits. The interview guide was developed with inputs from Global Fund country team members and covered key areas of service delivery program support such as PPM program scope, country policies and guidelines for the private sector, access to diagnostic testing and results, financial incentives, data systems and program management. Data was analyzed thematically and broad codes were refined through collaborative discussions. As a result, three primary themes driving TB notifications were identified: specimen transportation from private sector entities to public sector GeneXpert sites; financial and non-financial incentives for TB notification and diagnosis; and data recording systems. An in-depth analysis of five of the six countries—Indonesia, Nigeria, Pakistan, the Philippines and Tanzania—focused on these themes. The inclusion criteria required a Global Fund TB funding budget of at least US$49 million and a PPM budget of at least US$7 million from 2021 to 2023.[12]

The methodology incorporated diverse data sources and systematic analysis to mitigate potential biases, ensuring triangulation and cross-verification of findings. A wide range of perspectives minimized the risk of bias stemming from a limited focus, while the iterative refinement of analytical categories further strengthened the reliability of the results. A key limitation of this study is the potential discrepancy between national-level and project-specific data; thus, caution is advised when interpreting the findings of this report.

[9] Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)
[10] Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)
[11] WHO with the support of the Bill and Melinda Gates Foundation (BGMF), is working with seven PPM priority countries to help them streamline reporting of PPM data through enhanced dashboards. The countries include Bangladesh, India, Indonesia, Kenya, Nigeria, Pakistan and the Philippines. https://www.who.int/teams/global-tuberculosis-programme/public-private-mix-data-dashboards. WHO PPM Dashboards: https://www.who.int/teams/global-tuberculosis-programme/public-private-mix-data-dashboards
[12] While India has the highest TB burden globally, it was excluded from the analysis as a relatively large volume of published literature exists on the TB program.

3. High-level Insights from Six High TB Burden Countries

TB context

Bangladesh, Indonesia, Nigeria, Pakistan, and the Philippines are among the top 30 high TB burden countries for both drug-sensitive TB (DS-TB) and drug-resistant TB (DR-TB). Tanzania is also classified as a high-burden country, but only for DS-TB.[13] According to the WHO Global TB Report 2024, eight countries accounted for more than two-thirds of global TB cases in 2023. Among them were Bangladesh (3.5%), Indonesia (10%), Nigeria (4.6%), Pakistan (6.3%) and the Philippines (6.8%).

Table 1 provides a comparative overview of 2023 TB statistics among the six countries, highlighting notable differences in health outcomes and treatment accessibility. The Philippines and Indonesia have the highest TB incidence rates, with Indonesia also recording the most TB-related deaths (125,000). While Bangladesh has the highest treatment coverage (80%), Pakistan has the lowest coverage (69%) and also a high number of missing TB patients (205,900), indicating gaps in diagnosis and care. These disparities underscore the need for targeted interventions to improve case detection, treatment access and overall TB management.

Table 1: Population, TB incidence, treatment coverage, missing TB cases and estimated TB-related deaths

| S#	Country	Population (millions)	Incidence (per 100,000 population)	National TB case notification (2023)	Treatment coverage	Missing TB patients	TB-related deaths
1	**Bangladesh**	171.2	221	303,700	80%	75,300	44,000
2	**Indonesia**	275.5	387	821,200	74%	278,800	125,000
3	**Nigeria**	218.5	219	371,000	74%	128,000	64,000
4	**Pakistan**	235.8	277	480,100	69%	205,900	47,000
5	**Philippines**	115.6	643	585,700	78%	153,300	37,000
6	**Tanzania**	65.5	183	93,300	76%	28,700	13,000

Source: WHO Global TB Report 2024

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[13] WHO global lists of high burden countries for tuberculosis (TB), TB/HIV and multidrug/rifampicin-resistant TB (MDR/RR-TB), 2021–2025 (https://iris.who.int/bitstream/handle/10665/341980/9789240029439-eng.pdf?sequence=1&isAllowed=y)

Overview of private sector engagement

The components of private sector healthcare

The private sector landscape encompasses a diverse array of healthcare providers across various countries. While some countries engage the full spectrum of providers, others focus exclusively on private for-profit entities, often excluding informal providers and community health workers. Figure 1 outlines the components of the private sector in healthcare—highlighting key functions, formality and size. It emphasizes the dynamic flow of financing to and from the private sector that shapes provider incentives and performance.

Figure 1: Components of the private sector in healthcare
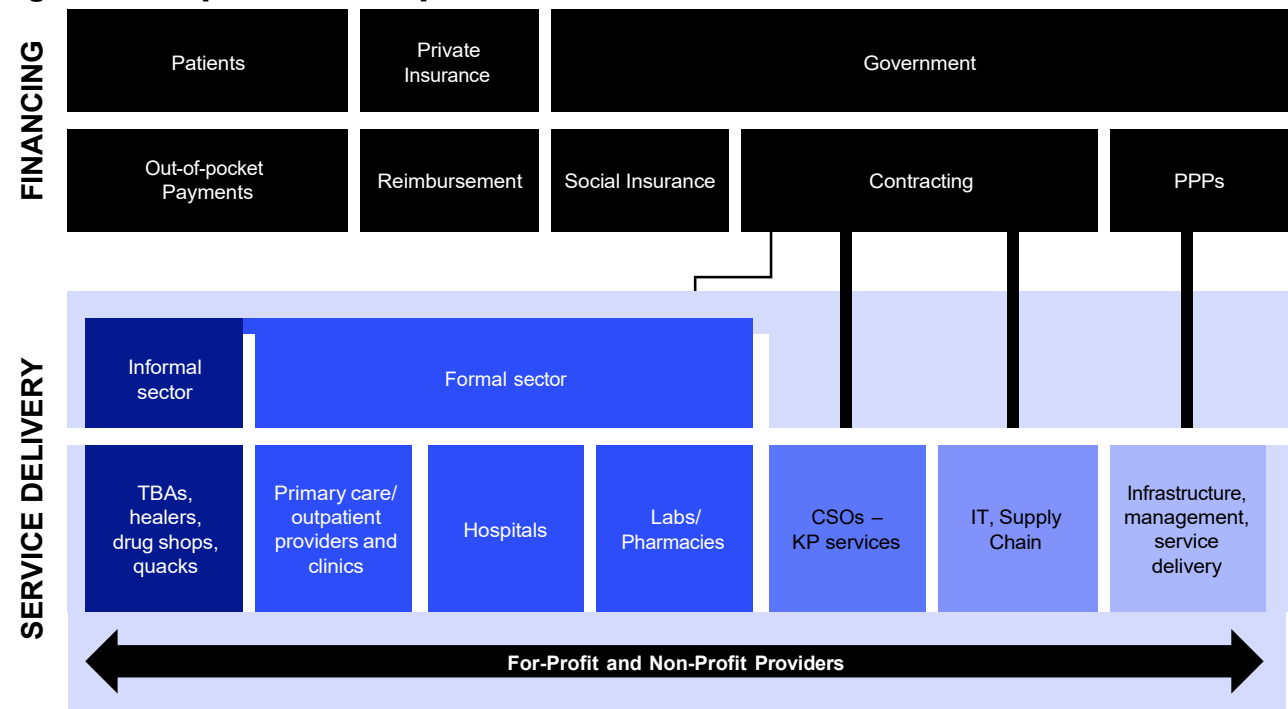
Source: Technical Evaluation Reference Group: Thematic Review on The Role of the Private Sector in Program Delivery

Effective public-private collaboration to end TB requires the active involvement of all healthcare providers in delivering TB services, beyond just corporate social responsibility and donations.[14] In the six countries examined, the private sector acts as the first point of contact for healthcare seeking for most individuals. Figure 2 provides the estimated proportion of people seeking healthcare with private providers in the country.

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[14] Opinion: Engaging the private sector is vital to ending TB (https://www.devex.com/news/opinion-engaging-the-private-sector-is-vital-to-ending-tb-104936)

Figure 2: Estimated proportion of people seeking healthcare with private providers
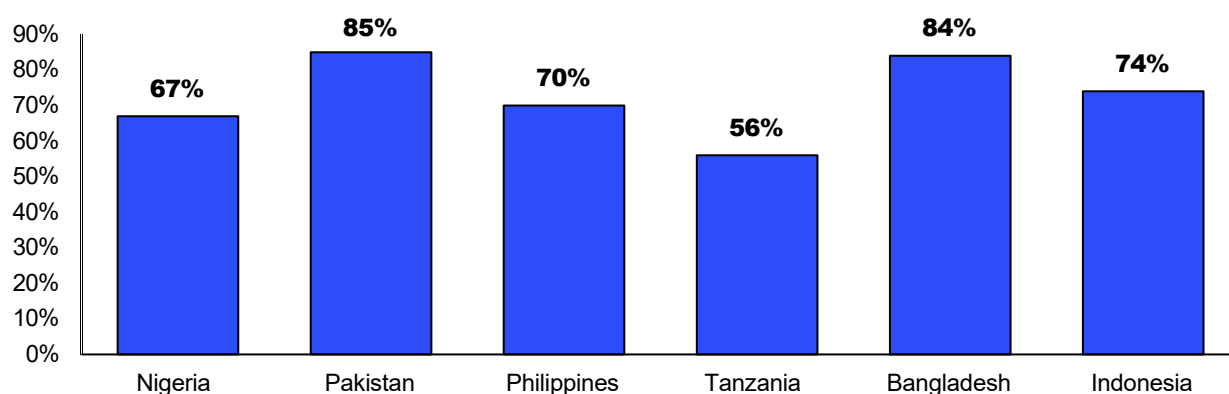
Sources: Engaging private health care providers in TB care and prevention: a landscape analysis, second edition
*Pathways and associated costs of care in patients with confirmed and presumptive tuberculosis in Tanzania: A cross-sectional study

Box 2: Expanding public-private models to enhance TB care

The Global Fund accounts for over 75% of international TB funding in low- and middle-income countries. Since 2017, the Global Fund provided additional support to PPM activities through its catalytic funding to find missing people with TB. Increased investments in private sector engagement have led to higher TB case notifications and significant progress toward ending TB.[15]

In 2023, with funding from The Bill and Melinda Gates Foundation, the Global Fund assessed its investments in PPM activities and the contributions of private healthcare providers to TB response in countries with a high burden of TB. Programmatic and financial data on TB were collected from 11 priority countries implementing PPM activities, including six countries (in bold) featured in this report: **Bangladesh**, Ethiopia, India, **Indonesia**, Kenya, Myanmar, **Nigeria**, **Pakistan**, **Philippines**, **Tanzania** and Vietnam.

Results from the analysis showed that the 11 countries collectively notified a total of 3,963,569 TB cases in 2021, achieving 79% of the Global Fund performance framework target, compared to 2022 where they notified 4,939,414 TB cases, reaching 98% of the target. PPM contributed roughly 29% and 28% of national notifications in 2021 and 2022, with 1,149,273 and 1,399,612 people with TB notified through PPM, respectively (Table 2).

TB grants from the Global Fund totaled US$1.4 billion for the 11 countries during grant cycle six, accounting for more than 60% of the total Global Fund funding for TB. The share of the budget for PPM ranged from 6% and 8% in the Philippines and Indonesia, respectively, to 21% in Nigeria and Pakistan. PPM contribution to national TB notification targets was 35%—ranging from 25% in Bangladesh to 36% in Pakistan (Table 3).

The analysis reveals that the PPM budget remains small compared with the PPM contributions to TB notifications. And while there is no correlation between the PPM budget and its contribution to notification targets,[16] results suggest private healthcare providers—supported by Global Fund investments—play a critical role in TB notification.

Source: Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)

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[15] Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)
[16] The performance of the national TB notification targets and the contribution of PPM could be affected by multiple factors beyond funding availability and the PPM budget in our analysis is from the Global Fund grants only, while the PPM notification targets are national and could be supported through other funding sources as well.

Table 2: TB notifications and the contributions of PPM to notifications in 2021 and 2022

Country	2021					2022				
	Notification target*	Notification result*	Achie-vement %**	PPM contribution to notification result	Proportion of PPM contribution %***	Notification target*	Notification result*	Achie-vement %**	PPM contribution to notification result	Proportion of PPM contribution %***
Bangladesh	**292,746**	**306,536**	**105**	**70,979**	**23**	**298,112**	**261,957**	**88**	**67,583**	**26**
Ethiopia	125,122	104,118	83	18,611	18	123,525	125,945	102	23,138	18
India	2,340,000	1,941,928	83	644,864	33	2,250,000	2,255,000	100	697,892	31
Indonesia	**726,752**	**398,086**	**55**	**76,723**	**19**	**768,882**	**741,794**	**96**	**146,605**	**20**
Kenya	101,323	77,921	77	15,353	20	99,910	91,087	91	16,913	19
Myanmar	142,893	65,801	46	17,112	26	139,510	107,086	77	52,117	49
Nigeria	**156,346**	**207,895**	**133**	**58,420**	**28**	**195,432**	**285,563**	**146**	**69,471**	**24**
Pakistan	**422,462**	**373,370**	**88**	**155,726**	**42**	**440,939**	**424,560**	**96**	**178,271**	**42**
Philippines	**470,604**	**321,564**	**68**	**70,006**	**22**	**493,326**	**445,726**	**90**	**122,732**	**28**
Tanzania	**90,146**	**87,415**	**97**	**14,852**	**17**	**97,446**	**99,539**	**102**	**15,120**	**15**
Vietnam	121,000	78,935	65	6,627	8	139,000	101,159	73	9,770	10
Total	4,989,394	3,963,569	79	1,149,273	29	5,046,082	4,939,416	98	1,399,612	28

* Targets and results are part of the Global Fund Performance Framework and are national.
** Calculated using the formula: notification results/notification targets*100.
*** Calculated using the formula: PPM contribution to notification result/overall notification result*100.
PPM = private-public mix.
Source: Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)

Table 3: Total TB grant, budget for PPM and contributions of PPM to national TB notification targets, 2021–2023

Country	Total TB grant/budget (USD)	Budget for PPM (USD)	PPM budget %	TB notification target	PPM contribution to notification target	PPM contribution to target %
Bangladesh	**121,767,021**	**15,615,893**	**13**	**894,117**	**219,960**	**25**
Ethiopia	56,893,736	1,774,351	3	366,422	76,751	21
India*	273,582,332	7,582,474	3	6,750,000	2,824,239	42
Indonesia	**170,000,000**	**14,096,111**	**8**	**2,264,005**	**725,314**	**32**
Kenya	64,694,297	3,547,036	6	299,774	83,890	28
Myanmar	99,126,255	24,998,046	25	418,305	96,441	23
Nigeria	**155,561,432**	**32,457,267**	**21**	**609,178**	**213,212**	**35**
Pakistan	**148,048,745**	**30,526,365**	**21**	**1,325,429**	**481,020**	**36**
Philippines	**171,920,126**	**9,915,062**	**6**	**1,471,238**	**417,841**	**28**
Tanzania	**49,088,020**	**7,262,213**	**15**	**286,655**	**85,997**	**30**
Vietnam	69,884,327	7,531,332	11	398,000	20,070	5
Total	1,380,566,291	155,306,150	11	15,083,123	5,244,735	35

* India's PPM activities (Patient Provider Support Agency) were transitioned to domestic funding during the current grant cycle with reduction in the budget.
PPM = private-public mix.
Source: Leveraging Global Fund's investments to expand innovative public-private provider engagement in TB (https://pmc.ncbi.nlm.nih.gov/articles/PMC11249657/)

Defining private and active healthcare providers

The WHO Advisory Group on the Governance of the private sector has defined private sector engagement as "the meaningful inclusion of private providers for service delivery in mixed health systems."[17] The definition is designed to be inclusive, covering a wide range of approaches to involving the private sector. Moreover, the WHO PPM dashboard provides a standardized framework that helps align definitions across various settings, ensuring consistency and better-targeted interventions.

However, the private health sector's diversity, including licensed and unlicensed practitioners as well as formal and informal providers, makes it challenging to determine the total number of practitioners in any country. Efforts to engage private providers in TB care often reach only a subset, with varying levels of success in recording active participation, creating additional challenges in assessing the full level of private sector engagement for TB care. Furthermore, the analysis found that across the six countries, the definition of "active" healthcare providers in TB care varies, reflecting diverse interpretations as can be seen in the Table 4.

Table 4: Definitions of private "active" providers in TB care

Country	Definition of "active" provider
Bangladesh	When they refer presumptive and diagnosed people to screening/diagnostic/treatment sites
Indonesia	When they identify and refer presumptive people
Nigeria	If they have signed MoU and have received training
Pakistan	When they identify and refer presumptive people
Philippines	When they are oriented and linked to GeneXpert testing sites
Tanzania	When they conduct screening to identify presumptive people

Standardizing the definition of "active" providers can improve clarity, consistency and alignment across countries, in line with WHO PPM dashboard terminology, making it easier to monitor and compare private sector engagement efforts globally.

Involvement of various healthcare providers in TB care and management

The involvement and support of various private healthcare providers in TB care and management varies significantly across different countries, with the highest contribution of providers to notification reflecting the investment focus of the different programs. Figure 3 provides an overview of the estimated total number of private healthcare providers in five of the six countries reached by programs compared to active private providers (those who reported at least one person with TB in 2023).

Figure 3: Active private providers against estimated total private providers engaged by programs in 2023
*The data for Nigeria is for 2024
Source: PPM Dashboard (for Tanzania source is NTP)
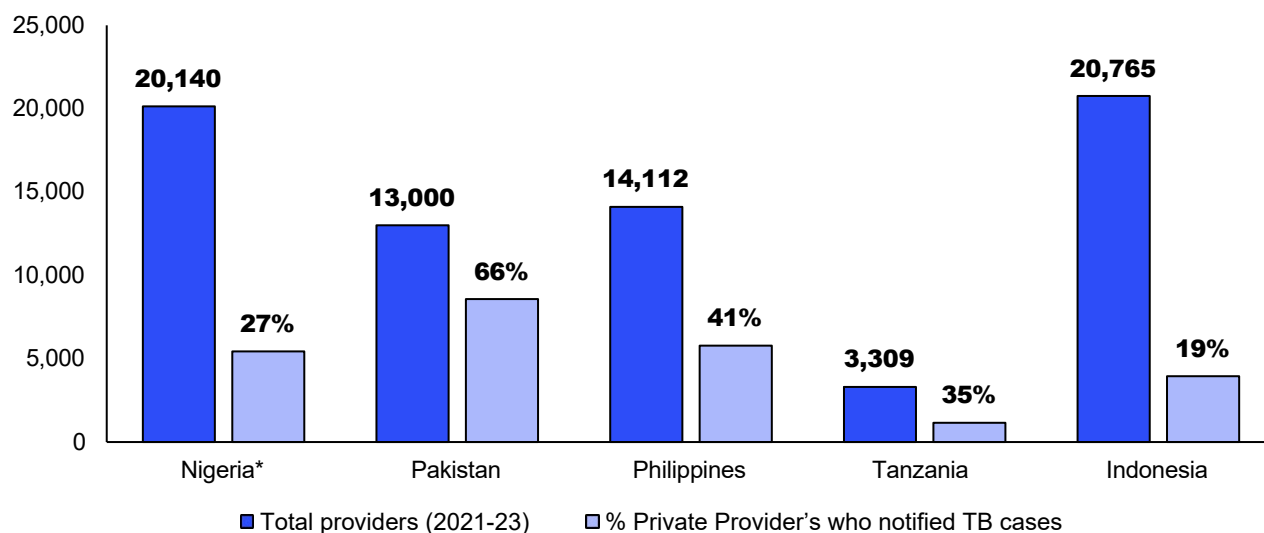
For example, in Nigeria, the highest case contributions came from the referrals through Patent Medicine Vendors (PMVs), followed by hospitals and clinics, traditional birth attendants (TBAs) and laboratories. In Pakistan, general practitioners (GPs) were the top contributors, with hospitals, pharmacies, NGO-run facilities and parastatal hospitals following. In Bangladesh, TB notification from Shasthya Shebika (community health workers) referrals made the largest contribution, followed by referrals from graduate private providers, other community health workers/volunteers, hospitals and village doctors. In the Philippines, most of the notifications are from private physicians from the Global Fund program. In Tanzania, private for-profit facilities led in case contributions, followed by Accredited Drug Dispensing Outlets (ADDOs) and traditional healers. In Indonesia, private hospitals led in contributions, followed by GPs and clinics.

Furthermore, the contributions of various healthcare providers span critical phases, including systematic screening, specimen and client referrals, case notification, diagnosis, treatment, follow-up and GeneXpert testing. These efforts collectively strengthen private sector engagement and advance global End TB efforts.

4. Key Findings

The following are key findings from Indonesia, Nigeria, Pakistan, the Philippines, and Tanzania.

TB notifications

Increased TB notifications

Between 2021 to 2023, more than 1.68 million people with TB were notified by the private sector across the five high-burden countries analyzed, reflecting an average increase of 103% in TB notifications. Notably, the private sector's contribution to overall TB notifications increased significantly, for example rising by 3% in Nigeria and by 41% in Indonesia. However, Tanzania reported a decline in contributions (see Table 5 and Figure 4).

Table 5: Overview of private sector's contribution to TB notification

Country	2021	2022	2023	% increase in notifications 2021 - 2023	Estimated private sector's contribution (2021)	Estimated private sector's contribution (2023)	Estimated % increase in private sector's contribution 2021 – 2023
Nigeria*	58,219	69,504	108,530	86.5%	28%	29%	3.57%
Pakistan	128,290	180,101	215,986	68.3%	39%	45%	15%
Philippines	70,821	130,567	141,907	100.3%	22%	25%	13%
Tanzania**	14,894	14,755	14,760	0.90% decrease	17%	16%	-5.88%
Indonesia	96,319	195,826	248,076	157%	22%	31%	41%

* Source: NTBLCP Nigeria
** Source: NTP Tanzania
Bangladesh is excluded from this analysis because of the lack of verifiable data.
Remaining data is from WHO PPM Dashboard for Pakistan, Philippines and Indonesia.

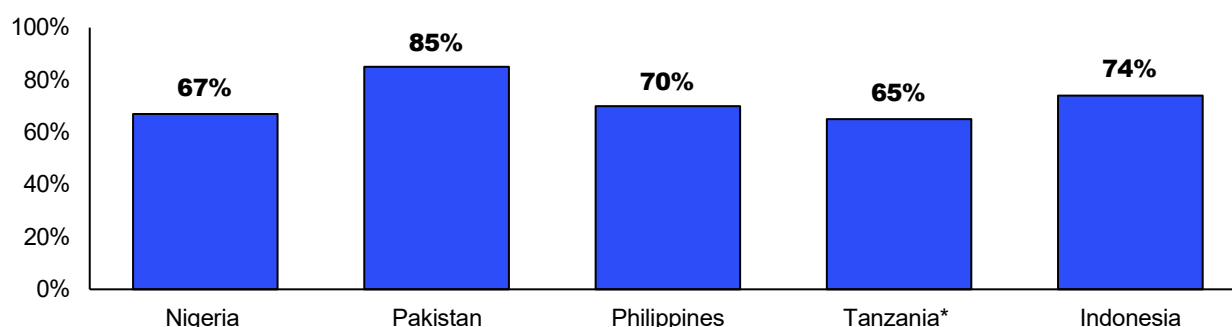**Figure 4: Contribution of private providers in TB notifications in 2023**

* Source: NTBLCP Nigeria
** Source: NTP Tanzania
Bangladesh is excluded from this analysis because of the lack of verifiable data.
Remaining data is from WHO PPM Dashboard for Pakistan, Philippines and Indonesia.

<u>Increased access to diagnostics at initial healthcare visit</u>

TB programs have focused on reaching primary care providers to improve TB care when patients initially seek healthcare. Primary healthcare is critical for early detection, as it helps identify individuals at the beginning of their care-seeking journey and is ideal for the provision of TB care. Data from the WHO PPM dashboard indicates that from 2021 to 2023, the number of primary health facilities engaged in TB programs increased significantly in Indonesia (871%), Pakistan (31%) and the Philippines (54%).

However, as secondary healthcare facilities, such as larger hospitals and specialized labs, have higher diagnostic capacity, strengthening linkages with primary healthcare facilities is critical. Where resources are limited, a more efficient and patient-centered approach can be supported by improving integration between primary healthcare and secondary care, while tailoring the response to the specific needs of the healthcare settings in each context.

The context can vary significantly by country. For example, in Indonesia, the insurance payment mechanism incentivizes hospitals to retain patients instead of decentralizing care, resulting in minimal contributions from general practitioners and clinics. Whereas, in other countries like Pakistan, the focus has been on engaging more GPs at primary care level (over 8,000) rather than large private hospitals (around 350). Expanding engagement and linkages between larger hospitals and GPs/clinics, depending on the country's context, could significantly enhance TB notification in the country. Tools like GPS mapping and diagnostic network optimization are valuable for optimizing intervention planning and the strategic placement of screening and diagnostic tools. Assessing feasibility of potential sites through comparisons of reach, yield, cost and the complexity of PSE engagement helps identify high-burden areas and high-volume facilities—more effectively targeting locations where patients can access comprehensive services.

Molecular WHO-recommended rapid diagnostics and sample transportation

Molecular WHO-recommended rapid diagnostics (mWRD) are accurate and cost-effective. They can also expedite treatment initiation and improve key patient outcomes.[18] Findings show a notable increase in molecular diagnostic equipment and testing at the national level in both private and public sectors in many countries. Given the constraints placed by limited resources, countries have prioritized the strategic deployment of GeneXpert machines and other molecular testing technologies (e.g., Truenat and TB LAMP) in high-burden regions and high-volume facilities to enhance early diagnostic capabilities.

Diagnostic network optimization exercises in the Philippines (2015), Pakistan (2022), Nigeria (2022), and Indonesia (2021), and a diagnostic network assessment in Tanzania (2021), have guided efficient deployment and increased utilization of equipment. For example, in the Philippines, the exercise highlighted gaps that resulted in optimal placement of GeneXpert machines and their increase from 317 in 2017 to 1,089 in 2023, leading to a 91% reduction in microscopy use and a 69% increase in molecular diagnostics. Similarly, Pakistan saw a 74% increase in GeneXpert machines, rising from 494 to 864. In addition to the GeneXpert machines, other advanced screening and diagnostic tools have been deployed, including TB LAMP and Truenat in Nigeria, and digital chest X-rays with CAD4TB in Pakistan.

Increased private sector access to molecular diagnostics

The analysis also indicates a slow but encouraging rise in the deployment of GeneXpert machines within the private sector. Specifically, Pakistan recorded a 146% increase in GeneXpert machines in the private sector, from 28 to 69 from 2021 to 2023. Similarly, the number of Xpert machines increased from 49 in 2021[19] to 92 in 2023 in Nigeria, and from 74 in 2021 to 82 in 2024 in Tanzania[20]. Moreover, the average number of tests per site per day appears to be higher in the private sector as compared to public sector in Pakistan (16 vs 8.4) and in Nigeria (12 vs 8). GeneXpert sites in private health facilities have not only improved access to diagnostics, but have also improved bacteriological positivity in the Philippines and Indonesia as shown in Table 6.

Table 6: Impact of expanded diagnostics access on bacteriological positivity

S#	Country	% Increase in number of Xpert machines in private sector	Percentage of bacteriologically positive people in private sector in 2021	Percentage of bacteriologically positive people in private sector in 2023
1	Nigeria*	87.76%	81%	81%
2	Pakistan	146%	40%	39%

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[18] WHO standard: universal access to rapid tuberculosis diagnostics (https://www.who.int/publications/i/item/9789240071315)
[19] **Partnering with the private laboratories to strengthen TB diagnostics in Nigeria**
(https://www.sciencedirect.com/science/article/pii/S2405579423000256#:~:text=The%20number%20of%20tests%20conducted,the%20public%20and%20private%20sectors.&text=facilities%20and%20laboratories-,Table,Contribution%20from%20Private%20Labs.)
[20] National TB and Leprosy Control Program – Laboratory data, Tanzania

S#	Country			
3	Philippines	Data not available	15%	20%
4	Tanzania	11%	Data not available	Data not available
5	Indonesia	Data not available	32%	34%

The data for Nigeria is for years 2022 and 2024
Source: WHO PPM Dashboard

Despite this progress, gaps remain. Table 7 provides a comparison of mWRD testing for patients in the private vs public sectors. In most countries, the rates for people diagnosed with TB and initially tested with mWRD are higher in the public sector, indicating insufficient distribution and access of machines in the private sector. This highlights the need for better-managed deployment of diagnostic equipment and linkages for specimen referrals.

Table 7: Overview of access to WHO-recommended rapid diagnostic test in private vs. public sector

S#	Country	Year	Percentage of people diagnosed with a new episode of TB who were initially tested with a WRD in private sector	Percentage of people diagnosed with a new episode of TB who were initially tested with a WRD in public sector
1	Nigeria	2022	69%	66%
2	Pakistan	2023	65%	77%
3	Philippines	2023	40%	86.5%
4	Indonesia	2023	41%	69%

Source : WHO PPM Dashboard

Improved access to diagnosis through specimen transportation models

Findings indicate the significance of specimen transportation models in enhancing access to diagnostics across all the countries. Each country has a distinct specimen transportation model for TB, involving various actors, contracting and payment methods and reporting mechanisms. Largely, these models reduced out-of-pocket costs for patients by moving the sample rather than the patient, ensuring convenience for both patients and providers. Similarly, efficient specimen transportation models have helped to reduce turnaround time.

Still, many countries struggle with labor-intensive and complex recording and reporting procedures, resulting in poor patient tracking, data errors, incomplete information, delays in payments, high transportation costs and issues with sample quality. Despite these challenges, streamlined transportation models have had a positive impact. Table 8 provides an overview of these models in the five countries.

Table 8: Overview of sample transportation models

	Characteristics of different systems				
	Nigeria	**Pakistan**	**Philippines**	**Tanzania**	**Indonesia**
Actors involved	Linkage coordinators, patent medicine vendors, DOTS Officers, and community-based organizations	Local motorcycle riders	Local motorcycle riders	Local motorcycle riders	Health facility staff and third-party service
Number of riders engaged	602	716	400	128	N/A
Average number of samples transported per rider per week	30-50	14	24	22.5	Data not available
RR case detection	440 in 2023	370 cases (2021-23)	Data not available	Data not available	Data not available
Average turnaround time for GeneXpert results	2-3 days	24 hours to 3 days	1-7 days	2-7 days	1-7 days
Average cost per sample/per transport	US$1.57	US$1.40	US$1.11	US$0.50	Data not available

Below are some detailed findings from the specimen transportation systems implemented across the five countries:

Specimen referral protocols: Establishing clear guidelines and protocols for specimen referral, handling and tracking streamlines operations and enhances efficiency. All countries reviewed have implemented sample transportation programs with varying levels of operational efficiency. On average, each rider supports 20 facilities (ranging from around 9 to 30).

Transportation costs and payments: The average cost to transport a TB sample in the selected countries is approximately US$1.50, ranging from US$0.50 to US$1.57. Payment mechanisms are varied. For example, in Pakistan, riders receive performance-based payments based on the distance covered. In the Philippines and Tanzania, riders receive fixed monthly payments in addition to the fuel. In Nigeria, under the Global Fund project, riders receive a fixed monthly stipend in addition to a transportation allowance. In the USAID-funded TB LON project, the riders receive transportation and communication allowance, in addition to a fixed monthly stipend.

Integrated transportation models: A unified system for collecting and delivering various health-related samples and supplies (e.g., integrating specimen transportation for HIV testing and drug supply chains) can optimize resources and streamline service delivery. Notable examples are the Philippines and Tanzania, where the same riders transport samples for both TB and HIV, effectively leveraging the strengths of a single model to support two major health programs.

Operational specimen transportation management: Different mechanisms to manage riders are employed in the selected countries:

- **Nigeria:** While a diverse group of stakeholders is involved in specimen transportation (including linkage coordinators, PMVs, DOTS Officers and community-based organizations), approximately 430 linkage coordinators primarily handle transporting samples and returning the results to about 5,000 referring facilities. The riders are managed by a sample transportation movement consultant at local government authority (LGA) level and monitored by mobile phone. The limited number of riders and long distances pose challenges in timely transportation of sputum samples. Health facility focal persons communicate with the rider via phone to notify them when samples are ready for collection. The data is maintained manually using an excel format. No real time data is available.

- **Pakistan:** The sample transportation system serves as an exemplary model, with well-defined operational guidelines that provide step-by-step instructions for all stakeholders involved in the process. The program employs 716 riders covering approximately 8,000 private facilities in 85% of the total districts in the country. The digitally-driven and robust sample transportation system involves community riders and pivots on an Android-based mobile application called "Riders for Health" that moderates a ride management system (RMS). The online system provides real-time information on the number of samples transported and tested. In addition, the system tracks the distance covered by each rider and automatically calculates their incentives. Test results are shared with the provider through an exclusive interface on the Riders for Health app, while patients are notified through text about results being ready. This payment structure incentivizes riders to transport as many samples as possible over longer distances. As a result, riders who are paid on a per-kilometer basis tend to prefer covering larger geographical areas to maximize their earnings, rather than deploying more riders over smaller areas, which may lead to inadequate compensation.

- **Philippines:** Approximately 400 STRiders are engaged to support sample transportation. They cover around 5,700 health facilities in an integrated care model that includes transporting drugs and reporting back to facilities. The STRiders are centrally managed by the prime recipient (PR). A government medical technologist oversees the lab aspect and provides them with a daily schedule. Just six months after the STRiders

system was established, the number of specimens processed at GeneXpert sites doubled and TB notifications rose by nearly 50%.[21]

- **Tanzania:** Riders are managed by health facility staff. Health facility focal persons communicate with them via phone to notify them when samples are ready for collection. The limited number of riders (128 across 64 councils) presents challenges related to coverage and distance within the councils. In instances where the distance within a council extends to approximately 160 kilometers, one rider may transport the sample halfway and another rider takes over for the remainder of the journey to the GeneXpert site. This is mainly because GeneXpert machines are only available in public health facilities and faith-based organizations.

- **Indonesia:** Indonesia employs two types of sample transportation models for TB diagnosis: internal and external. The internal model uses health facility staff or hospital couriers to transport samples to GeneXpert sites and reimburses them using a set rate or receipt-based payments. External models involve third-party couriers or community health workers, reimbursed per trip via the district health office. Sample transportation supports both public and private sectors and is mandated in all districts, improving access to diagnostics. However, underutilization, risks from improper sample handling, delayed turnaround times and funding gaps for private facilities remain challenges. A sample transportation app, SITRUST, exists but is currently inactive due to platform incompatibility.

Financial and non-financial incentives

Financial and non-financial incentive dynamics

An in-depth analysis of financial and non-financial incentives for private healthcare providers was conducted in Nigeria, Pakistan, and the Philippines. Tanzania and Indonesia were excluded from the analysis because Tanzania only provides non-financial incentives and the Indonesia program pays through insurance. The analysis shows financial incentives are provided to private providers at various stages in the TB care cascade—from presumptive identification to treatment completion—ranging between $0.13 and $13.34 (Table 9).

Furthermore, 2021 to 2023 data from three countries revealed significant increases in TB notifications and treatment initiation in the private sector, driven by Global Fund-supported programs that combine financial and non-financial incentives including diagnostics access, supervision, monitoring, training, provider support and data tracking. For example, Nigeria reported a 78% increase in TB notifications, with private providers contributing 29% of notifications. Pakistan had a 29% increase, with 45% coming from the private sector, while the Philippines saw an 82% surge in notifications, with the private providers contributing 24% in 2023. Nigeria offers the highest incentive per diagnosed and treated TB case (US$52), covering 20% of total and 72% of private notifications. Pakistan follows (US$27) for 31% of total and 72% of private notifications, while the Philippines (US$18) covers 24% and 97%, respectively. The total amount of incentives paid from 2021 to 2023 was US$3.26M (Nigeria), US$1.19M (Pakistan), and US$240K (the Philippines), excluding overhead and support costs.

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[21] Connecting the dots: Optimizing TB diagnostics in the Philippines (https://devex.shorthandstories.com/connecting-the-dots-optimizing-tb-diagnostics-in-the-philippines/index.html)

Table 9: Overview of types of financial incentives across the TB care cascade (2021-2023)

Type of provider (A)	Service for which incentives are provided	Incentive amount - (US$)	Total count of the service	Total number of providers performing the service	Average number of services per provider per year	Average incentive per provider per service per year (US$)
Nigeria						
Patent Medicine Vendor (PMV) **	Referral	1.22	577,252	6,605	29	36
PMVs	Confirmed TB case from referral	12.17	53,034	2,565	7	84
Clinician/ Medical Officer	Treatment initiation	7.30	30,860	1,905	5	39
Radiographer	Chest Xray	14.60	30,275	499	69	295
Hub (PFP, FBO)*	Treatment monitoring	7.30	58,726	1,905	10	75
Hub (PFP, FBO)	Treatment success with AFB follow-up	0.49	75,505	1,905	13	6.5
Linkage Coordinators	Client linkage	1.22	577,252	430	447	546

Average total incentive per patient diagnosed and successfully treated
(Referral, confirmed TB case, treatment initiation, chest Xray, treatment monitoring, treatment success, client linkage) $51.62

Type of provider (A)	Service for which incentives are provided	Incentive amount - (US$)	Total count of the service	Total number of providers performing the service	Average number of services per provider per year	Average incentive per provider per service per year (US$)
Pakistan						
GP	Case notification with treatment outcome	2.98	414,537	8,610	16	48
Lab technician	AFB slide	1.0	1,910,676	650	979	979
Hospital	GeneXpert testing (monthly operational cost)	~90		94 hospitals		

Average total incentive per patient diagnosed and successfully treated
(Microscopy, case notification and treatment outcome) $26.98

Type of provider (A)	Service for which incentives are provided	Incentive amount - (US$)	Total count of the service	Total number of providers performing the service	Average number of services per provider per year	Average incentive per provider per service per year (US$)
Philippines						
Private physicians	Notification of TB patient tested with mWDR	4.45	24,867	1,587	5	23
	Treatment outcome	13.34	9,980	388	8.5	112
RX Pass sites	mWDR test	30		103		

Average total incentive per patient diagnosed with mWDR and successfully treated is $17.79

*   PFP – Private for Profit; FBO – Faith Based Organization
** The total incentive is capped at 7 presumptive referrals per diagnosed TB case

Additional findings from the three countries are mentioned below:

Financial incentives impact and field staff assistance: Financial incentives to private providers can support timely initiation of treatment and free treatment for TB patients. However, efforts to encourage private providers to directly notify TB patients are hampered by lengthy reporting and claims processes or slow technology. Providing field assistants to support the private providers, even in the short term, has proven successful in improving physician practices and increasing TB notifications as seen in the Philippines and Nigeria.

In the Philippines, the Private Sector Engagement Notification Officers (PSENOs) play a crucial role in enhancing private sector compliance with TB mandatory notification. While the program trains and encourages private physicians to directly notify TB cases, most cases are usually reported with assistance for data entry by the PSENOs. The physicians begin by encoding patient data into the ITIS system. They complete incentive application forms quarterly, providing GeneXpert test results, treatment outcomes, and G-Cash account details. The completed forms are submitted to the assigned PSENOs, who review and validate them. The PSENOs provide ITIS screenshots as evidence for payment, verifying GeneXpert testing, notifications, and treatment outcomes, and removing any ineligible forms. Physicians or their secretaries then sign the forms.

Non-financial motivators: Non-financial incentives such as access to diagnostics, antitubercular (ATT) drugs, digitalization/simplification of the reporting and government recognition of private providers' contributions also serve as significant motivational factors for these providers. Across all countries, key informants highlighted the importance of both financial and non-financial incentives in driving engagement and performance among private providers.

Simplified payment mechanisms: The simplification of the incentive payment mechanism can reduce the administrative burden on providers, allowing them to concentrate more on patient care rather than completing multiple forms to access these incentives. For instance, in Pakistan, private providers are not required to engage in any documentation to claim their incentives. Also, a single carbonized form is used as evidence for payments to providers quarterly, after validation during quarterly review meetings.

Public-private data collaboration: Promoting collaboration and engagement among staff from both the public and private sectors involved in documentation management can significantly reduce data inconsistencies between these two sectors. In Nigeria, for instance, regular data harmonization meetings between field staff and government representatives have proven effective in enhancing data accuracy.

Data systems

Data system barriers
Innovations within the private sector, such as the development of various mobile applications across different countries, have improved data collection and reporting systems as presented in the Table 10.

Table 10: Overview of data systems in five countries

Country	Data collection methods								Who manages data/data entry	Number of field staff	Active providers ** per field staff (Average – 2023)	Patients per field staff (Average – 2023)
	Paper based	National MIS			Private sector applications							
		DHIS II	ITIS	SITB	Rx Tracker	MATS	IT IS Lite	WIFI TB				
Nigeria	X	X			X Presumptive screening				DOTS Officer/ mainly LC (project staff)	430 LCs	25	209 (17.4 patients per month)
Pakistan	X	X			X Presumptive referral				District field officers (project staff)	550	10	335 (28 patients per month)
Tanzania	X	X							DOTS provider/CHWs/ Volunteers	N/A	N/A	N/A
Philippines	X		X				X Case notification, treatment completion		PSENOs (project staff)	200	23	712 (59 patients per month)
Indonesia	X			X				X	Health facility staff	N/A	N/A	N/A

* The field staff reflect only those who are engaged in data management at the health facility level
** Nigeria: 10,786, Pakistan: 5,250, Philippines: 4,656

The findings highlight the significant variation in the applications used for data collection across the countries researched. While some countries rely on traditional paper-based systems, others have adopted digital tools such as DHIS II, ITIS, Rx Tracker, and ITIS Lite. This diversity reflects different stages of digital transformation and varying levels of infrastructure across healthcare systems. Harmonizing data across systems within a country is crucial for meaningful analysis and programmatic planning.

Further findings are included below:

Resource challenges in private sector data management: In each country, private providers often lack the resources to manage their own recording and reporting systems. However, larger facilities may have dedicated staff to support data management.

Streamlining documentation for efficiency: The data recording and reporting processes can be streamlined by consolidating redundant data entry points and forms, thereby easing the documentation burden on providers and field staff. In Pakistan, during a pilot project, Lady Health Workers (LHWs) involved in the contact screening of household members initially utilized separate forms for everyone, which imposed a considerable burden on both the LHWs and the field staff responsible for data review and validation. Learning from this experience, during the

scale up phase, the tool was modified to capture data for an entire household within a single form, significantly reducing the documentation burden.

Low utilization of digital apps in the private sector: While countries have attempted to provide private sector facilities with digital apps to facilitate data capture (e.g., MATS in Nigeria for presumptive identification, RX tracker in Pakistan to manage pharmacy referrals, WIFI TB in Indonesia for TB notification from private providers), low utilization, lack of stability and dependency are challenges. For instance, in Indonesia, only 9% of general practitioners report cases among the total engaged. One of the primary reasons for this low reporting rate is the complexity of the recording and reporting system, coupled with insufficient support for data entry. Additionally, private sector providers site numerous resource related challenges that impact regular and consistent use of the applications.

Data gaps in TB care cascade management: Data collection across all stages of the TB care cascade is essential for effective patient management. In the Philippines, tracking patients has provided valuable insights into treatment gaps at the district level, facilitating targeted interventions for improvement. However, a significant gap exists in the recording of drug dispensing for both public and private patients, which is particularly concerning for private patients. Addressing this issue would ensure comprehensive data for monitoring and improving treatment outcomes.

Unique identifiers for enhanced patient tracking: A robust electronic system equipped with unique identification numbers can enhance tracking patients throughout the TB care continuum. In Pakistan, patients are assigned a unique identifier upon registration, which aids in tracking their progress throughout treatment. However, this system requires further strengthening to prevent double counting in reporting where the same patient registers at a public facility.

Interoperability challenges with national data systems: Most countries face the challenge of a lack of interoperability with Ministry of Health data systems, which hinders seamless integration and data exchange between different systems across the country.

Improved coordination between NTP and private sector: Improving communication channels between the NTP and private sector facilitates better coordination and data sharing. A single data system with built-in de-duplication, like the one implemented in India, would streamline data integration and minimize the need for manual harmonization. Alternatively, in Nigeria (TB LON project) and Pakistan, where these systems are lacking, regular data harmonization meetings have significantly decreased discrepancies and inconsistencies in the data.
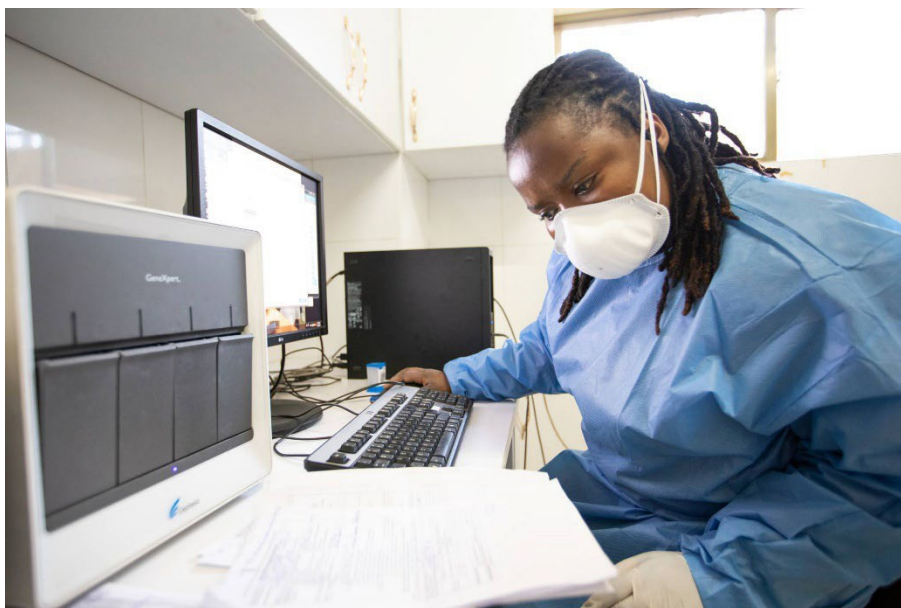
User-friendly mobile apps for better adoption: Challenges in the uptake and utilization of mobile apps persist in most countries with reported issues such as cumbersome user interfaces and reliability problems. These obstacles have hindered the adoption and effective use of mobile applications in the private sector, resulting in system-related issues that restrict data capture across the TB cascade and impede patient tracking and verification. In Pakistan, however, the rollout of the DHIS II tracker in the private sector has encouraged providers who were initially reluctant to participate in the TB program due to cumbersome data recording and reporting processes. These providers are now showing increased interest in joining the program.

The analysis of TB data collection and reporting systems across the five countries reveals a diverse landscape marked by both innovation and challenges. There is considerable variation in how each country handles these processes. Despite the introduction of digital tools like DHIS2, MATS, RX tracker and ITIS, the countries still struggle with incomplete data capture and reporting inefficiencies. Addressing these challenges requires a concerted effort to streamline data collection processes, enhance digital integration, invest in tracking every patient's journey and improve training and support for healthcare staff.

5. Discussion

Overall, findings from the countries highlighted in this analysis provide valuable evidence on diverse approaches for engaging private healthcare providers and the critical role they play in advancing goals to end TB—offering insights into the distribution of people with TB, the effectiveness of PSE interventions, and the diverse roles played by different healthcare providers in these countries.

Targeted engagement of private healthcare providers has significantly enhanced TB notification rates and service delivery. Countries that combined financial and non-financial incentives—such as access to diagnostics, supervision, training and government recognition—achieved notable increases in TB case detection, particularly in Pakistan, Nigeria and the Philippines. Still, while Nigeria reports significantly higher TB notifications and diagnostic testing resulting from financial incentives to private providers, in the Philippines, for example, the claims rate by physicians is low. There is, however, more evidence from this assessment that non-financial incentives such as training, provision of job-aides, provision of linkages and access to diagnostic labs, supportive supervision and government recognition all support greater inclusion of the private sector in TB care and may present a more sustainable approach to increased engagement.

Investments in diagnostic infrastructure, particularly the deployment of WHO-recommended rapid diagnostics and specimen transportation models, emerged as transformative. Countries, including the Philippines and Pakistan, have optimized sample movement through innovative logistics systems, reducing patient burden and turnaround time. Yet, gaps remain in diagnostic distribution across private facilities and in the integration of data systems. Despite the presence of multiple digital tools, challenges in interoperability, real-time data capture, and user-friendliness persist, hindering efficient program monitoring and planning. The variation in data collection tools across countries impacts data integration, timeliness, and accuracy. Digital systems enhance efficiency, while paper-based methods may cause delays and errors, affecting decision-making. Standardizing and harmonizing data systems is essential for effective TB surveillance and resource allocation.

These findings reinforce the value of context-specific approaches that align with existing healthcare ecosystems and leverage both primary and secondary level providers for improved patient reach and outcomes. They also underscore the importance of improving coordination between public and private actors, simplifying administrative processes, strengthening community-based interventions and fostering innovation through incentives and technology. Ultimately, these lessons offer a roadmap for expanding access, strengthening accountability and accelerating progress toward ending TB—especially in health systems where the private sector remains a dominant entry point for care.

The following key lessons learned have been drawn from this analysis:

1. In the six countries, private providers are not consistently engaged across all stages of the TB care continuum, from diagnosis to treatment completion. Comprehensive involvement of all private providers—from both formal and informal to primary and secondary level—is critical to closing gaps in care and improving treatment outcomes.

2. Digital technologies have enhanced reporting mechanisms in the private sector, contributing significantly to improved TB notifications and better insights into treatment gaps.

3. Despite improvements, poor treatment initiation records remain a challenge in the private sector across several countries. Tracking private physician patients throughout the care cascade provides valuable insights into treatment gaps, enabling targeted interventions for improvement.

4. Notification officers or district field supervisors significantly enhance the accuracy of notification and treatment success data from private sector physicians. This is evident in the experiences of the Philippines and Pakistan, where the involvement of such personnel has been a cornerstone of scaling up reporting and ensuring reliable data quality. Without their presence, efforts to achieve large-scale recording and reporting in the private sector are unlikely to succeed.

5. An integrated specimen transportation system ensures more efficient, reliable and consistent sample transport, as demonstrated by the successful implementation in the Philippines and Pakistan.

6. GeneXpert sites in private health facilities improved access to diagnostics, as well as bacteriological positivity and RR case detection.

7. A combination of financial (performance-based) and non-financial incentives, tailored to the specific context and available resources, can be highly effective in maintaining provider motivation. Non-financial incentives and enablers, such as government-issued certificates or recognition letters, as well as access to molecular testing, chest X-rays and anti-TB drugs play a crucial role in acknowledging and sustaining the commitment of private providers in delivering TB care, as evidenced across all six countries.

8. The integration of TB services into existing health insurance programs has demonstrated significant potential to enhance patient access to care, reducing out-of-pocket expenses and improving TB notifications.

9. A comprehensive understanding of the healthcare landscape by dedicated field staff is essential for maintaining uninterrupted TB care services. This ensures timely identification and replacement of closed facilities or incorporation of new ones, while providing an accurate picture of the number of providers to support target setting and resource allocation.

10. Close coordination with healthcare providers is vital for overcoming challenges in TB service delivery. Timely payments and comprehensive support strengthen TB detection, treatment adherence and overall TB management.

Increased investment in private sector engagement has shown promising results. By addressing key areas highlighted above, countries can leverage the full potential of the private sector in the fight against TB, reducing the incidence and improving the quality of care for TB patients. These insights emphasize the need for continuous review, improvement of existing programs and further implementation of innovative and adaptable solutions in the global effort to end TB.

Box 3: Considerations for Additional Research

1. Analyzing private sector dynamics to design targeted strategies that maximize their contribution to national TB response efforts.
2. Investigating the role of private providers in strengthening primary healthcare systems and fostering a mixed health system for effective TB care.
3. Assessing the impact of financial and non-financial incentives in motivating private providers to enhance TB notifications and treatment adherence.
4. Identifying barriers and opportunities in deploying molecular diagnostic tools across private healthcare settings, with a focus on their seamless integration into existing diagnostic workflows.
5. Evaluating the impact of private sector integration in TB care on improving cost-efficiency and ensuring long-term sustainability.
6. Assessing the impact of integrating TB care into the broader health system.
7. Exploring the role of digital health solutions in integrating public and private healthcare systems to streamline TB reporting and data management., monitoring and patient management.