ORIGINAL ARTICLE

PUBLIC-PRIVATE MIX IN TUBERCULOSIS CONTROL: A QUALITATIVE STUDY IN NORTH SUMATRA, INDONESIA

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ABSTRACT

The effective control of tuberculosis (TB) in Indonesia entails several challenges, including the limited involvement of non-governmental organizations (NGOs) and civil society organizations (CSOs) in TB prevention and treatment. The success of TB control initiatives depends on collaboration among government agencies, NGOs, and private healthcare providers. By fostering partnerships and comprehensive engagement, the goal of the public-private mix (PPM) model is to address gaps in TB services, which may lead to improved outcomes. This study aims to understand the dynamics of effective implementation, acceleration, and challenges of PPM partnership engagement in TB control strategies. Furthermore, this study seeks to provide a better understanding of the current TB control efforts and suggest a pathway for improved interventions and community participation in achieving TB elimination. This study employs a qualitative design to explore the dynamics of TB public partnerships in North Sumatra. Three primary data sources were analyzed: secondary data, published documents, and focus group discussions. Six themes were identified: (1) funding, priority allocation, and resources; (2) engagement through communication and collaboration; (3) access and health system mechanisms; (4) commitment and responsibilities; (5) implementation of existing regulations; and (6) monitoring and evaluation. The findings suggest that involving all relevant stakeholders (e.g., government, the private sector, NGOs, community leaders, and individuals), ensuring everyone has equal access to information/services, and maintaining ongoing communication and cooperation among the stakeholders are effective ways to achieve TB elimination in North Sumatra Province.
Keywords: *Stakeholder, Public-Private Mix, Tuberculosis, Control, North Sumatra*

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. According to the World Health Organization (WHO), TB ranks as the second leading cause of death from infectious agents worldwide, second only to COVID-19[1]. Indonesia accounts for approximately 10 percent of global TB cases, making it the second-highest contributor among the countries responsible for 87 percent of such cases, following India at 27 percent and preceding China at 7.1 percent[1]. In 2022, North Sumatra was the fourth province in Indonesia reporting the highest number of TB cases, trailing behind West Java, East Java, and Central Java. However, by 2023, the province saw an increase in cases, placing it third after West Java and East Java[2].

The percentage of TB case detection in North Sumatra from 2020 to 2024 has yet to meet the established target of 91%. Even so, there has been a notable increase in detection rates, with percentages recorded at 36, 37, 59, and 60 percent from 2020 to 2023, respectively[3]. TB control efforts encompass a comprehensive approach that prioritizes promotive and preventive strategies and integrates curative and rehabilitative measures. These efforts aim to improve public health; reduce the rates of morbidity, disability, and mortality; interrupt disease transmission; prevent the emergence of drug-resistant TB; and alleviate the adverse effects of the disease.

In line with these goals, the Ministry of Health of the Republic of Indonesia has established a national health development strategy for 2020-2024[4]. Effective TB control requires the involvement of multiple stakeholders, as recommended by the WHO[1]. The WHO promotes the public-private mix (PPM) approach as a strategy to enhance TB control by integrating the resources and services of both public and private health sectors. The PPM approach seeks to optimize the use of assets, infrastructure, and capacities from both sectors to improve diagnosis, treatment, and overall care for TB patients[5].

Furthermore, the success of TB control initiatives depends on collaboration among government agencies, non-governmental organizations (NGOs), and private healthcare providers. By fostering partnerships and ensuring

comprehensive engagement, the PPM model aims to address gaps in TB services, ultimately leading to improved outcomes in TB prevention, detection, and treatment. As Indonesia continues to confront the challenges posed by TB, implementing the PPM strategy within the national health development plan is essential to achieve more effective and sustainable TB control[2].

The effort to eliminate TB is multifaceted and requires a holistic approach that involves various stakeholders. The Indonesian Ministry of Health emphasizes the need for participation from communities, partners, and other sectors in TB elimination[6]. TB partners include individuals and groups committed to supporting TB control efforts, such as civil society organizations, educational institutions, professional bodies, business sectors, and media.

Efforts to address TB in North Sumatra have been formalized through the Governor's Decree No. 188.44/667/KFTS/2023, which aims to accelerate TB control in the province. The North Sumatra Health Office, supported by 71 institutions that include government agencies, financial institutions, community organizations, religious groups, NGOs, and professional organizations, plays a pivotal role in these efforts. The decree outlines the responsibilities of the TB acceleration team; these include developing an annual work plan, optimizing resources for TB control, coordinating efforts, and conducting monitoring and evaluation.

Study Aims

The implementation of TB control strategies necessitates clear stakeholder roles that highlight the varied contributions needed to address new TB cases. Furthermore, it is crucial to identify factors that support and hinder stakeholders in implementing accelerated TB control measures in the region. Understanding the dynamics of stakeholder engagement in TB control is imperative for interpreting these factors. Successful implementation of the TB control program in North Sumatra requires active involvement, along with the identification of enabling factors and barriers experienced by stakeholders. Such analysis can provide insight into the structural and operational challenges that must be addressed to improve TB elimination efforts. Supportive elements may include strong leadership from health authorities, adequate funding, and effective communication among stakeholders. Barriers may include insufficient training for health workers and social stigma associated with TB, which discourages individuals from seeking treatment.

This study involved a comprehensive analysis to identify the effective implementation, acceleration, and challenges of PPM partnership engagement in TB control strategies. The study also sought to enhance understanding of the current state of TB control and provide a pathway for improving interventions and community participation in TB control.

METHODS

Study Design, Setting, and Participants

This study employed a qualitative design to explore the dynamics of TB-related public partnerships in North Sumatra. This approach involves understanding, observing, documenting, analyzing, and interpreting phenomena, as experienced by informants, in order to reveal the essence of participants' thoughts, behaviors, perceptions, motivations, and actions. Analysis methods include in-depth interviews, focus group discussions (FGDs), observations, and documentation. This study specifically investigated the roles, opportunities, and challenges encountered by stakeholders in accelerating TB control efforts in North Sumatra, including their involvement in work plan development, resource provision, program coordination, and the monitoring and evaluation of TB control initiatives.

Inclusion criteria for participants were: (1) stakeholders who had an active role in TB control efforts in North Sumatra; and/or (2) individuals representing institutions formally appointed by the Governor of North Sumatra under Decree No. 188.44/667/KPTS/2023 as members of the Provincial TB Control Acceleration Team.

The study was conducted across multiple regions within North Sumatra Province, Indonesia. Participants consisted of stakeholders involved in the implementation of TB control acceleration in North Sumatra during the year 2022 **(Table 1)**.

Exclusion criteria included: (1) individuals who were not directly involved in TB control programs or decision-making processes; (2) stakeholders unable to participate in interviews or FGDs during the data collection period; and (3) individuals who declined to provide informed consent.

All participants were recruited purposively based on their roles and relevance to the study objectives. Prior to participation, all respondents were provided with information regarding the study objectives, procedures, and confidentiality measures. Written informed consent was obtained from all participants before data collection.

Data Collection Methods

In this study, a triangulation approach was employed to collect comprehensive data on TB control partnerships in North Sumatra. The study utilized three primary methods: analysis of secondary data, review of published documents, and FGDs.

Table 1: Stakeholders involved as Participants

No	Category		Code	Participants	Number of participants	Participant Code
1	Academicians	Non-Health stakeholders	FGD 1	Lecturers from universities in North Sumatra	2	A1, A2
2	Professionals	Health stakeholders	FGD 2	Representatives from the Association of Indonesian Hospital (PERSI), Family Medicine (PDKI), Pulmonology (PDPI), Public Health (IAKMI); Provincial Health Office	5	P1, P2, P3, P4, P5
3	Local NGOs	Non-Health stakeholders	FGD 3	Ex TB MDR patients' group (PESAT), community empowerment NGOs (YMMA, JKM, YMAPI)	4	L1, L2, L3, L4
4	Community stakeholders	Non-Health stakeholders	FGD 4	Local legal representative (DPRD) and religious leaders (MUI, KAHMI, MPKU, Buddha Tzu chi)	6	T1, T2, T3, T4, T5, T6
5	Business institutions	Non-Health stakeholders	FGD 5	Entrepreneurs, banks, companies/corporations	5	U1, U2, U3, U4, U5
6	Journalists	Non-Health stakeholders	FGD 6	Representatives from the Mass Media Association	2	M1, M2

The research team (ORR, IA, D, and DNY) comprised physicians with experience working in the TB program as TB consultants, together with the North Sumatera Tuberculosis WASOR (dedicated staff for the TB program).

1. Analysis of Secondary Data

The researcher collected unpublished internal TB reports, the Provincial Decree Letter for TB stakeholders, NGO reports, and other unpublished official documents collected from the North Sumatera Provincial Health Office. A thorough review was conducted by the research team, and the Provincial District Health Officer (WASOR TB) was involved in discussions. This process was deemed essential to identify relevant secondary data and establish a foundational understanding of existing TB control initiatives and stakeholder involvement in North Sumatra.

2. Review of Published Documents

Published documents included government regulations, global and national TB reports, peer-reviewed journal articles, and guidelines or frameworks for TB PPM. The secondary data and published official documents allowed the researchers to gain early context and to construct initial key themes for this study. This included factors related to motivation, facilitators, barriers, challenges, and the dynamic mechanisms among the factors in TB PPM in North Sumatra.

3. FGDs

We developed a semi-structured interview guide centered on the initial key themes. The FGDs were organized with TB stakeholders from North Sumatra Province. This method allowed for rich discussions among participants and facilitated the exploration of multiple perspectives on the support, challenges, and barriers faced in TB control PPM. The FGDs encouraged dialogue and enabled stakeholders to share their experiences, insights, and recommendations for improving TB control efforts. All interviews were transcribed and cleaned and then entered into NVivo qualitative software version 1.6.2.

Data Analysis

We performed thematic analysis, which is a qualitative research technique that facilitates the identification and interpretation of patterns within a dataset[7,8]. Braun and Clarke propose a six-step process for using thematic analysis to develop a conceptual model. To ensure the rigor and trustworthiness of the findings, several verification strategies were integrated throughout the process.

Step 1: Familiarization with the Data

The research team listened to the audio recordings and repeatedly read and reviewed the transcripts to gain a comprehensive understanding of the data and its context. Preliminary notes

were developed to capture initial ideas, emerging trends, and potential concepts.

Step 2: Generating Initial Codes
The data were systematically coded using NVivo software. A codebook was developed based on the study objectives, including implementation, acceleration, and challenges of PPM partnership engagement in TB control strategies. Coding was conducted by multiple researchers, and discrepancies were discussed to enhance coding reliability and reduce individual bias. The codebook was iteratively refined throughout the process.

Step 3: Searching for Themes
Codes were grouped into potential themes through an iterative process. The research team collaboratively reviewed code groupings to ensure consistency and coherence, supporting analytical triangulation.

Step 4: Reviewing Themes
Themes were reviewed and refined through regular peer debriefing. This step ensured that the themes accurately reflected the dataset and that there was clear distinction between themes. Any disagreements were resolved through discussion and re-examination of the data.

Step 5: Defining and Naming Themes
The team then defined the essence of each theme through detailed descriptions that addressed the research question.

Step 6: Producing the Report
A final report presenting a structured narrative of the themes was prepared. Each theme was supported with extracted data that enabled insightful interpretation. Collectively, these strategies strengthened the credibility, dependability, and confirmability of the findings by ensuring that interpretations were systematically derived from the data and not driven by individual researcher bias.

RESULTS

The analysis of secondary data, review of published documents, and FGDs conducted in this study clarified the dynamic roles of stakeholders involved in TB control in North Sumatra. These are illustrated in Figure 1. The roles of stakeholders in TB control and the corresponding data sources are presented in Table 2.

Figure 1 illustrates the coordination mechanism and roles of multiple stakeholders involved in the Public–Private Mix (PPM) tuberculosis control initiative within the Provincial TB Acceleration Team in North Sumatra. The model demonstrates a multisectoral governance structure in which policy direction, program implementation, and service delivery are interconnected through coordinated collaboration among governmental, health, and non-health stakeholders.

At the policy and governance level, the *Local Representatives (DPRD)* play a strategic role in advocating and communicating the importance of tuberculosis control within the legislative system. Through this role, DPRD supports the development of *local regulations and policy frameworks* that enable TB programs to be formally integrated into regional health priorities. These policies guide provincial and district authorities in determining program priorities and allocating resources.

The *Head of Province/District* is responsible for translating these policies into operational decisions. This includes approving and implementing agreed local regulations and ensuring that tuberculosis control programs are incorporated into regional development plans. The provincial and district leadership also supervises the implementation of TB-related regulations and ensures that financial allocations are used effectively.

Operational coordination is led by the *Local Government Health Office*, which serves as the central coordinating body for the TB program. The health office is responsible for managing regulations, funding allocation, training programs, diagnostic services, treatment availability, monitoring and evaluation activities, as well as coordination and communication among stakeholders. This institution functions as the primary hub linking policy decisions to program implementation across sectors.

Within the health service delivery system, collaboration occurs between multiple healthcare providers including *public primary health centres, public hospitals, private hospitals, private clinics, and private practitioners*. Health professionals working in these facilities provide diagnostic, treatment, and referral services for TB patients. Effective coordination among these providers ensures continuity of care and strengthens the reporting and surveillance system for tuberculosis.

Beyond the health sector, the model incorporates the involvement of *non-health stakeholders*, including business institutions, academic institutions, non-governmental organizations (NGOs/CSOs), and journalists. These actors contribute through advocacy, public communication, community education, and support for TB awareness initiatives. Their participation enhances community engagement and promotes early detection and treatment adherence.

At the community and patient level, program activities include *screening, education, community outreach, training, and resource mobilization*. These activities aim to identify TB cases early, support patient treatment, and reduce stigma associated with the disease.

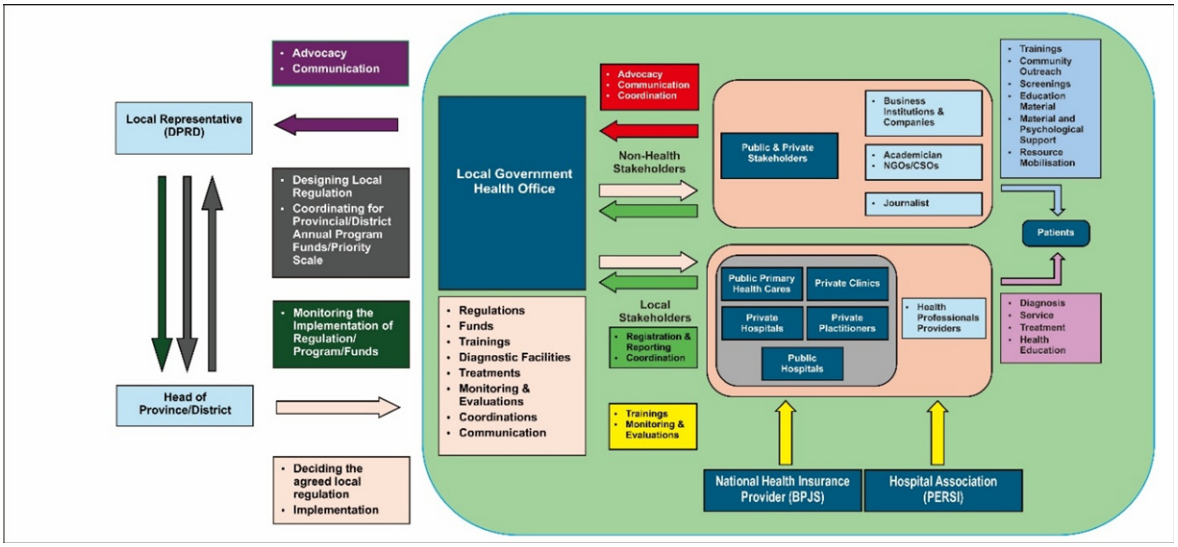

Figure 1: Roles of Public-Private Partnership in TB Control

Table 2: Roles of Stakeholders

No.	Stakeholders	Roles	Source of data
1	Local representatives	• Designing local regulation • Coordinating provincial/district annual program funds or priority scales • Monitoring the implementation of regulations, program, and funds	Secondary data and published documents
2	Head of province/district	• Designing local regulations • Coordinating provincial/district annual program funds or priority scales • Deciding the agreed local regulation • Implementation	Secondary data and published documents
3	Local government	• Advocacy • Communication • Regulation • Funding • Training • Diagnostic facilities • Treatment services • Monitoring and evaluations • Coordination • Communication	FGD
4	National health of insurance	• Training • Monitoring and evaluating public and private health facilities	Secondary data and published documents
5	Hospital association	• Training • Monitoring and evaluating public and private hospitals	FGD
6	Health professionals	• Registration and reporting • Coordination • Diagnosis • Service delivery • Treatment • Health education	FGD
7	• Business institutions and companies, academicians • NGOs/CSOs • Journalists	• Advocacy • Communication • Coordination • Registration and reporting • Training • Community outreach • Screening • Educational materials • Material and psychological support • Resource mobilization	FGD

Patients remain at the centre of the system, receiving diagnosis, treatment, health education, and follow-up services through coordinated efforts among health providers.

Supporting institutions such as the *National Health Insurance Provider (BPJS Kesehatan)* and the *Hospital Association (PERSI)* facilitate the sustainability of the system by ensuring financial coverage for TB services and strengthening coordination among hospital networks.

Overall, this multisectoral coordination framework demonstrates how policy actors, healthcare providers, non-health stakeholders, and community actors interact within a structured governance system to strengthen the Public–Private Mix strategy for tuberculosis control in North Sumatra. The model highlights that effective TB control requires integrated collaboration, clear role distribution, and continuous monitoring across all levels of the health system.

Themes and Subthemes

A combination of deductive analysis (predetermined key themes and codes) and inductive analysis (assessing the data with minimal preconceptions) was used. Based on the FGDs, the final themes were as follows.

1. **Funding, Priority Allocation, and Resources**

Participants described persistent funding constraints within TB control efforts in North Sumatra. The cost was considered quite small, especially when compared with the high number of TB cases. In this comparison, the budget allocated for the TB program was viewed as very limited, even though the target was to eliminate TB in 2030. Almost all areas in North Sumatra were reported to experience the same situation.

"Although there is a budget allocation for TB control, I think the available budget is not enough to meet the needs of the TB program. I think this is because several areas in North Sumatra are not serious about TB. So, to increase the budget, we need to strengthen collaboration with various stakeholders, because this is an important step to increase the effectiveness of the TB control program." [FGD3, L4]

"Most of the policy makers, if asked about the sustainability of the program, for example, 2028 TB free. Then they answer the obstacles, and the biggest obstacle is [that] the budget or the program is hampered because of the [low] budget from the local/central government." [FGD 6 M1]
"You could say that it is very small, especially if we compare it with the high level of TB cases. Looking at that comparison, surely the budget allocated for the TB program is very insufficient, even though our target is 2028 TB elimination. Almost all regions in North Sumatra are like this." [FGD 3 L2]

"But we also collaborate with companies or other private parties to help with additional food and vitamins for patients. Or sometimes, cadres also try to help with transportation costs or patient needs for treatment. This also involves the [village] head with the use of village funds, for example." [FGD3 L2]

"It seems that this budget issue has always been our challenge. In the past, we also advocated to stakeholders to pay more attention and be more serious about the TB program. This seriousness must, of course, be proven by allocating an appropriate budget, because if the budget allocated for the health program is not enough, then the TB program manager at the Health Office will have difficulty in running the program, which will ultimately affect the effectiveness of the TB control program." [FGD3 L2]

"Issues concerning financing or funds that will be allocated to groups, organizations, mass organizations, or groups with health interests. Usually, the group will hold a hearing by writing to the council, which will then accept and convey what they want to include in the regional budget. So indeed, if there is no proposal, it will not be included in the regional budget." [FGD 4 T1]

FGD participants also stated that TB program activities receive support from the global level to communities and individuals.

"The main source of funding for our program is from Global Fund, but YMMA also receives donations from individuals, LAZISMU, or companies that support social and health programs in the form of their CSR funds. These donations help us in running programs related to TB prevention." [FGD 1 A1]

"For PESAT, the source is currently only from YMMA, but we also have donations from members, so that the organization can continue to run…we once applied to be involved in type 3 self-management, but we didn't get it. So, we rely on member contributions only." [FGD1 A1]

The non-health stakeholders in this study, such as business corporations, also contributed to screening and diagnostic TB facilities at the district level through collaboration with the head of the district health office.

"We helped equip the laboratory at the primary health care with [assistance such as] microscopes [and] cartridge for TB grants up to 1000 [pieces]. So far, it has been used by the primary health care. We also provide storage for sputum." [FGD5 U1]

NGOs supported TB control through engagement with community cadres by improving their capacity for TB screening and serving as drug observers.

"If we do design capacity building and training for local health workers or village midwives, we focus more on strengthening existing resources, because it is more sustainable. Because they are health workers, so we only add to the content of their duties." [FGD 3 L2]

The government also has an online registration and reporting system that stores information about a patient's TB clinical history and outcomes.

"Fortunately, the TB information system [SITB] in Indonesia is now very good, which helps us as doctors to track the patient's treatment history. With this system, we can easily find out if the patient has dropped out of treatment or not, as well as the extent to which the treatment is working. This is very helpful in tracing and ensuring that TB treatment is going according to plan." [FGD2 P2]

2. Engagement Through Communication and Collaboration

Established collaboration with other stakeholders in the district was viewed as important for supporting TB control initiatives in the community. Participants noted that such initiatives required legal standing to ensure proper program coordination.

"PT Agincourt in collaboration with the Health Office, Tapsel, [and] Batang Toru Community Health Center conducted training of TB cadres representing villages that were decree[d] by the sub-district since 2017." [FGD5 U1]

Participants also described barriers in terms of communication and coordination, including limited socialization of TB priorities and uneven participation.

"Maybe it's a bit difficult to find sources who can use language that is easily understood by the community." [FGD6 M1]

Handling TB was seen as requiring commitment from various parties.

"Start simplifying the bureaucratic process, because it is very important to have more flexible administrative procedures, especially in terms of drug procurement or program implementation." [FGD3 L2]

Participants noted that program implementation required regular follow-up and end-of-year evaluation to strengthen program innovation.

"The weakness of program innovation is follow-up, so the program should be evaluated." [FGD5 U1]

"So, communication is necessary, because the main point is communication." [FGD6 M1]

A suggested way to improve communication was to open a hotline to provide information and support related to TB.

"One of them is the resource person; maybe it's a bit difficult to find a resource person who can use language that is easy for people to understand…a resource person with simple language and of course we can easily access them and meet their time." [FGD6 M1]

"Yes, just a normal meeting like that. When it was over, they left the room, and there was no follow-up. But if we say it like that, they think we are their rivals or opponents." [FGD6 M1]

3. Access and Health System Mechanisms

In remote areas, it was still difficult for communities to access health services, so the presence of TB-related programs helped address some of these challenges. Participants noted that transportation limitations and poor infrastructure often hindered them from obtaining information and services.

"This is a program designed to accelerate the detection and treatment of TB by extending services to hard-to-access communities. Our program includes strengthening the capacity of local health workers, improving case referrals, and supporting better health systems at the community level." [FGD 3 L2]

Geographical conditions in North Sumatra were also reported to hinder timely communication and collaboration among partners.

"Geographical constraints often occur, for example, internet networks and supporting facilities in health services that are inadequate, so the information system [SITB], which is expected to be integrated but has not run optimally. This has an impact on the reporting system or management of TB cases. The use of technology should be able to make it more effective and efficient, but it is not yet optimal." [FGD 3 L2]

This study also found that the availability of drug logistics, diagnostic facilities, and adequate human resource capacity were important considerations in TB control.

"Provision of adequate medicine and medical equipment and strengthening the capacity of health workers." [FGD 2 P2]

4. Commitment and Responsibilities

Awareness of professional obligations was described as important, particularly in relation to educating the community about TB. FGD participants stated that this sense of responsibility was strengthened by the organization's ability to mobilize their members.

"In this case, I try to see how colleagues in professional organizations can increase their sense of belonging and sense of responsibility for their duties." [FGD 2 P2]

"Usually, we organize activities such as webinars to discuss TB-related issues. Although there was no specific budget last year, we were still able to do so by utilizing internal resources. We update information and materials through various media, including YouTube. Actually, it all depends on how the organization mobilizes itself. If the organization is active, activities can run smoothly, but if the organization does not move, then activities will also stop." [FGD2 P3]

5. Implementation of Existing Regulations

Legal justification for TB control engagement was described as an important function for action. Government regulations from national to local levels were viewed as establishing binding responsibilities, roles, and guidelines for stakeholders involved in TB control.

"The TB prevention policy already exists; even the President of Republic Indonesia has issued three Presidential Decrees related to major problems, namely TB, stunting, and COVID-19. Although these policies already exist, the main challenge is how to implement them down to the grassroots level. All policies that have been formulated need to be implemented well in the field." [FGD 1 A1]

"We have had many discussions and provided input. In hospitals, there is such a thing as accreditation, which consists of 15 standards. One of them is the national program, and one of the national programs is TB control. This program is already in the national system, with various treatments that have been established." [FGD 2 P2]

"Currently, these measures are supported by a Presidential Regulation that regulates TB prevention. The latest information shows that the TB treatment program is a priority, even above other programs such as free food distribution. This policy shows increased attention to public health, especially TB treatment. Evaluation and monitoring through online meetings [Zoom] continue to ensure the effectiveness of these programs." [FGD 2 P3]

Participants also described challenges such as rapid regulatory changes, limited socialization of regulations, and bureaucratic and administrative difficulties.

"We are not saying that the existing system is not good, but it does take time to adjust. When we want to speed up a process or make sure something goes quickly, it turns out that we have to re-learn to adjust. Sometimes, just when we've started trying to speed things up, another change comes along." [FGD 1 A1]

"Actually, the government has made many policies, yes, because like last year, we launched a policy from the Dinas Tenaga Kerja, but it was not socialized, namely that every worker who is known to have positive TB is entitled to two weeks leave without [the employer] reducing [the worker's] severance pay, but it is not socialized so even if he wants to cough, he is silent so that he can work to get money. Well, actually, the policy from the government already exists, but even the labour force or maybe even the factories don't know that there is already a policy, it's just the implementation that doesn't exist." [FGD1 A1]

"Start simplifying the bureaucratic process, because it is very important to have more flexible administrative procedures, especially in terms of drug procurement or program implementation. I think the government also needs to create regulations that support the program, such as the RAD [Regional Action Plan]." [FGD 3 L2]

6. Monitoring, Evaluation and Feedback

Participants described how monitoring and evaluation activities were supported through collaboration with researchers and academics.

"We also often communicate with researchers or academics in terms of research like today, because we realize that we need data from a study to evaluate the effectiveness of the program, or the results of the research can later become recommendations to stakeholders." [FGD 3 L2]

Participants also highlighted weaknesses in follow-up after program activities.

"We involve the entire Faculty, as well as the local Health Office. It's integrated from various layers. But if I see the weakness, it's the follow-up. There is no follow-up. So, the program should be evaluated. To what extent…sometimes the program has been implemented, and the report has been completed, right? The follow-up, how much should be discussed in the future." [FGD 1 A1]

"They come to the activities, but that's just one fundamental activity, there is no follow-up." [FGD 1 A1]

"You need a response and follow-up from them, right? You're welcome; that's why you need his presence as a government, not [as] a person. His presence today is as a representative of his

institution, so there is a responsibility to realize what we discussed." [FGD 6 M1]

"So, every time there is an idea, there must be a solution. Otherwise, this is just running a program, carrying out budget decisions. In the end, it is limited to spending the budget. But if asked about other issues, the reason is that there is no budget." [FGD 6 M1]

Participants also noted limited feedback mechanisms.

"Every program implementation needs to be evaluated for program innovation at the end of the year. The weakness of program innovation is follow-up, so the program should be evaluated." [FGD5 U1]

"So, communication is necessary, because the main point is communication." [FGD6 M1]

DISCUSSION

The PPM program in North Sumatra, centered in Medan, aims to improve TB detection and treatment through the involvement of public and private health facilities. This approach is expected to strengthen TB service networks and community-based patient assistance. National data show that the estimated number of underreported TB cases will decrease by 25.7 percent in 2023 compared to 2017, with the most significant reduction coming from non-public health facilities[9]. Implementation of the provincial PPM program in North Sumatra cannot be separated from national implementation at the central level, as well as implementation at the level of all districts and cities in the province (Figure 1).

The PPM plays an important role in strengthening access to TB services and related health systems. This can be realized by easing access to diagnostics and ensuring the availability of drug logistics, for example, by involving delivery service companies in distributing sputum pots. Several private companies also supported diagnostics through corporate social responsibility programs, for example, by providing microscopes and financing cartridges for molecular fast tests. Involving cadres to deliver medication can support TB treatment services by reducing patient waiting times, preventing transmission, and assisting patients who live far from TB service centers.

Engaging multiple stakeholders in TB control presents challenges, such as the need for consistent communication across multiple parties, limited awareness of stakeholder responsibilities, limited resources for multi-stakeholder campaigns, and differing priorities that hinder collaboration[10–14]. Nevertheless, collaborative efforts have been undertaken to address these barriers.

Funding for TB programs is a major constraint. According to the Global TB Report[15], Indonesia meets only 23 percent of its TB financing needs, while addressing the estimated burden requires 516 million US dollars[1] (Figure 2).

Key questions remain, such as how much budget is allocated for TB in North Sumatra each year and whether this allocation is proportional to the expected reduction in TB cases. If the budget decreases before elimination targets are reached, it becomes clear that adequate inputs are essential.

Stronger regulations that are well communicated to public and private stakeholders are needed to ensure accountability and shared understanding of the benefits of TB control. Advocacy to local leaders is also important to prioritize the TB program. In North Sumatra, a governor's decree has been issued to establish a TB task force. In Medan City, a Regional Action Plan for the TB program is still being drafted[16]. To ensure that funding is allocated as required, active engagement from all stakeholders is essential. A careful analysis of financing needs should also be conducted so that resources are better targeted and incorporated into the regional budget drafted by legislators and district heads. Community leaders and community groups can contribute to financing by supporting TB services and patient needs, such as screening, medicine assistance by cadres, patient transportation, nutritious food, vitamins, and financial relief for families who lose income during treatment.

To improve coordination in TB control, several strategies can be implemented. These include establishing a TB control committee that involves various stakeholders, developing an integrated reporting and monitoring system, providing joint training for health workers, and conducting joint public awareness campaigns. These efforts support adequate and sustainable resource allocation and may strengthen collaboration and the overall effectiveness of the TB program (Table 3 & Figure 3).

The findings revealed persistent funding constraints across districts, with participants highlighting insufficient government allocation and reliance on donor funding. Therefore, strengthening multi-source financing mechanisms involving government, private sector CSR programs, and NGOs is critical to sustain the TB control program[1,5].

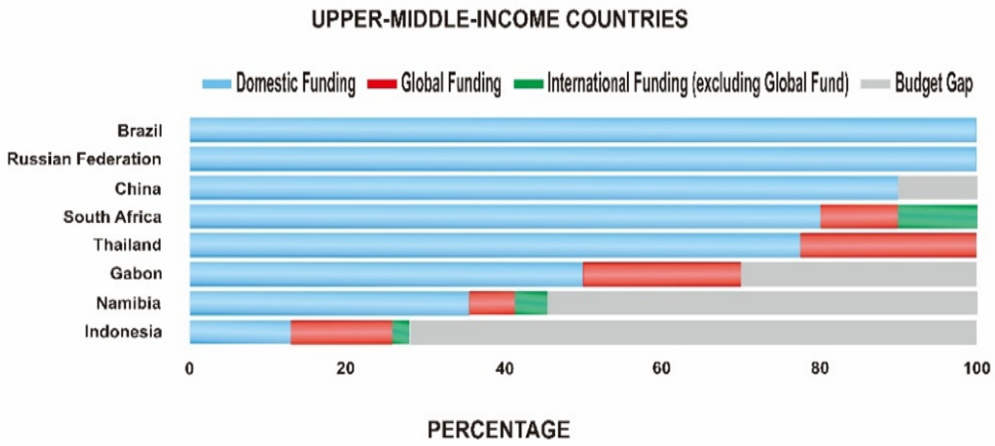

Figure 2. Increases in domestic and international funding for TB are urgently required in Indonesia

Table 3. Key action/strategies to improve outcome of PPM for TB implementation in North Sumatra Province

Themes	Key Actions	Strategies
Funding, Priority Allocations, And Resources	Multisource TB financing	Integrate local funds + CSR + NGO + donor
		Create local TB financing pool
		District level co-financing outreach, transport, nutrition support, and diagnostics
Engagement through Communication and Collaboration	Formalized multi-stakeholder coordination platform	TB coordination forum
		Regular inter-sector meetings
		Communication channels
Access and Health System Mechanism	Integrating TB diagnostic network at primary level	Decentralized screening and referral
		Strengthened PHC / lab readiness
		Community-based transport/logistics support
		Improved digital reporting interoperability
		Training for TB workers at primary level
Commitment and Responsibilities	Strengthening Institutional Accountability in TB PPM	Stakeholder role matrix
		Institutional focal person for each sector
		Minimum expected contribution per stakeholder group
		Performance responsibility at organization level, not only personal goodwill
Implementation of Existing Regulation	Operationalizing TB PPM Policy at District Level	Translate national/provincial policies into local operational plans
		Regulation socialization to employers, facilities, NGOs, and communities
		Administrative simplification for procurement and implementation
Monitoring, Evaluation, and Feedback	Data-driven Review & Continuous Improvement System in TB PPM	Link regulation to district budgeting and review
		Feedback loop from program data and research
		End-of-year innovation review
		Corrective action tracking

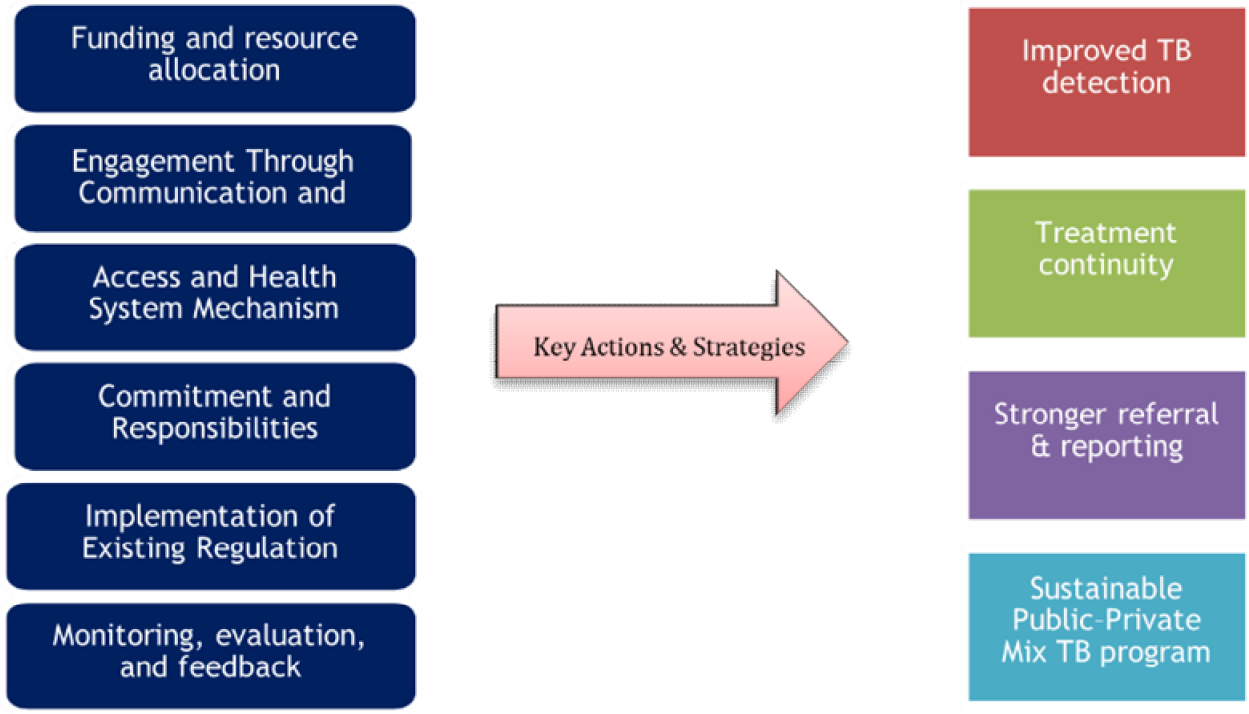

Figure 3. Strategic model of PPM for TB implementation in North Sumatra Province

Strengthening sustainable financing mechanisms is essential for the Public–Private Mix (PPM) TB strategy. Previous studies suggest that diversified funding sources, including government budgets, donor funding, private-sector contributions, and civil society organizations, can significantly improve the sustainability of TB programs[17]. Corporate social responsibility initiatives have also been recognized as an important mechanism to support TB prevention, screening, and patient support programs[18]. Furthermore, pooling financial resources from multiple sources and implementing co-financing mechanisms at the district level may enhance financial sustainability and program effectiveness[19-21].

Participants emphasized that collaboration among stakeholders often lacked continuity and follow-up. Establishing a formalized multi-stakeholder coordination platform may improve sustained engagement among government agencies, private sector actors, NGOs, and community representatives.

Stakeholders may face several concerns when participating in TB control, such as community stigma, increased workload without sufficient support, limited financial and human resources, and difficulties in coordinating with multiple parties with different priorities. Overcoming these concerns requires an inclusive approach and broad support[18,22,23]. Inclusive support refers to active and equal involvement from all stakeholders, including government, the private sector, NGOs, community leaders, and individuals. This includes ensuring equal access to information and services, maintaining communication and cooperation between parties on an ongoing basis, and providing support tailored to the needs of each group to increase the program's effectiveness[13,14,18]. With this approach, all parties are expected to share a sense of responsibility for TB control in North Sumatra.

The limitation of this study has not addressed the impact of the significant decline in international funding support and the reduction of government financial support due to the current efficiency measures implemented after this research was conducted. The others are the presence of publication bias that may occur because positive outcomes from the PPM are highly expected and encouraged. This situation is difficult to assess without quantitative analysis.

CONCLUSION

All parties, including the government, the private sector, NGOs, community leaders, and individuals, should work to ensure equal access to TB information and services. It is also important to maintain consistent communication and cooperation and provide support based on the needs of each group to strengthen the effectiveness of the TB program in North Sumatra Province.

Ethics approval

This study was approved by the Health Research Ethics Committee Universitas Sumatera Utara (approval number: 1082/KEPK/USU/2024).

Competing interests
The authors declare no competing interests.

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Underlying data
To enhance transparency and reproducibility, the data analyzed in this study, including the thematic analysis codebook, are publicly accessible via the Open Science Framework (OSF) at: **https://doi.org/10.17605/OSF.IO/EAXBQ**

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