Original Article

JHSMR Journal of Health Science and Medical Research

Challenges in HIV Screening Among Pulmonary Tuberculosis Patients as Perceived by Healthcare Workers: Mixed-Methods Study and Qualitative Synthesis of Data in Indonesia

Muhammad Ilham Dhiya Rakasiwi, M.D.[1,2,3], Estiana Filzadiyanti, M.D.[1,4], Dio Alief Supriyanto, M.D.[1,4], Windu Prasetya, M.D.[5], Imron Riyatno, M.D.[5], Widayanto Widayanto, M.D.[6], Erlina Burhan, M.D, Ph.D.[3,7], Nurul Aini, M.D.[8]

[1]Faculty of Medicine, Universitas Indonesia, Central Jakarta, Special Capital Region of Jakarta 10430, Indonesia.

[2]Department of General Medicine, Soehadi Prijonegoro General Hospital, Sragen, Central Java 57215, Indonesia.

[3]Respiratory Programmatic Implementation and Research Insititute (RPRI), East Jakarta, Special Capital Region of Jakarta 13230, Indonesia.

[4]Department of General Medicine, Soeratno General Hospital, Sragen, Central Java 57274, Indonesia.

[5]Department of Pulmonology, Soehadi Prijonegoro General Hospital, Sragen, Central Java 57215, Indonesia.

[6]Department of Pulmonology, Soeratno General Hospital, Sragen, Central Java 57274, Indonesia.

[7]Department of Pulmonology and Respiratory Medicine Faculty of Medicine Universitas Indonesia-Persahabatan National Hospital, East Jakarta, Special Capital Region of Jakarta 13230, Indonesia.

[8]Department of Internal Medicine, Soehadi Prijonegoro General Hospital, Sragen, Central Java 57215, Indonesia.

Received 14 May 2025 ● Revised 7 August 2025 ● Accepted 14 August 2025 ● Published online 16 March 2026

Abstract:

Objective: Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) remain major global health challenges, with only half of TB patients in Indonesia aware of their HIV status. Despite the World Health Organization (WHO)'s recommendations for HIV testing among TB patients, stigma and other barriers hinder implementation. This study, conducted in Sragen, Indonesia, aimed to explore the barriers to HIV screening education and testing among TB patients, drawing from qualitative studies conducted in Indonesia.

Material and Methods: The study employed a mixed-methods approach, combining quantitative and qualitative data, along with a systematic literature review. A quantitative study assessed TB-HIV service readiness by surveying healthcare

Contact: Muhammad Ilham Dhiya Rakasiwi, M.D.
Respiratory Programmatic Implementation and Research Insititute (RPRI), East Jakarta, Special Capital Region of Jakarta 13230, Indonesia.
E-mail: muhammad.ilham65@ui.ac.id

J Health Sci Med Res
doi: 10.31584/jhsmr.20261332
www.jhsmr.org

workers, providing insights into facility backgrounds and staff knowledge preparedness. Qualitative interviews explore healthcare providers' goals, strategies, and challenges in educating TB patients about HIV screening, complemented by a synthesis of Indonesian journals on challenges in HIV case detection among primary pulmonary TB patients.

Results: Eight participants were involved in providing TB-HIV services at their respective hospitals. Of these, only five had received TB-HIV training in the past two years, and only three had undergone training on HIV screening education. Six themes emerged from the qualitative study, including the significance of HIV screening, TB-HIV program management during the pandemic, provision of HIV testing to TB patients, challenges in HIV screening, proposed solutions, and aspirations. Data synthesis identified individual, interpersonal, and environmental factors influencing the implementation of HIV screening programs.

Conclusion: Healthcare workers face challenges in providing HIV screening education to TB patients in Indonesia, including communication barriers, stigma, and limited medical support.

Keywords: healthcare providers, human immunodeficiency virus, Indonesia, screening, tuberculosis

Introduction

Tuberculosis (TB) remains a global health challenge, particularly for immunocompromised individuals such as children and those living with Human Immunodeficiency Virus (HIV)/ Acquired Immuno-Deficiency Syndrome (AIDS). HIV complicates TB management, often leading to severe or fatal outcomes when the immune system is weakened[1,2]. Data from the World Health Organization (WHO) in Indonesia showed the percentage of TB patients with HIV-positive status increased from 3.3% in 2012 to 7.5% in 2013, with antiretroviral therapy (ARV) coverage for co-infected patients at 54%[1]. Comprehensive treatment efforts, including ARV, TB therapy, and cotrimoxazole prophylaxis, have been prioritized since 2014[1,3]. Contributing factors to Indonesia's high TB incidence include population density and inadequate living conditions[4].

At present, all TB patients in Indonesia are encouraged to undergo HIV testing unless they decline. If the HIV test yields a negative result, the TB patient receives education on sexually transmitted infections (STI) and HIV prevention. However, if the HIV test returns positive, the patient is provided with cotrimoxazole preventive therapy (CPT), ARV, and interventions for transmission prevention and partner notification[5]. Given that HIV/AIDS treatment with ARVs is a long-term commitment, support from various stakeholders is essential to ensure medication adherence. Unfortunately, real-world data presents a contrasting scenario. Despite the increasing number of TB patients aware of their HIV status each year, as of 2022, only 67% have been informed of their HIV status, and merely 38% have initiated ARV treatment[1,6]. In Central Java Province in 2022, the data show that only 61% of TB patients are aware of their HIV status, and only 41% of TB-HIV patients receive ARV therapy[6].

Co-infection of TB and HIV is a vicious cycle that exacerbates each other's condition[7]. Several risk factors associated with this co-infection include age, gender[8,9], educational background, economic status, and sexual behavior[9,10]. Co-infection with HIV and Mtb demonstrates the harmful interaction between a virus causing immunodeficiency and a bacterium that relies on the host's capacity to limit its growth[7]. To prevent this co-infection condition from becoming a syndrome, the Indonesian government, through the Ministry of Health

(MoH), has implemented collaborative TB–HIV service guidelines, including HIV screening for TB patients and vice versa[5]. Although the program has been incorporated into the national plan, the achievement of HIV screening rates among TB patients has not yet reached the target[6].

The implementation of TB–HIV management programs in real–world settings encounters various challenges, particularly in conducting HIV testing among TB patients[11]. These challenges may arise from patient–related factors, healthcare provider limitations, or programmatic issues[11]. A study conducted in India revealed that facility–related obstacles, such as the unavailability of specimen collection kits or insufficient staffing, contributed to approximately a quarter of the cases where HIV testing was not performed in patients suspected of having TB[12]. Notably, healthcare worker–related factors, such as limited awareness or high workload, also played a significant role[12,13]. Similarly, research in Cambodia highlighted challenges faced by healthcare providers, including poor knowledge of TB/HIV, inadequate communication skills, and fears related to test results and stigma among TB patients[13]. Studies in Indonesia have shown relatively similar findings, particularly concerning stigma and the educational process[14]. However, to date, no studies have summarized the existing evidence on the challenges of HIV testing from the perspective of healthcare providers, particularly in Indonesia. This study aimed to explore the barriers to HIV screening education and testing implementation among TB patients from the perspective of healthcare providers in Sragen, Indonesia, one of the districts in Central Java Province with an estimated notification of 1200 new TB cases and 25 patients diagnosed with TB–HIV in 2022. This study also encompasses a synthesis of published qualitative research findings focused on the obstacles associated with implementing HIV screening for tuberculosis patients in Indonesia.

Material and Methods

Study design and setting

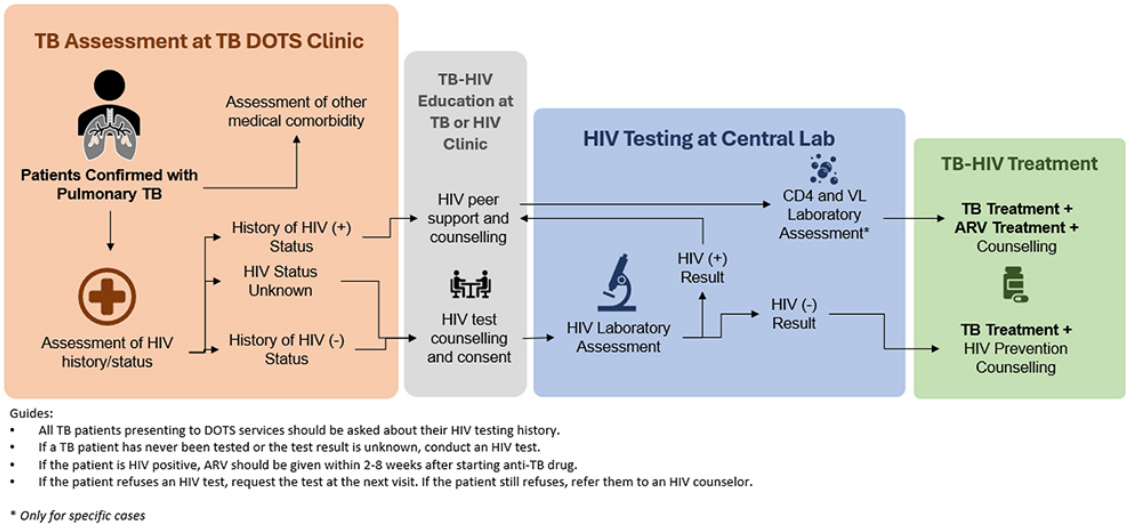
This study is a mixed–methods study combining quantitative and qualitative data, as well as a systematic literature review from the perspective of healthcare providers on HIV education and screening for pulmonary TB patients in Indonesia. Quantitative data were collected by asking participants to complete an online survey on the availability and readiness of TB–HIV service integration, adapted from the Service Availability and Readiness Assessment (SARA) questionnaire developed by the WHO[15]. Questionnaire completion was utilized to gather foundational data on the available facilities for TB and HIV services.

Qualitative data were collected by in–depth interviews[16] with participants using a semi–structured questionnaire regarding the goals, approach taken, and obstacles encountered when educating TB patients to undergo HIV screening. The interviews were conducted at two public general hospitals in Sragen from May–July 2023. The questionnaire was developed through discussions with pulmonologists (WP and EB), and the finalized questionnaire was pilot–tested by two researchers (IR and WI) at each hospital.

To provide TB health services to the entire Sragen District population, there are two regional public hospitals and 25 community health centers (Puskesmas). One hospital is located in an urban area, while the other hospital is located in a suburban area. All community health centers provide GeneXpert testing services, DOTS, and HIV testing[17]. The flow of care for TB–HIV patients at the two public hospitals in Sragen follows the Indonesian National Guidelines for TB–HIV management (Figure 1).

Study participant

Participants were health workers directly involved in caring for TB patients. We utilized the snowball sampling method. The first participant was the most senior nurse



TB=tuberculosis, HIV=human immunodeficiency virus, DOTS=directly observed treatment short-course, VL=viral load, ARV=antiretroviral therapy

Figure 1 Flow of care for TB HIV patients in two public hospitals in Sragen, Indonesia

with the longest experience in the field of TB-HIV at both hospitals. After data collection, participants were asked to recommend competent colleagues for subsequent participation. We did not involve health workers with less than 2 years of experience in the field of TB. All the participants were approached at work and filled out informed consent to be involved in the research. Interviews were conducted in a quiet place, separated from other health workers or patients. Participants were assured of confidentiality and permitted to withdraw from this study.

Study instruments and variables

The quantitative research instrument used was a modified questionnaire based on the Service Availability and Readiness Assessment (SARA) by WHO[15]. Variables collected included the readiness of TB healthcare facilities, training of medical staff, and HIV counseling. Meanwhile, the qualitative research instrument utilized a self-developed semi-structured questionnaire (Appendix A). The interview guide covered topics such as implementation, approaches to HIV testing for TB patients, and challenges in HIV screening among TB patients.

Data collection, management, and analysis

The interviews were carried out in Indonesian by the authors (MID and DAS) in a dedicated hospital room without others present, lasting from 30-60 minutes. They were sound-recorded, transcribed into Indonesian, and then translated into English. The researchers initiated each interview with an introduction, clarification of the research objectives, and obtained informed consent. Furthermore, they assured the participants that their responses would remain confidential and would not impact their work environment. During the interview sessions, researchers could make small notes that served as language focal points or cues for the participants. Participants were encouraged to provide feedback and clarify any misunderstandings within each question/topic[18]. For subjects who used a mix of Indonesian and Javanese, the transcripts were directly

written in Indonesian with consultation from a pulmonologist at each hospital (WP and WI).

The data processing began with a quantitative analysis derived from questionnaires, using descriptive analysis with SPSS version 26 for Windows. For the qualitative data in the form of interview transcripts, three authors (MID, DAS and EF) reviewed and discussed the data to develop codes, categories, themes, and sub-themes from the transcriptions after organizing them using QDA Miner Lite.

Literature review

A thematic synthesis was carried out to explore the challenges faced by health workers in the TB HIV program in Indonesia. Literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[19], with a literature search performed by three researchers (MID, DAS and EF) using predetermined MeSH term keywords. The inclusion criteria for the study were qualitative research, a specific population of healthcare professionals handling TB-HIV cases, research conducted in Indonesia, and the data available in English and Indonesian. There was no restriction on the publication year of the journals. Studies addressing TB screening in HIV patients were excluded. The quality assessment of the studies utilized the Consolidated Criteria for Reporting Qualitative Research (COREQ) framework[20] health care providers, policy makers and consumers. Although partial checklists are available, no consolidated reporting framework exists for any type of qualitative design. Objective: To develop a checklist for explicit and comprehensive reporting of qualitative studies (indepth interviews and focus groups conducted by two researchers, MID and EF, independently. The research report followed the Enhancing Transparency in the Reporting of Qualitative Health Research (ENTREQ) statement[21].

Ethical consideration

The research proposal and protocol have received a letter of ethical approval from the independent Ethics committee of Soehadi Hospital (110/ETIK-CRSSP/VI/2023). To maintain privacy and confidentiality, subject codes have been used for all the names mentioned in this document.

Results

Subject characteristic

There were a total of 8 participants who met the study criteria and were willing to participate in the interviews. Most participants had a minimum of 5 years of experience in

Table 1 Characteristics of participants

Subject Code	Gender	Work experience in TB HIV care (years in range)	Work location
A-01	Female	>10	TB Isolation Ward
A-02	Female	5-10	TB Isolation Ward
A-03	Female	>10	TB Isolation Ward
A-04	Female	>10	TB DOTS Clinic
A-05	Male	2-5	TB DOTS Clinic
B-01	Male	2-5	TB DOTS Clinic
B-02	Female	5-10	TB Isolation Ward
B-03	Female	5-10	HIV Counsellor

TB=tuberculosis, HIV=human immunodeficiency virus, DOTS=directly observed treatment short-course

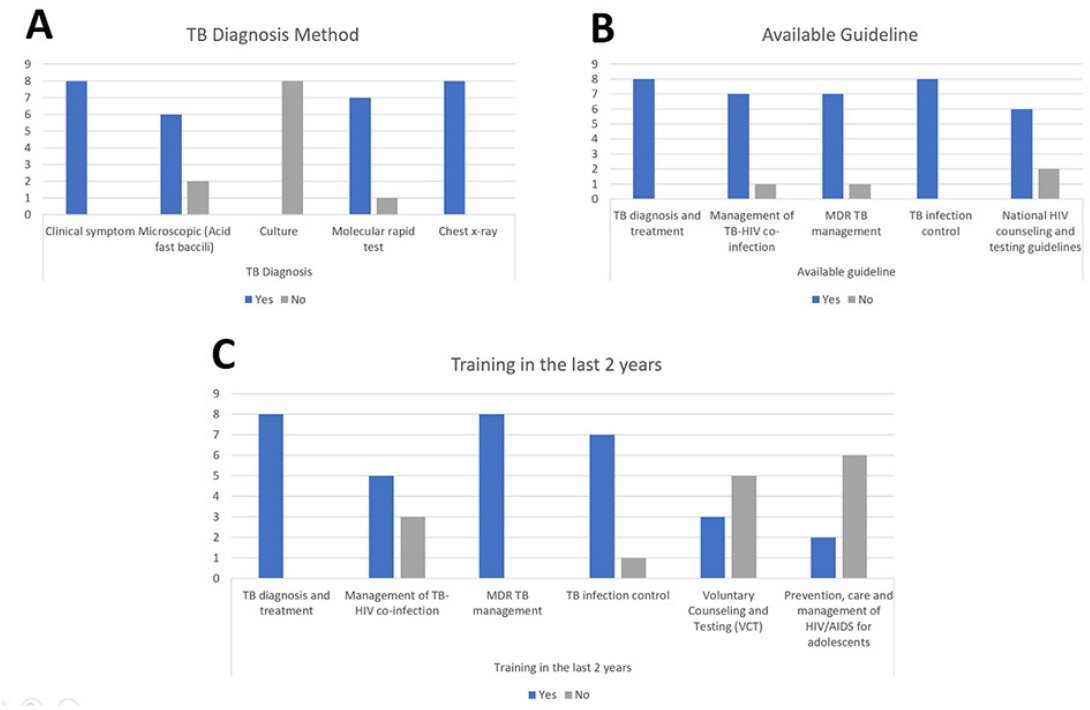
TB–HIV services. Half of the participant population worked in TB isolation wards.

Availability of health facilities for the TB HIV program

In both hospitals, all the participants reported that their workplace provides diagnostic services to TB management, including TB–HIV management, drug-resistant (DR) TB, and TB with other comorbid conditions. All subjects were aware of the HIV diagnostic pathway for the TB population. Of all TB diagnostic methods, two participants answered "no" to the question "Which of the following methods is used in this facility to diagnose TB: [Acid fast baccili examination]" (Figure 2). In terms of training and material provision, only five participants had received TB–HIV coinfection management training in the last two years. The number of participants who had received Voluntary Counselling and Testing (VCT) training in the last two years was only three, and even fewer (two) had received training on prevention, care, and treatment of HIV/AIDS for adolescents in the last two years.

Participants perception

There are 5 themes generated from the interview results, covering the importance of the program, program implementation during COVID, patients offered, barriers to screening, solutions to address these issues, and hopes for the TB HIV program. From each topic, several sub–themes were further developed to specifically depict the information provided by the participants.



TB=tuberculosis, HIV=human immunodeficiency virus, MDR=multi–drug resistant

Figure 2 Participants' responses to each question regarding TB–HIV Service Integration, adapted from the SARA Questionnaire (8 subjects). (A) Methods of TB diagnosis used at respondents' workplaces. (B) Available and accessible guidelines/manuals at participants' workplaces. (C) Training history for participants.

Theme 1: Importance of the TB-HIV program

All participants agree that the TB-HIV program is vital to be implemented. Participants said it is essential for many benefits, including those for patients and health workers.

Subtheme 1.1: Patient's benefit

6 out of 8 participants mentioned patient benefit as one of the critical reasons for the TB-HIV screening program, as follows:

"So, for example, if diagnosed as early as possible, the status is known as early as possible, and treatment will be faster." (A03)

"If it were discovered earlier, treatment would also be quicker that way." (B03)

"...one of the benefits is increasing the success of HIV treatment." (A05)

Many participants address the function of the TB-HIV screening program as enabling the treatment of HIV as soon as it is diagnosed in order to increase the treatment's effectiveness.

Subtheme 1.2: Health workers' safety

1 participant addressed the benefit of health workers' safety as the reason for the TB-HIV screening program's importance, as follows:

"..especially for health workers. So first, it is more beneficial for officer safety." (B02)

This shows that the health workers will also benefit from the program to lower the risk of HIV transmission to health workers.

Subtheme 1.3: Reducing transmission in the community

Some of the participants (3 out of 8) mentioned one of the program functions as a means to slowing the transmission in the community, as follows:

"It is the first step to reducing transmission." (A05)

"There is also education so that there is no more transmission to the community." (A01)

The screening function to diagnose the HIV infection in one individual with tuberculosis is the first step to stopping the transmission, especially among partners.

Theme 2: TB-HIV screening program in the COVID-19 pandemic

Most participants mentioned that the TB-HIV screening program was not affected during the COVID-19 outbreak period, as follows:

"Remains the same during a pandemic. No changes continue as usual." (A01)

"Several patients are afraid to come here; yes, some have had their TB or HIV treatment decreased." (A05)

During the COVID-19 pandemic, some patients were afraid to come to the hospital because they feared getting infected by COVID-19. However, most participants said there were no changes to the program itself. Every TB patient was also screened for HIV during the COVID-19 pandemic.

Theme 3: TB patients offered HIV testing

Eight participants said that all TB patients would be tested for HIV, as follows:

"For the TB-HIV program, collaboration is mandatory. We try as much as possible to screen every TB patient for HIV." (B01)

"The TB program means that all TB patients must be screened for HIV. Like it or not, we have an agreement. So, we have screened all patients at the hospital here for HIV." (A03)

Due to the presence of a TB program in hospitals, TB officers will consistently require all patients to undergo HIV screening. Therefore, all the participants said the same thing regarding the proposal for HIV testing in TB patients.

Theme 4: TB-HIV screening problem

Table 2 depicts the distribution of the main barriers perceived by healthcare workers at both hospitals.

Table 2 Participant perception on the challenges to Introduce HIV screening among TB patients*

No.	Challenge	Urban (Soehadi Hospital)	Sub-urban (Soeratno Hospital)
1	Denial/rejection from patient	+	+
2	Ineffective communication	+	+
3	Stigmatization	-	+
4	Limited facility and funding	-	+
5	Insufficient manpower/ excessive workload	-	+

*"+"=important ; "-"=negligible

Subtheme 4.1: Denial or rejection from patient

All of the participants mentioned that one of the obstacles met in TB-HIV screening problem is denial or rejection from the patient, as follows:

"If the patient is detected as HIV positive, what is certain is that the denial phase will appear. In the beginning, there may also be depression, not being able to accept it." (A01)

"Usually, I asked why they do not want to. Their answer mostly said, for example, I am not ready yet, or I am still afraid like that. If that is the case, I usually give them a chance for a month…" (A03)

"There were three people; the reason they said was that they did not want to, all three of them were afraid." (A04)

"One incident in which the family and patient were in denial because they felt it was impossible to have HIV considering that the patient's habits were acceptable according to the family." (B02)

It showed that denial and rejection are common in this program, especially in the settings where the result turned out to be HIV-positive. However, patients did not want to do the HIV screening test for many reasons. The most common reason is fear of the result.

Subtheme 4.2: Ineffective communication

Two out of the eight participants mentioned ineffective communication as one of the program's obstacles:

"We have obstacles communicating with patients, service methods, etc. When one person refuses, we usually call someone more senior and experienced, meaning that the language they deliver is acceptable." (B01)

Knowledge and education barriers sometimes hinder effective communication. Sometimes, patients do not fully understand the purpose of the HIV screening problem, so they are not willing to take the test. Senior officers who have more experience in dealing with this situation are sometimes needed to handle this situation.

Subtheme 4.3: Bad stigmatization

Bad stigmatization toward HIV infection and HIV patients is still mentioned as one of the problems found in the program. Three out of eight participants mentioned it, as follows:

"If we read from the language said, it seems that in their home, there is also a stigma (toward HIV and TB)." (B01)

"Some are suspicious, too; maybe they already suspect that they have HIV, they have a negative mindset towards themselves, and they are afraid that they are positive. 'If I find out I have HIV, that means I will die quickly, right?' or something like that" (B03)

Subtheme 4.4: limitations in the facility and funding

Two out of eight participants addressed the limitations of the facility and funding of the program as follows:

"Here are several obstacles faced, especially in pediatric patients, when collecting samples we do not have a proper instrument to do so." (B01)

Improper tools or instruments were mentioned as one of the problems, especially for pediatric patients, that may significantly affect the program's effectiveness.

Subtheme 4.5: Insufficient manpower

Three out of eight participants mentioned there was

an insufficient number of manpower or official tasks in the program, as follows.

"The problem is human resources. Human resources may be lacking" (B01)

"So we do not focus on one place. For example, I am an HIV counsellor, and I also have to work in another place (head of the emergency department). So, the problem is more technical. For instance, no one has focused on it because they do not have the workforce." (B03)

Most of the problems are mentioned because the program's manpower is not explicitly tasked only to the program; almost all have double duty or jobs in the hospital. This could significantly affect the program's effectiveness because the burden may overwhelm the officer.

Theme 5: Proposed solutions for the TB-HIV problem

Subtheme 5.1: Simplification in communication

Eight participants said that using language that is easier to understand when carrying out TB-HIV examinations on patients is one solution for the TB-HIV program, as follows:

"If someone asks, we say it is only for immune checks. It seems that we are more accepted than being tested for HIV, so that the words may be different, sir, so HIV is scary." (B02)

Simplifying communication is also important in explaining a series of examinations in a language that is easy to understand so that patients want to undergo examinations.

Subtheme 5.2: Recruiting HIV volunteers/ teams

Four out of eight participants said that the existence of HIV volunteers/teams helped the TB-HIV program run well, as follows:

"The VCT started to run well, and the following year, there was more training for the care, support, and treatment services. So that sends another team, the pharmacist, then the nurse, the doctor, like that." (A03)

Subtheme 5.3: Educate patient and family

All participants said it was necessary to educate patients and families both in carrying out the initial examinations and in the results of these examinations, as follows:

"We usually educate at the beginning. Suppose TB is automatically treated according to the pulmonary doctor's treatment for six or nine months, depending on the examination later. However, for HIV, for example, if he is also positive, we educate him that HIV means he will be on treatment for life. That means he will automatically control it again." (B03)

"....usually, there is both: there is the patient, and there is their family, too." (A02)

Subtheme 5.4: Creating supportive policy

Seven out of eight participants said that creating policies for the TB-HIV program helped organize the course of the program in hospitals more clearly, as follows:

"We also convey that we have a TB-HIV collaboration, so whether we like it or not, we are still doing what is a hospital program. Very helpful for policy." (A04)

"From the start, there is a team, then treatment screening planning, there is ongoing monitoring and evaluation, SITB activation, and then the HIV one is SIHA. This supports the running of the TB-HIV program in hospitals." (A03)

Subtheme 5.5: Regular meeting

One out of eight participants said that regular meetings were a forum for discussing the TB-HIV program as well as finding solutions to problems encountered in the field, as follows:

"We have regular meetings every three months for the TB HIV program. This means that the HIV program holder, the TB program holder, and management are present. So, we can discuss and convey what happened, then what it should be like, so we will look for a solution there." (B03)

Data synthesis from literature

There were 4 studies (Appendix B) that were suitable for further full-text analysis and reporting quality assessment with COREQ (Appendix C). Data extraction focused on subject characteristics, research location, year of research, focus of study discussion, and the findings obtained from researchers. Study characteristics are shown in Table 3.

All studies were conducted in several provincial capitals in Indonesia that have the best TB HIV healthcare access in their respective provinces[14,22–24]. Figure 3 illustrates all themes identified from the included studies.

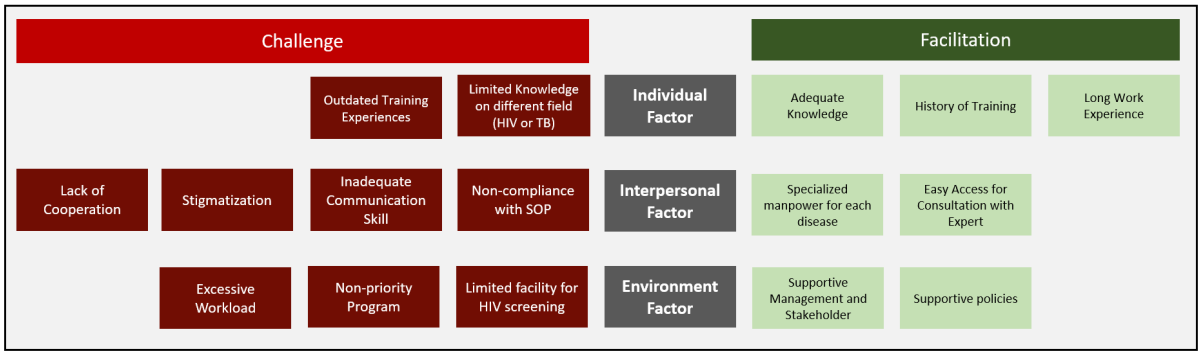
Individual factors

Two factors identified from this theme are a lack of training and workshop opportunities, and limited knowledge, both of which intersect and mutually influence each other.

"Training, my suggestion is not only the amount or frequency given but also the officers involved. If there

Table 3 Characteristics of the included studies in Indonesia

Author	Year	Location (City)	Method	No of Participant	Challenge Identified
Mahendradhata Y, et al[14]	2008	Yogyakarta	In-depth Interview Focus group discussion	40	- Patient feeling offended Education background - Stigmatization - Lack of FacilityCommunicational difficulty
Kusumawati P, et al[24]	2021	Semarang	Semi-structured interview	19	- Lack of training for HIV workers
Supriati T, et al[22]	2020	Yogyakarta	Questionnaire In-depth interview	11	- Lack of support in management system for workers - Lack of coordination and communication between health workers - Health care facility resources
Mahmud PE[23]	2019	Ambon	In-depth interview	6	- Lack of facilities and infrastructure (ex. reagent for test) - Meeting and program evaluation not regular - Patient feeling offended



TB=tuberculosis, HIV=human immunodeficiency virus, SOP=standard operating procedure

Figure 3 Diagram Depicting the factors that facilitate the services and challenges faced in the tuberculosis human immunodeficiency virus HIV program in Indonesia, identified from the literature

is an integrated system, it means that everyone must be trained, not just TB officers" (TB Staff)[22] -> Outdated training experiences

However, it's noteworthy that knowledge and training history can also serve as facilitators for HIV screening, especially when coupled with extensive work experience.

"There are no specific criteria; all TB patients must be tested for HIV… We also have to check children" (TB Staff)[24] -> Adequate knowledge

Interpersonal factor

This theme illustrates the interpersonal relationships that arise among healthcare workers when introducing or conducting HIV screening in TB patients. Interactions can occur between patients and healthcare workers or among healthcare workers themselves. Identified challenges include non-compliance, inadequate communication, excessive workload, lack of cooperation, and stigma.

"We discussed how TB is the leading opportunistic infection for HIV. At the end, it became confusing because the theory was not clear. At the end, she refused. So how can we deal with patients who are highly educated?" (Nurse)[14] -> Non-effective communication

"We don't have enough staff for our lung clinic. It's just me and one assistant. If there are many patients, we really don't have time, really too overwhelmed to offer" (TB Staff)[14] -> Excessive workload

"We're concerned about the possibility of nurses contracting it as well. If that happens, it will pose a significant risk to HIV-negative patients. We should isolate them once identified, but currently, we're unable to distinguish between positive and negative cases. Even if it's just gonorrhoea and someone is aware, it alters everyone's behavior." (Nurse)[14] -> Stigma

"The new program only has one trained personnel for TB and one for HIV. This becomes a constraint when these personnel are unavailable or assigned tasks unrelated to their expertise" (Nurse)[22] -> Specialized manpower, excessive workload

Environment/health system factor

Environmental or health system factors are factors that emerge in almost every study. Factors that support the TB HIV program in Indonesia include a supportive management system, starting from program initiation to monitoring and evaluation, as well as clear and supportive policies/regulations for program implementation. However, in reality, factors such as limited facilities, excessive workload, and prioritization of other programs hinder the implementation of the TB HIV program.

"There is a VCT clinic, laboratory, medications, chest X-ray, CT scan, reagents, and facilities for HIV rapid testing. The problem here is mainly with the chest X-ray, which has been damaged for a long time. As for the others, they are fine. Reagents are usually depleted, and the same goes for medications." (Nurse)[23] -> Lack of facility

"Monitoring is usually conducted by the city health department, but what I notice is mainly when there are visits from external parties, such as the WHO. However, those visits are not frequent. They take reports. As for monitoring itself, there will be a scheduled event. So, HIV clinics from both primary health centers (puskesmas) and hospitals will be summoned" (Nurse)[23] -> Non-priority program

"There is a plan for infrastructure for each supporting service and activity, as well as budget allocation to enhance the capacity of TB and HIV personnel through seminars and training sessions." (Head of Community Health Centre)[22] ->Supportive management

Discussion

This study is the first to apply a mixed-methods approach—both quantitative and qualitative—in exploring the challenges of HIV testing among TB patients in Indonesia, with a focus on healthcare providers' perspectives. It

is further supported by a qualitative synthesis of other qualitative studies in Indonesia on a similar topic (HIV screening among TB patients). The findings reveal that the challenges are multi-stakeholder in nature, involving healthcare workers, patients, and supporting infrastructure. In addition to identifying these challenges, the study also explores potential solutions that have been considered or even implemented to address them.

Studies addressing collaborative TB-HIV programs remain limited in Indonesia, with many focusing on assessing risk factors for coinfection or management9,10. Regarding the challenges faced in screening, more research has been conducted on specific high-risk populations such as pregnant women25 or sex workers[26,27]. In the case of TB, academics have conducted numerous studies in countries with a high TB burden, especially focusing on patient-related factors[28–30].

From the healthcare worker's perspective, our study found that the issues of facility availability and limited funds pose challenges, especially in suburban settings. The lack of appropriate equipment for specific populations, such as pediatric patients, hinders healthcare providers from conducting HIV screening. In suburban and rural settings, depleted reagent stocks and medications present additional challenges for healthcare providers[23]. Studies in Cambodia have shown that low commitment, lack of program targets, and insufficient financial support are barriers to providing HIV services for TB patients[13]. The lack of commitment from local government authorities, evidenced by monitoring efforts only occurring during external visits, or the low priority given to the program, hampers the implementation of HIV screening23. Several challenges mentioned above have been identified in the national action plan for the TB-HIV collaboration program in Indonesia for the period 2020-2024, but interventions need to be further optimized[5].

In addition to facility-related challenges, our study found that stigma, coupled with ineffective communication, significantly impacts the success of HIV screening. Ineffective communication fosters a negative stigma among patients, leading to their reluctance or refusal to undergo HIV screening. A study in India also indicates communication challenges and facility availability for HIV screening implementation[31]. Furthermore, the emergence of stigma surrounding both HIV and TB, whether from the patient's environment or healthcare providers themselves, also obstructs timely screening and treatment[31,32]. These challenges may stem from the educational backgrounds of both patients and healthcare providers[33]. A low educational background inhibits patients from understanding the information provided, while a high educational background makes patients highly critical and overwhelms healthcare providers in providing explanations[33].

The perspectives provided by healthcare providers in India31 and Uganda[34] highlight several solutions to overcome challenges in TB-HIV service integration. These solutions may include enhancing healthcare provider training and awareness programs, fostering closer collaboration between TB and HIV programs, implementing targeted interventions to increase HIV testing uptake among TB patients, and addressing stigma and other barriers to service integration. By setting clear targets or goals focused on implementing these solutions, healthcare systems can improve the effectiveness and efficiency of TB-HIV services, ultimately leading to better health outcomes for patients[31,34]. Our study also indicates a similar finding, where several participants expressed the need for more intensive collaboration between TB and HIV program officers as well as up-to-date training for all healthcare workers, both new and experienced.

The limitation of this study lies in its relatively small sample size, attributed to the limited number of health workers specializing in TB health, and the exclusion of the private sector, as all TB cases in Sragen are referred from public hospitals. Another limitation is the inclusion of literature meeting the criteria, sometimes regardless of quality and methodological rigor, aiming to maximize the

available data due to limited qualitative research on barriers to HIV screening for the TB population in Indonesia.

Conclusion

This study identifies several challenges faced by healthcare workers when conducting HIV screening education for TB patients in Indonesia. These challenges include ineffective communication related to inadequate training history, resulting in patient or family rejection/denial, as well as negative stigma. Challenges in terms of supporting medical facilities and limited healthcare personnel involvement hinder the effective process of HIV screening education. Evidence gathered from grassroots populations (healthcare workers who directly interact with patients) in this study, both from the qualitative research population in Sragen and the data synthesis of qualitative studies in Indonesia, can provide insights for the development of TB-HIV programs in Indonesia.

Acknowledgement

We would like to extend our heartfelt gratitude to Muhammad Fauzan, MD, for his careful and thorough transcription of the audiotape recording, and to Inayah, B.PH, for her thorough review of the qualitative results. We also wish to express our sincere appreciation to the Board of Directors of Soehadi Prijonegoro Hospital and Soeratno Hospital for their unwavering support and administrative assistance throughout this study.

Funding source

None

Conflict of interest

The authors declare no competing interests.

References

1. Probandari A, Harbianto D, Meyanti D, Houben R, Rudman J, Fiekert K, et al. National Strategy for Combating Tuberculosis in Indonesia 2020-2024 [in Indonesian]. Nurjannah, Widada S, editors. Jakarta: Ministry of Health Republic of Indonesia; 2020.
2. Bruchfeld J, Correia-Neves M, Kallenius G. Tuberculosis and HIV coinfection. Cold Spring Harb Perspect Med 2015;5.
3. Sharma SK, Mohan A, Kadhiravan T. HIV-TB co-infection: epidemiology, diagnosis & management. Indian J Med Res 2005;121:550–67.
4. Wardani DW, Lazuardi L, Mahendradhata Y, Kusnanto H. Clustered tuberculosis incidence in Bandar Lampung, Indonesia. WHO South-East Asia J Public Heal 2014;3:179.
5. Ministry of Health Republic of Indonesia. National Action Plan for TB-HIV Collaboration 2020-2024 (in Indonesian). Jakarta: Ministry of Health Republic of Indonesia; 2021.
6. Ministry of Health Republic of Indonesia. Tuberculosis Control Program Report 2022 [in Indonesian]. Jakarta: Ministry of Health Republic of Indonesia; 2023.
7. Azevedo-Pereira JM, Pires D, Calado M, Mandal M, Santos-Costa Q, Anes E. HIV/Mtb Co-Infection: From the Amplification of Disease Pathogenesis to an "Emerging Syndemic." Microorganisms 2023;11:853.
8. Tiwari B, Karki S, Ghimire P, Sharma B, Malla S. Factors associated with high prevalence of pulmonary tuberculosis in HIV-infected people visiting for assessment of eligibility for highly active antiretroviral therapy in Kathmandu, Nepal. WHO South-East Asia J Public Heal 2012;1:404.
9. Haryani L, Ramadhani R, Meirawan RF, Burmanajaya B. Overview of risk factors for HIV patients with Tuberculosis at Bogor city general hospital [in Indonesian]. J Epidemiol Kesehat Indones 2023;7:105–10.
10. Iftitah NM, Adi S, Gayatri RW. Factors affecting the occurrence of Tuberculosis co-infection in HIV/AIDS patients in Malang regency [in Indonesian]. Prev Indones J Public Heal 2020;5:27–34.
11. Salomon A, Law S, Johnson C, Baddeley A, Rangaraj A, Singh S, et al. Interventions to improve linkage along the HIV-tuberculosis care cascades in low- and middle-income countries: A systematic review and meta-analysis. PLoS One 2022;17:e0267511.
12. Kumar AM, Gupta D, Kumar A, Gupta RS, Kanchar A, Rao R, et al. HIV Testing among patients with presumptive Tuberculosis: how do we implement in a routine programmatic setting? results of a large operational research from India. PLoS One 2016;11:e0156487.

13. Samrith W, Rahman M, Harun-or-Rashid M, Sakamoto J. Trends and barriers to HIV testing among tuberculosis patients in Prey Kabas operational district, Takeo province, Cambodia. Asia Pac J Public Heal 2012;27:NP789-97.
14. Mahendradhata Y, Ahmad RA, Lefevre P, Boelaert M, Van der Stuyft P. Barriers for introducing HIV testing among tuberculosis patients in Jogjakarta, Indonesia: a qualitative study. BMC Public Health 2008;8:385.
15. World Health Organization. Service Availability and Readiness Assessment (SARA): A Reference Manual. Geneva: World Health Organization; 2015.
16. Rachmawati IN. Data Collection in Qualitative Research: Interviews [in Indonesian]. J Keperawatan Indones 2007;11:35–40.
17. Ministry of Health Republic of Indonesia. Guidelines for Collaborative TB HIV Activities [in Indonesian]. Jakarta: Ministry of Health Republic of Indonesia; 2023.
18. Afiyanti Y. Validity and Reliability in Qualitative Research [in Indonesian]. J Keperawatan Indones 2008;12:137–41.
19. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMC 2021;372:n71.
20. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Heal care 2007;19:349–57.
21. Tong A, Flemming K, McInnes E, Oliver S, Craig J. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Med Res Methodol 2012;12:181.
22. Supriati T, Mahendradhata Y, Probandari A. Integrating TB-HIV services in community health centers in Kulon Progo District. BKM 2020;36:24–32.
23. Mahmud PE. The challenges of implementing collaborative TB-HIV services at RSUD Dr. M. Haulussy Ambon [in Indonesian]. Pasapua Heal J 2019;1:6–13.
24. Kusumawati PK, Saraswati LD, Martini M, Hestiningsih R. Description of TB-HIV Healthcare Workers' Knowledge in Detection and Access to Treatment [in Indonesian]. J Kesehat Masy 2021;9:497–503.
25. Lubis D, Wulandari LPL, Suariyani NLP, Adhi KT, Andajani S. Private Midwives' perceptions on barriers and enabling factors to voluntary counselling and HIV test (VCT) in Bali, Indonesia. Kesmas Natl Public Heal J 2019;14:14–20.
26. Prabawanti C, Dijkstra A, Riono P, Hartana G. A survey on hiv-related health-seeking behaviors among transgender individuals in jakarta, based on the theory of planned behavior. BMC Public Health 2015;15.
27. Mitchell E, Lazuardi E, Rowe E, Anintya I, Wirawan DN, Wisaksana R, et al. Barriers and enablers to HIV care among waria (Transgender Women) in Indonesia: a qualitative study. AIDS Educ Prev 2019;31:538–52.
28. Anuwatnonthakate A, Jittimanee S, Cain J, Nateniyom S, Wattanaamornkiat W, Komsakorn S, et al. Barriers to human immunodeficiency virus testing of tuberculosis patients in Thailand, 2004-2007. Int J Tuberc Lung Dis 2010;14:980–5.
29. Bishnu B, Bhaduri S, Kumar AMV, Click ES, Chadha VK, Satyanarayana S, et al. What are the reasons for poor uptake of HIV testing among patients with TB in an Eastern India District? PLoS One 2013;8.
30. Kunarisasi S, Putri FM, Tauhidah SA. Provider Initiated Testing and Counseling (PITC) Strategy Increased Coverage of HIV detection among TB Patients. J Heal Sci Prev 2022;6.
31. Soyam VC, Sharma N, Das J, Boro P, Kohli C, Khanna A, et al. Perspectives of health care provider regarding TB-HIV referral strategy and non-uptake of HIV testing in Delhi - A qualitative study. Indian J Tuberc 2015;62:156–61.
32. Waluyo A, Culbert GJ, Levy J, Norr KF. Understanding HIV-related stigma among Indonesian nurses. J Assoc Nurses AIDS Care 2015;26:69.
33. Courtwright A, Turner AN. Tuberculosis and stigmatization: pathways and interventions. Public Health Rep 2010;125(Suppl 4):34-42. doi: 10.1177/00333549101250S407.
34. Katende JN, Omona K. User - provider perspectives to overcome the challenges of TB/HIV service integration at Mulago National Referral Hospital _ Kampala. Afr Health Sci. 2021;21:248.

Appendix A Tools for Data Collection

Adopted SARA Questionnare

Please mark (X) on the answer that fits your condition

No	Question	Yes	No
Tuberculosis			
1800	Does this facility offer diagnosis, treatment prescription, or treatment follow-up of tuberculosis?	1	2
1801	Do providers in this facility diagnose TB	1	2
1802	Which of the following methods are used at this facility for diagnosing TB:	1	2
	• Clinical Symptoms	1	2
	• Sputum smear microscopy	1	2
	• Culture	1	2
	• Rapid test (GeneXpert)	1	2
	• Chest X-ray	1	2
1803	Does this facility provide drugs for TB patients?	1	2
1804	Does this facility prescribe drugs for TB patients?	1	2
1805	Does this facility manage and provide treatment follow-up for TB patients?	1	2
1806	Do providers in this facility screen or test TB patients for HIV or have a system for diagnosis of HIV among TB patients?	1	2
1807	Please tell me if the following guidelines are available in the facility today		
	• Diagnosis and treatment of TB	1	2
	• Management of HIV dan TB co-infection	1	2
	• MDR TB	1	2
	• TB infection control	1	2
1808	Have any providers of TB services at this facility received training in the following topics in the last two years?		
	• Diagnosis and treatment of TB	1	2
	• Management of HIV dan TB co-infection	1	2
	• MDR TB	1	2
	• TB infection control	1	2
1809	Does this facility stock any medicines for TB treatment?	1	2
1810	Are any of the following medicines available in this service site today?		
	• Ethambutol	1	2
	• Isoniazid	1	2
	• Rifampicin	1	2
	• Pyrazinamid	1	2
	• INH + Rif	1	2
	• INH + Eta	1	2
	• RHZ	1	2
	• RHE	1	2
	• RHZE	1	2
HIV counselling and testing			
1400	Does this facility offer HIV counselling and testing services?	1	2
1401	Do you have the national HIV counselling and testing guidelines available in this facility today?	1	2
1402	Have you or any provider(s) of HIV/AIDS counselling and testing services:		
	• Received any training in voluntary counselling and testing (VCT) in the last two years?	1	2
	• Received any training in HIV/AIDS prevention, care, and management for adolescents in the last two years?	1	2
1403	Does this facility provide HIV counselling and testing services to minor adolescents?	1	2
1404	Is the HIV testing and counselling service room or area a private room/area with auditory and visual privacy?	1	2
1405	Does this facility have HIV rapid test kits (with valid expiration date) in stock in this service site today?	1	2

No	Question	Yes	No
1406	Does this facility have condoms available in this service site today to give to clients receiving services	1	2
1407	Please tell me if the following resources/supplies used for infection control are available in this service area today		
	• Clean running water (piped, bucket with tap, or pour pitcher)	1	2
	• Hand-washing soap/liquid soap	1	2
	• Alcohol based hand rub	1	2
	• Disposable latex gloves	1	2
	• Waste receptacle	1	2
	• Sharps container ("safety box")	1	2
	• Environmental disinfectant	1	2
	• Disposable syringes with disposable needle	1	2
	• Auto-disposable syringes	1	2

Questionnaire CHHAT Study*

Respondent's Personal Information
(DO NOT INCLUDE NAME OR INITIALS)
a. Age:
b. Job position:
c. Years of work experience:

1 **Implementation of TB HIV Program**
1. In your opinion, how is the implementation of the TB-HIV program in this place?
2. In your opinion, since when has the TB-HIV program in this place been running effectively?
3. Are all TB patients who are unaware of their HIV status educated for HIV testing (including children)?
4. In your opinion, how does the TB-HIV program enhance understanding of TB-HIV?

2 **The Importance of HIV Screening in TB**
1. In your opinion, how important is HIV screening for TB?
2. In your opinion, what are the negative and positive impacts of HIV screening for TB?
3. In your opinion, does HIV screening have more positive or negative impacts on TB patients?
4. In your opinion, should TB patients with HIV-positive status immediately receive ARV?

3 **Approach to HIV Screening in TB**
1. In your opinion, have you offered HIV testing to all TB patients?
2. Have you informed the name of the HIV screening test?
3. Do you recommend HIV testing on the same day when TB diagnosis is established/first starting TB treatment?
4. Have you ever encountered patients who are unwilling to undergo HIV testing?

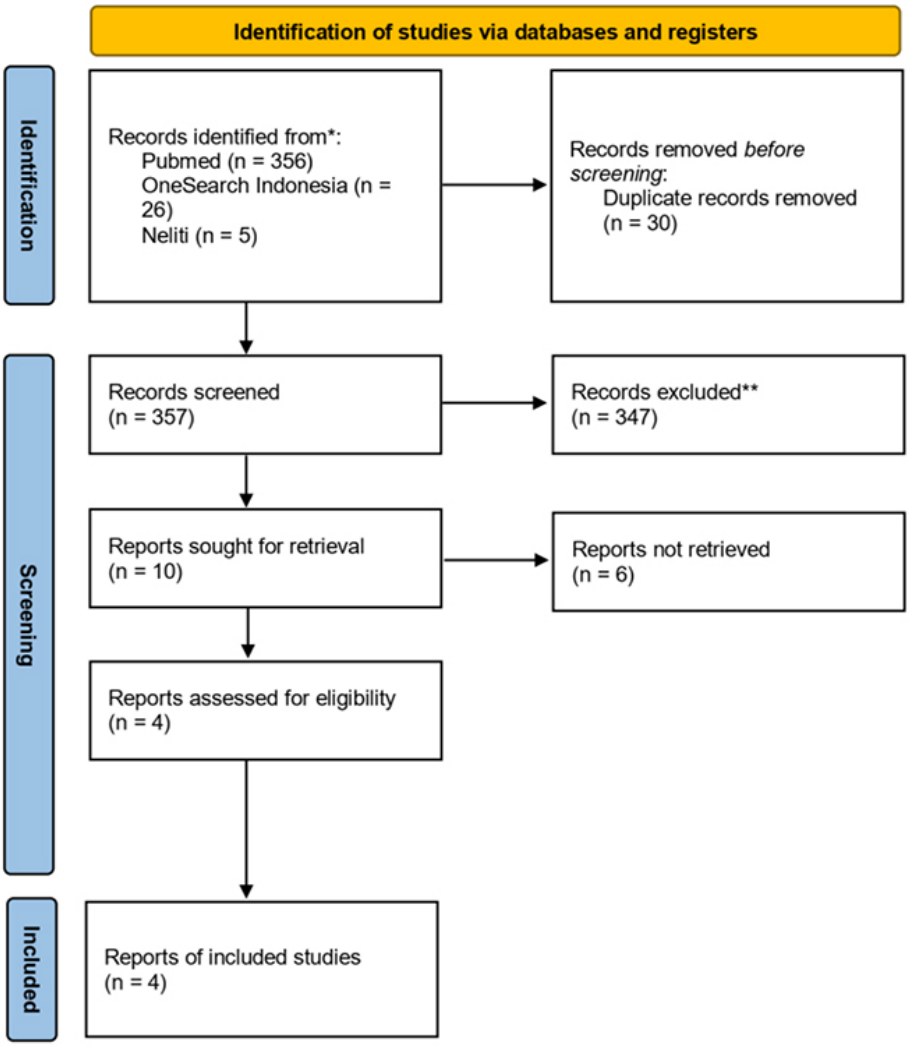
4 **Barriers in HIV Screening for TB**
1. In your opinion, is it difficult to educate TB patients to undergo HIV testing?
2. Have you ever had difficulty explaining or answering questions from TB patients about HIV screening?
3. In your opinion, is there stigma for TB patients when undergoing HIV screening?
4. In your opinion, is recommending HIV screening for TB patients considered impolite?
5. In your opinion, are there facility constraints (location, infrastructure, funding) in HIV screening for TB patients?
6. In your opinion, are there communication barriers with TB patients to undergo HIV screening or explain the results of HIV screening?

5 **Solutions to Challenges in HIV Screening for TB**
1. In your opinion, have you ever discussed or conveyed the challenges you have experienced with the program coordinator or team?
2. Have you ever tried to independently overcome the challenges you have experienced? If so, please provide examples!

Thank you for your willingness to participate in this study. Your involvement is confidential and will not impact your job or the institution where you work. We will organize and send you the transcript as a gesture of transparency and confidentiality in this research. We sincerely appreciate your participation.

guide for researchers conducting interviews

Appendix B Literature Search Flow



Appendix C COREQ Quality Assessment

Domain	Study			
	Mahendradhata Y, et al	Kusumawati P, et al	Supriati T, et al	Mahmud PE
Research Team and Reflexivity				
Interviewer/facilitator	+	-	+	-
Credentials	+	-	+	-
Occupation	+	-	-	-
Gender	+	+	+	+
Experience	+	-	-	-
Relationship Established	+	-	-	-
Participant knowledge of the interview	+	-	+	-
Interviewer characteristic	+	-	-	-
Study Design				
Methodological Orientation	+	-	+	+
Sampling	+	+	+	+
Method of Approach	+	+	+	-
Sample Size	+	+	+	+
Non-participation	+	-	-	-
Setting of data collection	+	-	+	-
Presence of non-participants	-	-	+	-
Description of Samples	+	+	+	-
Interview Guide	+	+	+	-
Repeat Interviews	-	-	-	-
Audio/visual recording	+	-	+	-
Field notes	-	-	-	-
Duration	-	-	+	-
Data saturation	-	-	+	-
Transcript returned	-	-	-	-
Analysis and Findings				
Number of data coder	+	-	-	-
Description of the coding tree	-	-	-	-
Derivation of themes	+	+	+	+
Software	+	-	-	-
Participant checking	-	-	-	-
Quotations presented	+	+	+	+
Data and finding consistent	+	-	+	+
Clarity of major themes	+	+	+	+
Clarity of minor themes	+	-	+	-

Legends	
+	Stated in the manuscript
-	Not stated in the manuscript