

Exploring the tuberculosis medication program in Indonesia as perceived by patients and their families: A qualitative study



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Abstract

Background: Tuberculosis (TB) remains a significant public health challenge in Indonesia, with the country experiencing one of the highest numbers of lost cases in TB management. Therefore, there is a need to identify the underlying reasons for this problem.

Objective: This study aimed to explore the experiences of TB-diagnosed patients and their families during the time of diagnosis and while undergoing the TB medication program.

Methods: This study employed a qualitative descriptive-interpretive approach. The study was conducted in government community health centers (CHC) from May 2022 to July 2022. A total of 22 participants, consisting of 12 TB-diagnosed patients and ten family members, were included in the study. Data were collected through focus group discussions and analyzed thematically.

Results: Five themes were developed: (1) Delay in tuberculosis diagnosis, (2) Delay in starting TB treatment, (3) High willingness of patients and their families to recover, (4) Understanding that TB is an infectious disease, and (5) Factors affecting patient recovery.

Conclusion: The study findings might contribute to the National TB elimination program. It is recommended that all health workers practicing in the community should be involved in the TB program to improve its management. Collaboration between multiple sectors in the community can also provide an advantage in solving TB problems by increasing new case detection. Additionally, it is suggested that all nurses working with TB patients establish rapport with health cadres and patients' families to enhance medication adherence in patients.

Keywords

Indonesia; tuberculosis; nurses; focus groups; communicable diseases

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Background

The burden of tuberculosis (TB) in Indonesia remains a challenge despite several TB control strategies implemented by the Indonesian government (Erawati & Andriany, 2022). In 2015, the World Health Organization (WHO) proposed The End TB Strategy and the Sustainable Development Goals to eradicate the global TB epidemic by 2030 (United Nations Development Programme, 2015). Indonesia, in response, drafted the Ministry of Health regulation number 67 in 2016 to guide TB medication control, which recommended the Direct Observed Treatment Strategy (DOTS) for health facilities (Indonesia Ministry of Health, 2016). Nevertheless, only government community health centers are required to have a DOTS team. In contrast, private primary care centers are only advised to be involved and can offer services to the appointed TB case manager in their district or province health office.

Despite the efforts of the Indonesian government to implement various TB control strategies, the recorded data in 2019 indicates that Indonesia is among the seven countries with the highest number of lost TB cases (World Health

Organization, 2019). These cases are mostly unreported or undiagnosed, and a high loss in case data correlates with the continuous widespread of TB cases with increased severity. Care-seeking patterns and diagnostic delays among TB patients are among the determinants contributing to the high number of lost cases. Most Indonesians initially seek care from private primary care centers with limited diagnostic tools, TB treatment supplies, and inadequate healthcare workers' capacity to manage new cases (Sunjaya et al., 2022). Private primary care centers also tend to have less information regarding care methods and the required quality of TB care (Arini et al., 2022).

Private primary care centers are crucial in supporting Indonesia's healthcare system, as half of the research sample in a study by Surya et al. (2017) preferred private primary care centers for their health needs, and almost half of the participants did not understand TB symptoms, leading to a delay in seeking help for up to 14 days. This finding is essential in understanding the health-seeking patterns and the private primary care centers' involvement in the nation's TB control

program, explaining the high risk of lost TB cases. However, the problem requires further exploration to identify solutions.

Previous studies have suggested the concept of switching the focus from patient-centered care to community-centered care to increase surveillance and bridge various sectors in the community to solve obstacles in TB management (Biermann et al., 2019; Odone et al., 2018). The concept emphasizes the need to consider the difficulties patients and their families face in following and completing the program and to improve their awareness of their social, economic, cultural, and environmental conditions.

The limited involvement of private primary care centers, incompetence, lack of willingness to follow the TB national program healthcare workers, and healthcare-seeking patterns by Indonesian citizens require inspection. Understanding the obstacles from the patients' and their families' points of view may help healthcare workers in providing a resolution. Nurses, as one of the professions in the DOTS team, have high contact with patients and informal workers (cadres) and are responsible for entering data into the information system and collaborating with the vertical team in the district or province. The unique roles and autonomy of nurses are suitable for building good relationships with groups and communities (Blanco-Fraile et al., 2022) and treating people equally with respect to their differences (Oblitas et al., 2010).

This research aimed to explore the experiences of TB-diagnosed patients and their families during the time of diagnosis and while undergoing the TB medication program. The study aimed to understand the patients' journey in obtaining a diagnosis of TB, following and completing their medication, as well as to provide insight into the obstacles experienced by these patients throughout the entire process. By exploring the experiences of the patients and their families through qualitative interpretative research, the researchers seek to understand the problems that prevent early diagnosis and medication and provide insight into the weakness in the healthcare system for the TB program. To our knowledge, no similar studies were conducted until February 2023, when this article was drafted.

Methods

Study Design

This study employed a qualitative descriptive-interpretive approach (Thorne, 2016) to explore the experiences of TB patients and their families during diagnosis and medication programs. The study was conducted in government community health centers (CHC) in East Medan District, Indonesia, from May 2022 to July 2022.

Participants

The participants in this study were selected through purposive sampling from a population of patients and their closest family members who were currently undergoing TB medication under the care of government CHCs. The researchers collaborated with TB managers to collect participants, who were invited by health cadres. Patients included in the study were those undergoing a TB medication program for at least two weeks and were in stable condition, along with one of their closest family members. The exclusion criteria were patients still unstable and taking medication for less than two weeks. In

addition, the researchers worked with health cadres to ensure that the patients were in stable condition and that transportation was prepared in case of emergency. The study included a total of 22 participants, consisting of 12 TB-diagnosed patients and ten family members.

Data Collection

The data for this study were collected through two focus group discussions (FGDs) conducted in a private room provided by the researcher to ensure privacy for the patients and their families. The first FGD was conducted on May 24, 2022, with seven participants: four TB-diagnosed patients and three family members. After the first FGD, the researcher found that more data were required and held a second FGD on July 15, 2022, with 15 participants, including eight TB-diagnosed patients and seven family members.

The FGDs were steered using open-ended questions and a guideline for discussion and conducted in Bahasa Indonesia. The researcher believed using FGDs was appropriate to understand the process, as it stimulated participants to explain real and more detailed experiences. The first researcher was in charge of both sessions of FGDs. Initiation questions used for data collection included: (1) How did the patient end up being diagnosed with TB, (2) How the patients acquired access to medications, (4) How patients followed their medications program, and (5) Who became their support system throughout the medication program. These questions were developed concerning the need for data confirmation. After the second FGD, data were considered saturated, and no new information could be collected.

Data Analysis

The first researcher, who had a health education and career background and was pursuing a doctoral degree in nursing during the study, made meticulous verbatim transcriptions of the audio recordings. The transcripts were then returned to the participants for verification and correction to ensure accuracy. The data were analyzed using thematic content analysis (Braun & Clarke, 2006). The analysis involved manual reading, coding, identifying categories, and generating themes. The transcripts were scrutinized repeatedly to detect emerging trends and recurring concepts. Codes were assigned to segments of text, and similar codes were grouped to form categories, which were then organized into themes. The first author (ILR) did the coding while the rest of the team (SS, HH, and AYZ) reviewed the appropriateness of the coding, categories, and themes. The researchers jointly analyzed the findings, discussed the results, and resolved any discrepancies. They also examined the themes and sub-themes and their relevance to the research question. There was no significant dispute during the analysis, and the researchers agreed upon all themes.

Trustworthiness/Rigor

The data credibility was ensured during the FGDs, and participants were given sufficient time to express their opinions and share experiences without strict time limitations. The first researcher (ILR) facilitated the discussion using open-ended questions and confirming information when necessary. Participants were also encouraged to give feedback and clarify any misunderstandings within the group. The FGDs were

recorded to avoid the loss of any data. To maintain trustworthiness, confirmation, and audit trails were conducted. ILR confirmed the transcript with the participants to clarify the written words. Next, ILR, HH, and AYZ reviewed and discussed the data to develop codes, categories, themes, and sub-themes from the transcription. Finally, the second researcher audited the transcription, coding, categories, themes, and sub-themes to ensure accuracy.

Ethical Considerations

Ethical approval was obtained from the appropriate body and local government before the study was conducted. The Ethics Committee of the Nursing Faculty of Universitas Indonesia granted ethical clearance with identity number KET-157/UN2.F12.D1.2.1/PPM.00.02/2022. Prior to data collection, the first researcher (ILR) introduced herself and explained the study’s objectives and data collection process to the participants. The TB officers and health cadres were with the participants throughout the process to assist them with any issues. Informed consent was obtained before data collection. The informed consent contained information about the research’s background and purpose, the participants’ roles, the data that would be collected, the privacy of the participants’ identity and provided information and the research results’ usefulness for improving the national TB program.

Results

The study included 22 participants, comprising 12 TB-diagnosed patients and ten family members. Gender was equally represented in both groups. Among the TB-diagnosed patients, the highest percentage of participants fell in the productive age group of 20-50 years old (58.3%), followed by the pre-older-adults to the older-adults age group of 50-70 years old (33.3%). One participant was in the teenage age group, aged 13 years old (8.3%).

Table 1 The participants’ demographic characteristics

No	Participants	Years	Gender
1.	K1	28 years	Man
2.	K2	13 years	Adolescent girl
3.	K3	32 years	Woman
4.	K4	32 years	Man
5.	K5	56 years	Woman
6.	K6	62 years	Man
7.	K7	48 years	Woman
8.	K8	63 years	Man
9.	K9	68 years	Man
10.	K10	22 years	Woman
11.	K11	23 years	Woman
12.	K12	28 years	Man
13.	KK1	61 years	Man
14.	KK2	70 years	Man
15.	KK3	31 years	Woman
16.	KK4	19 years	Woman
17.	KK5	56 years	Woman
18.	KK6	67 years	Man
19.	KK7	47 years	Woman
20.	KK8	63 years	Woman
21.	KK9	57 years	Man
22.	KK10	61 years	Man

Note: K = Patient; KK= Patient’s closest family

For the family members, the majority were in the pre-elderly to the elderly age group of 50-70 years old (70%), followed by the productive age group of 20-50 years old (20%). One participant was in the teenage age group (10%). To facilitate identification throughout the paper, the researcher used symbols; “K” represented TB-diagnosed patients while “KK” represented family members, as stated in **Table 1**. The patients and families were assigned numbers based on their arrival time, and the researchers made notes of their identities. All patient and family comments were analyzed as a single piece of data.

The research findings resulted in the development of five themes. The themes were as follows: (1) Delay in tuberculosis diagnosis, (2) Delay in starting TB treatment, (3) High willingness of patients and their families to recover, (4) Understanding that TB is an infectious disease, and (5) factors affecting patient recovery (**Figure 1**).

Theme 1: Delay in Tuberculosis Diagnosis

Subtheme 1.1: Community’s lack of knowledge of TB symptoms

Three out of 22 participants mentioned the community’s lack of knowledge of TB symptoms, as follows:

“When I first started coughing, I did not know that it was TB, so I went to the clinic and got better, but then I started coughing again around a month later, got better again, and then for some reason, I got sick again here (points at an area near the chest). So I was rushed to the hospital, and that was when they told me I had TB” (K8).

“At the time, I was coughing continuously, but I just thought it was normal” (K1).

“The coughing did not stop until I was coughing out blood. I thought it was my tonsillitis, but it turned out the coughing became more severe, so my sibling brought me to UPT Paru” (K3).

It was found that coughing was the initial symptom presented by the patients. Patients would present this symptom to the pharmacy or clinics (PPCs) to seek medication. As there were no proper diagnoses, and the patients were just sent home with cough suppressants, patients tended to be diagnosed at a later date when the disease had developed further and the patients were in a poorer condition.

Subtheme 1.2: The primary healthcare centers’ lack of knowledge of TB symptoms

One participant mentions this:

“Blood came out, but they said it was because of ... turns out it was ... and then we brought them to the hospital, and they were given this medication. After they took medicine, we got sent home, but over time they lost a lot of weight, and for five days, they felt feverish, so I brought them back to PH hospital. That was when we knew it was the lungs.” (KK2)

Healthcare workers (HCWs) are expected to be appropriately trained and aware of early TB symptoms, and a delay in proper diagnosis should not occur. However, the study found that HCWs’ insufficient understanding of TB symptoms remains a weakness in TB recognition. In addition, limited knowledge of TB among patients and their families and the lack of appropriate education by HCWs further contribute to barriers during acceptance of the diagnosis.

Subtheme 1.3: TB diagnosis occurred after patients experienced severe symptoms in the hospital or government community health services center

This was mentioned by six out of 22 participants as follows:

"At first, I was coughing, then brought to the clinic. In the clinic, they told us to do a sputum check in the government community health services center, and that's it" (KK10).

"So it's like this, this is my in-law, so they live in the house but had to go here and there to get help because the coughing didn't stop" (KK1).

"Until my condition was so bad, I didn't eat. One month, I didn't eat rice, and at the end, I couldn't even walk, couldn't do anything. That was when my brother brought me to the hospital, Hospital H" (K12).

"Yes, like that too, we just bought medicine for the past six years, and it became worse, so I brought them to the government primary healthcare services center. In the house, I couldn't do anything. S would know" (KK9).

"The coughing did not stop until I was coughing out blood. I thought it was my tonsillitis, but it turns out the coughing became more severe, so my sibling brought me to UPT P" (K3).

"They got treatment inpatient at hospital A. They took him from the social affair district office, and they treated them in hospital A. There they got treatment for two weeks, then died." (KK2)

Patients and their families shared similar experiences during the time of their diagnosis. Unfortunately, most participants were diagnosed with TB only when the patients presented with bloody cough or malnutrition, at which stage they required hospitalization, blood transfusion, and nutritional support. The delay in confirming the diagnosis was due to the HCWs' lack of understanding of TB symptoms and the importance of starting and completing medication, especially in their initial encounter with patients in PPCs.

Theme 2: Delay in Starting TB Treatment

Subtheme 2.1: Time is required to wait for laboratory results

Two out of 22 participants mentioned the following:

"Around two weeks before that, I did the lab check, then two weeks after I did another lab check" (K2) (when asked how long the patient had to wait to get the patient's lab results)

"Sputum check" (K9) (when asked about the reason the patient had to wait a week to get their medication)

The delay in obtaining laboratory results is due to the overwhelming number of patients and inadequate testing facilities. The recommended laboratory test for TB diagnosis is the molecular test, which requires specific equipment called TCM (Tes cepat molekuler). The advantage of using TCM over conventional methods is its ability to produce faster results. However, our study found that the TCM available in this study setting can only run 50 tests per day. In addition, these facilities are also expected to handle samples collected from all health service units in the area. The mismatch between equipment availability and patient demand leads to delayed laboratory results, with an average of three days required to obtain results.

Subtheme 2.2: The health center providing medication is different from the one that made the diagnosis

Three out of 22 participants mentioned the following:

"Alhamdulillah, after we were treated here (in a big hospital), they referred us back to the government primary health services center to get the medicine until now" (KK11)

"Went back to the government primary health care services center, continuing up until now" (K5) (patient was referred from the hospital to the government primary health care services center to get their medication)

"After all, they did not give me the medicine, I did not know the name of the medicine, but then I brought them back to the government primary health care services center to meet that guy" (K2)

Patients do not immediately receive medication after receiving the laboratory result. Based on the national program's system, these patients need to be referred to the health service units close to their homes. The responsibility for referrals falls on the health service unit where patients first register. These units would then conduct referrals according to the national regulations, in which patients diagnosed with primary TB are referred to a CHC, while patients diagnosed with co-morbidities or multi-drug resistant (MDR) TB are directed to a hospital.

Theme 3: High Willingness of Patients and Their Families to Recover

Subtheme 3.1: Patients understand the need to complete their medication as instructed by healthcare workers

This was mentioned by four out of 22 participants, as follows:

"Yes, because if we stop, then we would have to start again from the beginning, so like it or not, we need to continue taking medicine even though it's hard." (KK5)

"The red medicine that I drink always gives me a headache and makes me want to vomit, but like it or not, I have to take it until I complete." (K3)

(Nodding, smiling) "From the doctor in that hospital, they said don't stop taking medicine because if I do, I would need to start over from the beginning." (K1)

"Hospital P, when I was diagnosed with TB first, the doctor there explained that I need to take medicine, don't stop because if I stop even for a day, I need to start over from the beginning." (K4)

The participants exhibited a high level of willingness in patients and their families to recover once they were confirmed with TB and had started medication.

Subtheme 3.2: Family and cadre support help strengthen patients in their recovery

This was stated by five out of 22 participants, as follows:

"My weight was 40kg and didn't increase after I started consuming the medicine, supported by A (sibling). Before that, I already felt hopeless, but there were people that supported me. Since A helped guide me, alhamdulillah, I am now healthy. Now I am supporting my child too." (K3)

"Alhamdulillah, I am a very fussy person. Medication needs to be taken at the right time. If we agree to take it at 6 in the morning, then it has to be done at 6 in the morning, and until now, they are getting healthier and gaining weight." (KK10)

"That is right because every day I ask them if they have taken medicine or not. Every morning, I check on them about the medication." (KK8)

"There are also times when taking medicine in the morning, they need to have very hot water. If not, it makes them sick in the stomach." (K6)

"By drinking a lot of warm water, it helps the medicine go down smoother." (K5)

Patients felt much support from their families and cadre in completing their medication. Cadre and their family also showed positive efforts to help the patient.

Subtheme 3.3: Positive efforts are made by patients and their families to support recovery

Two participants stated this:

"Yeah, if it is difficult for them to take it, I grind the medicine. For me, because I want to be cured, I have to take medicine. I have to be cured. If I leave the medicine, I will have to start again from the beginning. So for me, I need to swallow it." (K1)

"I always drink natural goat milk. My mom always makes me ginger, red ginger water, buys fruits to make juice that I drink frequently, but I never eat fish." (K12)

Although feeling discomfort from the medication's side effects, they continuously attempted different methods to overcome these so that they could continue consuming the medicine. Additionally, the patients and their families correctly understood the importance of continuing their medication to recover and protect people in their community.

Theme 4: Understanding that TB is an Infectious Disease

Subtheme 4.1: TB is infectious to other members of the family

A participant expressed this:

"Akbar's brother, the one that passed away, did not seek treatment at all until his lungs swelled up. He got infected from his dad when he was one year and six months old." (KK2)

Patients realized that they were a risky source of infection to others, especially their beloved families.

Subtheme 4.2: TB needs to be cured so that it does not harm others

Two participants stated this:

"There is a history of parents having TB." (K4)

"The suggestion is exactly like what this guy has mentioned, in which this sickness can harm other people, even loads of other people, so we have to get cured." (K3)

This adequate understanding of the risk of TB is a positive factor in pushing patients and their families to conduct screening for other members and contributes to early diagnosis. This also ensures patients follow through with their medication regimen.

Theme 5: Factors Affecting Patient Recovery

Subtheme 5.1: Patient's pre-existing co-morbidities or experiencing TB relapse

Two participants expressed this:

"At first, it was just TB, but during my checkup at the lung hospital, they also checked my heart and blood sugar. It turns out my blood sugar was around 400." (K3)

"I've known about my TB for six years now. I know it affects my lungs, but I stopped taking the medication, so it came back. I went to the government primary healthcare center and got admitted to the hospital. It's all my fault because I stopped taking medicine." (KK9)

The researchers discovered that several severity factors complicated TB, including the existence of co-morbidities and relapse in patients with incomplete therapy.

Subtheme 5.2: Financial constraints

This is mentioned by two out of 22 participants:

"Yes, sometimes we want to buy vitamins, but we cannot afford them because of our economic condition. Even for this disease, they need a certain kind of milk and vitamins. Before taking medicine, they need to take vitamins first." (K4)

"We cannot afford additional food. Our job now is driving a pedicab." (KK9)

The main inhibiting factors identified were the economic constraints patients and their families face in providing good nutrition, especially for patients with poor financial status.

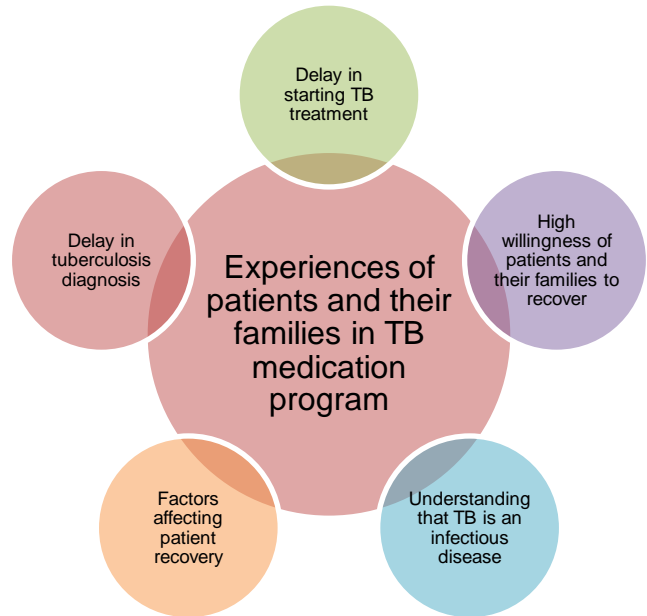


Figure 1 Thematic findings

Discussion

The first theme indicated the delay in TB diagnosis due to insufficient knowledge of primary care clinicians (PPCs) to conduct TB screening and lack of awareness of TB symptoms. Therefore, [Burman et al. \(2019\)](#) suggest that all health workers practicing in a community should be trained in TB screening, medication provision, and counseling to participate in TB surveillance and ensure medication adherence actively. Furthermore, informal health workers should also be trained to assist in screening and supporting TB programs. Similar recommendations were made by [Khachadourian et al. \(2020\)](#) and [Wroe et al. \(2021\)](#), who advocate for the involvement of all HCWs in a TB program to facilitate the early detection of cases. As mentioned, low new case detection rates are another challenge facing TB programs besides patient non-adherence to medication. Therefore, inadequate knowledge and awareness of TB by HCWs is one reason for this problem, which may be attributed to the current TB management system.

TB programs are typically managed by DOTS teams appointed by provincial or district health officers, and not all health service units are involved. Government-managed community health centers (CHCs) constitute the majority of the involved health service units, with only a small number of private units participating. As a result, HCWs involved in DOTS programs have a better understanding of TB detection and treatment. However, those not involved miss out on this opportunity, which may explain their inadequate

understanding of the disease. Nurses comprise the largest portion of HCWs and have the most contact with patients (Oblitas et al., 2010). According to Rumsey et al. (2022), nurses constitute two-thirds of the healthcare workforce, making their active involvement in policy development regarding universal health coverage (UHC) crucial. Therefore, providing training for all HCWs, particularly nurses, in the early detection of TB and ensuring they have the proper knowledge is proposed as a strategy to increase TB case detection.

The second theme, "delay in starting TB treatment," indicated that there are weaknesses in the availability of laboratory facilities and the regulations regarding TB patients' referral system, which results in delays in diagnosis and the initiation of medication regimens. Reza et al. (2020) recommended increasing TB screening in the community using GenXpert (TCM) and allowing patients to begin their medication immediately after diagnosis confirmation. The usage of TCM is beneficial as they require less time and are more sensitive. However, during the study period, the researchers found that TCM was only available in the research setting with a limited capacity of testing 50 samples per day, leading to delays in laboratory result confirmation. Furthermore, even after receiving their laboratory results, patients must be referred to a health service unit based on their address, which increases the risk of lost TB cases if patients fail to present themselves at the appointed place. This complication further acts as a barrier in patients starting medication regimens on the same day as diagnosis, as Reza et al. (2020) recommended.

Fulfilling balanced laboratory test equipment is quite challenging to resolve due to requiring additional resources. Foster et al. (2022) conducted a scoping review on the effects of counseling on patients with suspected TB infection and found that having continued contact with suspected patients positively impacts TB case finding. By counseling TB suspects on the signs and symptoms to be aware of, they better understand when to return for further investigation. This concept helps patients to identify notable TB signs and symptoms and continue to be cautious of them. With this proper understanding, patients can promptly act and present themselves to HCWs when necessary. This strategy could be critical in tracking TB suspects who failed to be diagnosed (or had a delay in laboratory testing).

The referral system for medication supply also contributes to medication delays. Ampomah et al. (2021) recommended integrating facilities to increase the quality of services. All health facilities should organize to support one another, which would push referral cases. There is an opportunity for the involvement of PPC units to provide screening for suspected cases and later refer cases to facilities that can conduct laboratory tests and medication. Referrals should also consider patients' preferences to ease medication and support continued follow-ups. By having this integration between facilities, patients would be able to receive swift diagnoses and appropriate medication.

The third theme demonstrated that patients and their families had good adherence to the TB program once the diagnosis was confirmed. This finding contrasted with studies from Adrian et al. (2020) and Falzon et al. (2011), which showed a low success rate of TB medication programs due to patients discontinuing their medication and the development

of multi-drug resistance (MDR) resulting from low adherence to their medication regimen.

Next, our study found that patients and families were willing to ensure recovery and understood the importance of continuing their medication to prevent the transmission of infection to others. Therefore, nurses who work closely with TB patients and informal workers should utilize these findings to build good relationships with patients' families and cadres in the community to support the success of patients and the TB program.

The researchers identified that the root of the problem lay in receiving confirmation of diagnosis and delayed commencement of medication, resulting in severe impacts on the patient's close contact. Unclear information and delayed medication initiation were identified as problems that impacted patients and had adverse effects on others who had contact with the patient, leading to the spread of TB. This problem stemmed from improper education and information from the first contact healthcare workers (HCWs). Patients and their families often received inadequate information due to the HCWs' oblivious behavior and inappropriate explanation. Stigma and feelings of shame also played a role in patients' difficulty accepting the diagnosis of TB, leading to delayed acceptance and medication. Blanco-Fraile et al. (2022) identified the autonomy role of nurses in community practice to provide education to patients and their families, building their ability to be good educators in the first contact. Khachadourian et al. (2020) found that home visit-based DOTs significantly improved patients' knowledge and reduced their depression and stigma. Therefore, continued explanation through home visits could improve patients' knowledge and help them reduce depression and stigma. Turimumahoro et al. (2022) studied the advantage of mobile health (m-health) in increasing the service quality and communication between patients and health workers, and the study found that m-health significantly improved service quality and communication. The researchers recommended increasing the involvement of PPCs and HCWs in the TB program and applying information technology to assist and enhance integration. The use of a mobile application could integrate other facilities, including health officers, informal health workers, and other sectors, and provide increased infrastructural support for home-based services. Despite the potential cost, the benefit of this application development should be considered.

This finding strongly emphasizes the need for all HCWs, especially nurses, to have good knowledge about TB and increase their sensitivity to early symptoms. Introducing TB programs to all HCWs and enhancing their involvement are good strategies based on this research. Most participants had contact with HCWs at the beginning of their symptoms but were not confirmed earlier with TB. Given the prevalence of TB in Indonesia, all HCWs should always consider TB a diagnosis for patients who present with continuous coughing or drastic loss of body weight. Based on the findings of this research, medication adherence should no longer be considered the main issue in TB programs. This is because participants felt they had adequate support from informal health workers and that medication was readily available. Informal health workers, such as health cadres, were found to play a significant role in providing support, such as positive motivation for patients and their families. This was also evident

from the findings of Bello et al. (2017). Furthermore, Louwagie et al. (2022) also agreed on involving family and community support to help maintain patients' adherence. Their findings are supported in this study. Once patients and their families understood the diagnosis, they willingly sought the medication and followed instructions from PHC officers and informal health workers.

In the last theme, the researchers found several inhibiting factors, including existing health co-morbidities and economic constraints, that must be addressed. TB with other co-morbidities is associated with higher severity levels. Therefore, HCWs should be aware of these co-morbid conditions during first contact with the patient. The economic constraint is a complicated issue that impacts the general situation in Indonesia. This problem would require comprehensive treatment from multiple sectors.

Limitations

As this study only employed a qualitative descriptive design with small samples, the finding might not represent the whole context in Indonesia. Further studies are needed to confirm the results.

Conclusion

The current study has identified issues with the TB National Program, specifically a delay in diagnosis and medication for the majority of participants. Weaknesses in this process included inadequate PPC services, limited capacity of laboratory test centers, and a complicated referral system for medicine. However, the most significant problem was the lack of ability for HCWs to conduct TB screening. This weakness HCWs in the community to diagnose TB within a short period relates to the lack of TB screening. In addition, the study found that HCWs in the community who were not involved in the DOTS team lacked knowledge of how to detect TB. To address these issues, it is recommended to involve all health workers practicing in the community in the TB program. Furthermore, a collaboration between multiple sectors in the community can provide an advantage in solving TB problems by increasing new case detection. Additionally, it is recommended that all nurses working with TB patients establish rapport with health cadres and patients' families to enhance medication adherence in patients. These recommendations aim to contribute to the success of the National TB elimination program.

Declaration of Conflicting Interest

None.

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Authors' Contributions

ILR contributed substantially to the study's conception and design, data collection, data analysis, interpretation of data, and manuscript writing. SS

contributed to drafting the work, revising it critically for important intellectual content, data analysis, and manuscript writing. HH and AYS revised the work critically for important academic content. All authors were accountable at each study step and approved the article's final version for publication.

Authors' Biographies

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Data Availability

The datasets interpreted and analyzed during the study process are not made public but available from the corresponding author upon reasonable request.

Declaration of use of AI in Scientific Writing

Nothing to declare.

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