



The Effects of Accessibility, Individual Assessment, and Disease Severity on the Utilization of Pulmonary TB Services in the Peripheral Areas of Deli Serdang Regency

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Abstract

Tuberculosis (TB) remains a major public health challenge in Indonesia, including in Deli Serdang Regency. The number of pulmonary TB cases in the peripheral areas of Deli Serdang continues to rise each year, accompanied by a low cure rate. This study aims to analyze the effects of accessibility, individual perception of the disease, and disease severity on the utilization of pulmonary TB services in the peripheral areas of Deli Serdang Regency. A

quantitative research design with a cross-sectional approach was employed. The study population consisted of pulmonary TB patients in two peripheral sub-districts, with a total of 130 respondents selected using a purposive sampling technique. Data were collected through interviews using structured questionnaires and analyzed using the Chi-Square test and logistic regression. The results showed a significant effect of accessibility ($p = 0.006$, $R = 0.139$), disease severity ($p = 0.023$, $R = 0.139$), and individual perception of the disease ($p = 0.038$, $R = 0.139$) on the utilization of pulmonary TB services in the peripheral areas of Deli Serdang Regency. It can be concluded that the utilization of pulmonary TB services in these areas remains low and is influenced by various multidimensional factors. The implications of this study highlight the need for integrated interventions to improve access to TB services. The findings are expected to serve as recommendations for local governments and policymakers in developing sustainable strategies for TB elimination.

Keywords: Accessibility, Disease severity, Individual assessment, Service utilization, Tuberculosis

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Introduction

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, a bacterium that primarily attacks the lungs and is commonly known as pulmonary TB. This infection leads to respiratory issues such as chronic coughing and shortness of breath, along with systemic symptoms like fever and night sweats. TB treatment requires long-term therapy and high adherence to prevent the development of drug resistance. If left untreated, TB can result in severe complications and even death. Beyond the lungs, *Mycobacterium tuberculosis* can also affect other organs such as the kidneys, bones, lymph nodes, and meninges, a condition referred to as extrapulmonary TB.

Transmission of TB occurs through droplets released when an infected individual coughs, sneezes, laughs, talks, or sings. High-risk groups include individuals living in overcrowded and unhygienic environments, healthcare workers, the elderly, children, drug users, individuals with chronic conditions such as kidney failure, those with malnutrition, alcohol dependence, smokers, and people with weakened immune systems, including those with HIV/AIDS, cancer, diabetes, and patients receiving immunosuppressive therapy.

According to global data from 2022, TB was responsible for approximately 1.3 million deaths, a slight decrease from the 1.4 million deaths recorded in both 2020 and 2021. That year, 7.5 million new TB cases were reported globally. However, the 19% reduction in mortality since 2015 falls short of the World Health Organization (WHO) target of a 75% decrease by 2025. The 30 countries with the highest TB burden accounted for 87% of all cases, with the top eight contributors being India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%), and the Democratic Republic of the Congo (3.0%).

Indonesia ranks second after India in terms of TB burden. According to the Global TB Report 2021, there were an estimated 824,000 pulmonary TB cases in Indonesia, yet only 48% were reported and received treatment. In 2022, the detection rate for new TB cases was 39% (target: 90%), while the treatment success rate was 74% (target: 90%) (Ministry of Health, Republic of Indonesia, 2022).



The Global TB Report 2023 estimated around 1,060,000 TB cases and 134,000 deaths per year in Indonesia—equivalent to roughly 14 TB-related deaths every hour. In 2022, 724,309 pulmonary TB cases were officially recorded, which represented 75% of the estimated 969,000 total cases, leaving 25% unreported. The estimated number of multidrug-resistant/rifampicin-resistant (MDR/RR) TB cases in 2021 reached 28,000, a 17% increase from the previous year, with 1,836 estimated cases in North Sumatra in 2022.

North Sumatra ranked sixth among Indonesian provinces in TB case numbers in 2021 and rose to fourth place in 2022, contributing 72,738 cases. As of September 14, 2023, the province had recorded 31,150 TB case notifications, representing 37.1% of the 91% national target. However, the treatment success rate had reached 90.4%, meeting the national target (Dinkes Prov. Sumut, 2023; Dirjen P2P, 2023).

The cities and regencies with the highest pulmonary TB cases in North Sumatra include Medan City, Deli Serdang Regency, and Simalungun Regency. TB detection and screening programs, including symptom checks and chest X-rays, have been implemented. In Deli Serdang, which consists of 22 sub-districts and 34 community health centers, the number of TB cases rose from 3,143 in 2021 to 5,859 in 2024. Although treatment rates increased, the number of suspected cases also rose significantly, and the cure rate declined—from 1,363 patients in 2022 to 924 in 2023.

This trend indicates ongoing barriers to effective utilization of TB services, particularly at primary healthcare facilities such as community health centers. Challenges include limited access, inadequate public knowledge, persistent stigma surrounding TB, and low adherence to long-term treatment regimens. The growing TB burden is also directly linked to efforts to achieve the Sustainable Development Goals (SDGs), particularly target 3.3, which aims to eliminate TB by 2030. However, limited resources, poor accessibility, and uneven quality of healthcare services in underprivileged regions suggest that this goal remains difficult to attain. Improving TB services at the community level is urgently needed as part of a broader effort to strengthen an inclusive and resilient healthcare system.



Initial survey results in peripheral areas of Deli Serdang Regency—remote regions with underdeveloped infrastructure and economic limitations—revealed that only 30% of 30 surveyed female TB patients (housewives) had accessed TB services. Many faced long travel distances, poor road conditions, and high transportation costs. In addition, limited knowledge about TB contributed to delayed diagnosis. Approximately 15% of patients relied on traditional medicine as a first response, which worsened their conditions and increased the risk of developing drug-resistant TB (DR-TB).

One respondent reported that accessing healthcare services involved high expenses, and that few families had the means or assistance to reach health facilities. This highlights the significant challenges faced by residents in peripheral areas when attempting to utilize TB services.

As a result, this study focuses on the peripheral regions of Deli Serdang Regency, recognizing the substantial barriers to both the provision and use of TB services. The study aims to provide a comprehensive understanding of the obstacles and enabling factors influencing TB service utilization, and to offer evidence-based recommendations for the development of more context-sensitive and effective health policies.

Methods

This study employed a quantitative research design with a cross-sectional approach, aiming to examine the relationship between independent variables and a dependent variable at a single point in time without any follow-up. The research was conducted in two sub-districts located in the peripheral areas of Deli Serdang Regency, namely Pantai Labu District and Hamparan Perak District. The study was carried out from January to June 2025.

The study population consisted of 243 pulmonary TB patients residing in the two sub-districts of the peripheral areas of Deli Serdang Regency in 2025. Sampling was conducted using a purposive sampling technique. The sample size was determined using the Isaac and Michael table, which estimates the appropriate sample size based on the total population with a 10% margin of error, resulting in a sample of 130 TB patients.



The independent variables in this study were accessibility, individual assessment of the disease, and disease severity, while the dependent variable was the utilization of pulmonary TB services. Data were collected through direct interviews with TB patients using a structured questionnaire. The data measurement instruments used included the Guttman Scale and the Likert Scale. The data analysis consisted of univariate and bivariate analyses. The Chi-Square test was used to support the research hypothesis by identifying the relationship between the studied variables.

Results

Univariate Analysis

Respondent Characteristics. The total number of respondents in this study was 130. Of these, 79 were female and 51 were male. Further details are presented in the following table:

Table 1. Frequency Distribution of Respondents by Gender, Age, and Education Level

Respondent Characteristics	n = 130	%
Gender		
Man	51	39.2
Woman	79	60.8
Age		
0 – 14 years	3	2.3
15 – 24 years	9	6.9
25 – 44 years	48	36.9
45 – 59 years	40	30.8
60 – 74 years	28	21.5
>75 years	2	1.5
Level of education		
SD	13	10.0
Junior high school	26	20.0
Senior high school	83	63.8
College	8	6.2

Based on the results of the study involving 130 respondents, 51 respondents (39.2%) were male, and 79 respondents (60.8%) were female. A total of 48 respondents (36.9%) were aged 25–44 years, 40 respondents (30.8%) were aged 45–59 years, and 2 respondents (1.5%) were over 75



years old. In terms of education level, the majority of respondents had completed high school, accounting for 83 respondents (63.8%).

Accessibility Characteristics. This refers to the extent to which respondents found it easy to reach and utilize TB services or facilities. The distribution of respondents based on accessibility is presented in the following table:

Table 2. Frequency Distribution Based on Accessibility to the Utilization of Pulmonary TB Services

Accessibility	Yes		No	
	n	%	n	%
1. Is the Community Health Center in your area easily accessible by public or private transportation?	48	36.9	82	63.1
2. Are you aware of the schedule for TB examination services at the Community Health Center?	57	43.8	73	56.2
3. Is the cost of transportation to the health center a barrier for you in utilizing TB services?	73	56.2	57	43.8
4. Do you know the location of the designated TB examination room at the Community Health Center?	86	66.2	44	33.8
5. Have you ever postponed or avoided seeking treatment because the health center was difficult to reach?	73	56.2	57	43.8
6. Are you aware that treatment for Pulmonary TB requires regular visits to the Community Health Center?	54	41.5	76	58.5
7. Have you ever experienced difficulties in accessing TB services at the Community Health Center?	56	43.1	74	56.9
8. Does it take more than 30 minutes to travel from your residence to the health center?	67	51.5	63	48.5
9. Is the road to the health center in good condition and safe to travel on?	73	56.2	57	43.8
10. Do you feel that the health workers at the Community Health Center provide clear information about Pulmonary TB?	80	61.5	50	38.5

Based on the results of the accessibility frequency distribution, it was found that the highest percentage of respondents (66.2%) knew the location of the designated TB examination room at the Community Health Center. Additionally, a significant number of respondents reported that they felt the health workers at the center provided clear information about TB.



Table 3. Distribution of Values Based on Accessibility to the Utilization of Pulmonary TB Services

Accessibility	n	%
Bad	63	48.5
Currently	52	40.0
Good	15	11.5
Amount	130	100

Based on the categorization of accessibility, it was found that out of 130 respondents, 63 respondents (48.5%) had poor accessibility, 52 respondents (40.0%) had moderate accessibility, and 15 respondents (11.5%) had good accessibility.

Characteristics of Severity. This refers to the extent to which the condition or symptoms experienced by the respondents affect their daily activities and overall quality of life. The detailed distribution of respondents based on severity is presented in the following table:

Table 4. Frequency Distribution Based on Severity Level in the Utilization of Pulmonary TB Services

Severity Level	Yes		No	
	n	%	n	%
1. Do you consider Pulmonary TB a disease that can lead to death if left untreated?	52	40.0	78	60.0
2. Do you believe that Pulmonary TB can spread rapidly in an unhealthy environment?	75	57.7	55	42.3
3. Do you think individuals with Pulmonary TB are at risk of serious complications if they do not seek treatment?	63	48.5	67	51.5
4. Are you aware that Pulmonary TB can cause permanent damage to the lungs?	68	52.3	62	47.7
5. Do you believe that untreated Pulmonary TB patients can transmit the disease to many others?	77	59.2	53	40.8
6. Do you think that people with Pulmonary TB should seek immediate treatment to prevent more severe conditions?	56	43.1	74	56.9
7. Do you believe that non-adherence to TB treatment increases the risk of developing drug resistance?	72	55.4	58	44.6
8. Do you think people with Pulmonary TB should isolate themselves to prevent further transmission?	87	66.9	43	33.1
9. Do you believe there is a risk of Pulmonary TB recurrence even after being declared cured, if health is not properly maintained?	61	46.9	69	53.1
10. Do you consider Pulmonary TB a disease that requires long-term monitoring?	66	50.8	64	49.2



Based on the results of the frequency distribution of severity levels, it was found that the highest percentage of respondents (66.9%) agreed that TB sufferers must isolate themselves to prevent wider transmission. Additionally, 59.2% of respondents believed that individuals with TB who do not seek treatment can transmit the disease to many others.

Table 5. Distribution of Values Based on Severity Level in the Utilization of Pulmonary TB Services

Severity Level	n	%
Bad	52	40.0
Currently	51	39.2
Good	27	20.8
Amount	130	100

Based on the categorization of severity levels, it was found that out of 130 respondents, 52 respondents (40.0%) were categorized as having a low severity level, 51 respondents (39.2%) were at a moderate severity level, and 27 respondents (20.8%) were at a high severity level.

Characteristics of Individual Assessment of Disease. This refers to how a person perceives, believes, and understands the health condition they are experiencing or may potentially experience. The distribution of respondents based on their individual assessment of the disease is presented in the following table:

Table 6. Frequency Distribution Based on Individual Assessment in the Utilization of Pulmonary TB Services

Individual Assessment	Yes		No	
	n	%	n	%
1. Do you consider Pulmonary TB a dangerous disease?	58	44.6	72	55.4
2. Do you feel that Pulmonary TB interferes with your daily activities?	61	46.9	69	53.1
3. Are you concerned if someone around you is diagnosed with Pulmonary TB?	55	42.3	74	56.9
4. Do you consider Pulmonary TB a condition that requires special attention from health workers?	69	53.1	61	46.9
5. Do you believe that the treatment of Pulmonary TB requires strict medical supervision?	60	46.2	70	53.8
6. Do you think Pulmonary TB can reduce a person's quality of life?	55	42.3	75	57.7
7. Do you feel that individuals with Pulmonary TB are at risk of experiencing social stigma?	59	45.4	71	54.6



8. Do you believe that maintaining cleanliness can help reduce the risk of Pulmonary TB?	56	43.1	73	56.2
9. Do you believe that Pulmonary TB can be completely cured with proper treatment?	60	46.2	70	53.8
10. Do you think it is important to get tested if you experience symptoms of Pulmonary TB?	56	43.1	74	56.9

Based on the results of the frequency distribution of individual assessments, it was found that the highest percentage of respondents (53.1%) considered Pulmonary TB a disease that requires special attention from health workers. This was followed by 46.9% of respondents who felt that Pulmonary TB could interfere with daily activities.

Table 7. Distribution of Values Based on Individual Assessment in the Utilization of Pulmonary TB Services

Individual Assessment	n	%
Bad	82	63.0
Currently	40	30.8
Good	8	6.2
Amount	130	100

Based on the categorization of individual assessments, it was found that out of 130 respondents, 82 respondents (63.0%) had a low level of individual assessment, 40 respondents (30.8%) had a moderate level, and 8 respondents (6.2%) had a high level of individual assessment.

Bivariate Analysis

Cross-tabulation of Accessibility and Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

Based on the results of the cross-tabulation between accessibility and the utilization of TB services, of the 63 respondents with poor accessibility, only 9 respondents (14.3%) utilized TB services, while 54 respondents (85.7%) did not. Among the 52 respondents with moderate accessibility, 17 respondents (32.7%) utilized TB services and 35 respondents (67.3%) did not. Of the 15 respondents with good accessibility, 6 respondents (40.0%) utilized TB services and 9 respondents (60.0%) did not.



The results of the chi-square test showed a p-value of 0.025 ($p < 0.05$), indicating a statistically significant relationship between accessibility and the utilization of TB services.

Table 8. Cross-tabulation of Accessibility and Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

Accessibility	Utilization of Services				Total	
	Yes		No			
	n	%	n	%	n	%
Bad	9	14.3	54	85.7	63	100
Currently	17	32.7	35	67.3	52	100
Good	6	40.0	9	60.0	15	100

Cross-tabulation of Disease Severity Level and Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

Based on the results of the cross-tabulation between disease severity and the utilization of Pulmonary TB services, out of 64 respondents who perceived their disease severity as low, only 10 respondents (15.6%) had utilized TB services, while 54 respondents (84.4%) had not. Among the 37 respondents who reported a moderate severity level, 10 respondents (27.0%) had utilized TB services and 27 respondents (73.0%) had not. Of the 29 respondents who perceived the disease severity as high, 12 respondents (41.4%) had utilized TB services, while 17 respondents (58.6%) had not. The results of the chi-square test showed a p-value of 0.026 ($p < 0.05$), indicating a statistically significant relationship between disease severity and the utilization of Pulmonary TB services.

Table 9. Cross-tabulation of Disease Severity Level and Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

Disease severity level	Utilization of Services				Total	
	Yes		No			
	n	%	n	%	n	%
Bad	10	15.6	54	84.4	64	100
Currently	10	27.0	27	73.0	37	100
Good	12	41.4	17	58.6	29	100



Cross-tabulation of Individual Assessment and Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

Based on the results of the cross-tabulation between individual assessment and the utilization of Pulmonary TB services, among 80 respondents who had a low individual assessment, only 15 respondents (18.8%) utilized TB services, while 65 respondents (81.2%) did not. Of the 39 respondents with a moderate individual assessment, 11 respondents (28.2%) utilized TB services and 28 respondents (71.8%) did not. Among the 11 respondents with a high individual assessment, 6 respondents (54.5%) utilized TB services, while 5 respondents (45.5%) did not. The chi-square test analysis yielded a p-value of 0.029 ($p < 0.05$), indicating a statistically significant relationship between individual assessment and the utilization of Pulmonary TB services.

Chi-Square Statistical Test Results

The results of the chi-square test analysis also indicate a significant relationship between accessibility, disease severity, and individual assessment with the utilization of Pulmonary TB services.

Table 10. Bivariate Test Results between Independent Variables and the Dependent Variable

Independent Variable	Dependent Variable	p-value	Information
Accessibility	Utilization of services	0.025	There is a relationship
Individual Assessment of Disease		0.026	There is a relationship
Severity of Disease		0.029	There is a relationship

Discussion

Respondent Characteristics

Based on the research findings, the majority of respondents were aged 25–44 years (36.9%), followed by those aged 45–59 years (30.8%), 60–74 years (21.5%), 15–24 years (6.9%), 0–14 years (2.3%), and >75 years (1.5%). Most individuals affected by Pulmonary TB were in the productive age group.



The majority of respondents were female (60.8%), primarily housewives, with the highest level of education being high school (63.8%), followed by junior high school (20.0%) and elementary school (10.0%). Most did not have stable employment or independent income and were economically dependent on their spouses or other family members.

This reflects the socio-economic conditions typical in peripheral areas of Deli Serdang Regency, where limited access to formal education and employment opportunities affects the community's ability to obtain adequate health information. Dependence on others for decision-making—particularly regarding health—makes this group more vulnerable to delayed diagnosis and treatment. The findings suggest that individuals from lower socio-economic and educational backgrounds are disproportionately affected by Pulmonary TB due to various structural and non-structural barriers in accessing timely and quality healthcare. Limited health literacy, lack of accurate information, and inadequate health service infrastructure further compound their vulnerability.

The Influence of Accessibility (Enabling Factors) on the Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

The results of the bivariate analysis show that accessibility has a significant effect on the utilization of TB services, with a p-value of 0.025 ($p < 0.05$).

Accessibility, as part of enabling factors, refers to the availability of facilities, infrastructure, and resources that support individuals in reaching and utilizing health services. In the context of Pulmonary TB control, poor accessibility remains one of the major barriers, particularly in rural and peripheral areas. The study revealed that most respondents faced physical and economic challenges in accessing TB services, such as long travel distances, limited public transportation, and high transportation costs. These issues often result in treatment delays, and in many cases, complete avoidance of formal healthcare services.

The findings affirm that low accessibility directly reduces the likelihood of service utilization, even when the services are provided free of charge. Many TB patients in peripheral



areas are reluctant or unable to visit health centers regularly due to logistical constraints. Some delay treatment until symptoms become severe or resort to traditional remedies perceived as more accessible.

These results are consistent with the study by Susanti and Maulana (2020), which found that limited transportation access and distance to health facilities significantly hindered TB service utilization in rural areas. Their research indicated that patients residing more than 5 kilometers from health centers were twice as likely to abandon treatment as those within a 2-kilometer radius.

Similarly, Rohmah and Prasetyo (2019) emphasized that the presence of health facilities alone does not ensure service utilization if not accompanied by physical accessibility. Factors such as road conditions and lack of public transport contribute significantly to low TB service coverage.

The World Health Organization (WHO, 2022) also highlights that equitable access to healthcare is a prerequisite for achieving global TB elimination targets. Geographic barriers often lead to delayed diagnosis and a higher rate of treatment interruption, increasing the risk of TB transmission and the development of drug-resistant TB (DR-TB) cases.

The Influence of Need Factors (Disease Severity and Individual Assessment) on the Utilization of Pulmonary TB Services in the Peripheral Area of Deli Serdang Regency

The bivariate analysis showed that both disease severity and individual assessment significantly influence the utilization of Pulmonary TB services, with p-values of 0.026 and 0.029, respectively ($p < 0.05$).

Perceived need involves an individual's perception and recognition of their health condition, which plays a critical role in the decision to seek medical assistance. The study found that some respondents did not perceive their illness as serious and delayed treatment until symptoms became more severe. Others preferred traditional medicine over clinical intervention, indicating a disconnect between actual medical needs and personal perceptions of illness severity.

These findings align with those of Yulianti and Wahyuni (2019), who reported that TB patients often underestimate early symptoms and delay seeking professional healthcare. This



misperception contributes to the continued spread of TB and may lead to worse health outcomes, including complications and increased risk of drug resistance.

Conclusion

Based on the results of a study involving 130 respondents in the peripheral areas of Deli Serdang Regency, it was found that the utilization rate of Pulmonary Tuberculosis (TB) services remains relatively low. Only 40.8% of respondents had utilized Pulmonary TB services, while 59.2% had not used the services optimally. Analysis of the factors influencing service utilization showed that accessibility had a significant impact. Respondents with easier access to healthcare facilities were more likely to actively utilize TB services. Additionally, individual perceptions of disease threat and symptom severity also had a significant influence. The greater the perceived risk and the more severe the symptoms experienced, the more likely individuals were to seek treatment. These findings confirm that adequate access and a strong perception of the need for healthcare services are key factors in promoting the utilization of Pulmonary TB services in peripheral areas.

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