

Determinants of Tuberculosis Health Service Utilization among Patients in Indonesia: A Cross-Sectional Study from Takalar Regency

ABSTRACT

Background: Despite the availability of free tuberculosis services in Indonesia, suboptimal utilization remains a major challenge to achieving the End TB Strategy. This study aimed to identify factors associated with tuberculosis health service utilization in Takalar Regency, Indonesia.

Methods: A cross-sectional study was conducted among 201 registered tuberculosis patients selected through purposive sampling in Pattalassang District, Takalar Regency, in February 2026. Data were collected using a structured questionnaire and analyzed using the Chi-square test and binary logistic regression.

Results: Adequate knowledge was associated with higher tuberculosis health service utilization (adjusted odds ratio [AOR] = 8.38; 95% confidence interval [CI]: 2.97–23.62). Poor accessibility to health facilities was associated with lower utilization (AOR = 0.19; 95% CI: 0.09–0.40). Attitude, family support, and trust were not independently associated with tuberculosis health service utilization after adjustment.

Conclusion: Improving tuberculosis service utilization requires not only strengthening community knowledge through continuous health education but also reducing geographical and financial barriers to healthcare access.

Keywords: Tuberculosis, Health Services Accessibility, Health Service, Health Knowledge, Attitudes, Practice

1. Introduction

Tuberculosis (TB) remains one of the world's leading public health challenges and the deadliest infectious disease caused by a single pathogen. According to the World Health Organization (WHO), an estimated 10.8 million people developed TB globally in 2023, with the WHO South-East Asia Region accounting for the largest proportion of cases. Indonesia ranks second worldwide after India in TB burden, with an estimated incidence of 385 cases and a mortality rate of 49 deaths per 100,000 population. These figures indicate that TB continues to pose a major obstacle to achieving the targets of the End TB Strategy and the Sustainable Development Goals (SDGs) aimed at ending the TB epidemic by 2035 (1, 2).

In response to the high TB burden, the Indonesian government has prioritized TB elimination through Presidential Regulation No. 67 of 2021 on Tuberculosis Control, which emphasizes improving case detection, treatment success, and reducing TB-related mortality. Despite these efforts, substantial gaps remain in programme performance across regions. In 2024, approximately 860,100 TB cases were notified nationally, representing only about 79% of the estimated 1.09 million cases. This indicates that a considerable proportion of TB cases remain undetected, potentially sustaining ongoing transmission within communities (2).

South Sulawesi is among the provinces with the highest TB burden in Indonesia. In 2023, the provincial TB case detection rate reached only 53.7%, considerably below the national target of at least 90%, while 45,556 TB cases were reported in 2024 (2). Within the province, Takalar Regency represents one of the priority districts, reporting 821 TB cases in 2023 and increasing to 1,040 cases in 2024, including 86 paediatric cases. Despite this increasing burden, several healthcare facilities have not achieved programme targets for TB suspect identification, indicating persistent challenges in the utilisation of TB health services (3).

Effective utilisation of TB health services is fundamental to successful TB control because timely diagnosis, treatment initiation, and treatment completion depend on patients' ability and willingness to seek appropriate healthcare. Andersen's Behavioral Model of Health Services Use provides a comprehensive framework for explaining healthcare utilisation through three interrelated domains: predisposing factors, enabling factors, and need factors (4).

Accumulating international evidence demonstrates that TB healthcare utilisation is shaped by multiple individual, social, and health system determinants. A recent global systematic review identified inadequate TB knowledge, long travel distance, transportation costs, stigma, fear of discrimination, poor coordination of health services, limited diagnostic availability, and lack of trust in healthcare systems as major barriers to accessing TB diagnosis and treatment (5). Similarly, systematic evidence suggests that community-based health workers, mobile TB clinics, specialised TB services, and stronger coordination between healthcare providers substantially improve TB service uptake, particularly among vulnerable and hard-to-reach populations (6). Beyond individual factors, health system characteristics—including healthcare workforce capacity,

infrastructure, service delivery, organisational support, and institutional culture—also play critical roles in facilitating or hindering access to TB services, especially in low- and middle-income countries (7).

Although these determinants have been widely investigated internationally, evidence from district-level settings in Indonesia remains limited. A cross-sectional study conducted in North Sumatra reported that education level, employment status, knowledge, attitudes, and healthcare accessibility were significantly associated with the utilisation of TB services in primary healthcare settings. However, the study was confined to a single district and may not adequately capture the diverse contextual factors influencing TB healthcare utilisation across different regions of Indonesia (8). Given Indonesia's geographical, sociocultural, and health system diversity, further evidence from different local settings is needed to inform context-specific TB control strategies.

In Takalar Regency, preliminary interviews with TB programme managers identified stigma, fear of discrimination, misconceptions about TB, and reluctance to seek examination or treatment as persistent barriers to TB health service utilization. Given the district's high TB burden and unmet case detection targets, identifying factors influencing healthcare utilization is essential for strengthening TB control.

Therefore, this study aimed to examine the influence of knowledge, attitudes, family support, accessibility to health facilities, and trust on TB health service utilization among patients with tuberculosis in Takalar Regency, Indonesia. The findings are expected to inform targeted strategies to improve healthcare utilization and accelerate local TB elimination

2. Materials And Methods

2.1. Study Design and Setting

This analytical quantitative study employed a cross-sectional design and was conducted in February 2026 in Pattallassang District, Takalar Regency, South Sulawesi, Indonesia.

2.2. Population and Sample

The study population comprised all tuberculosis (TB) patients registered and receiving TB healthcare services within the Pattallassang District health service area ($N = 404$). The minimum required sample size was calculated using the Slovin formula, yielding a sample size of 201 participants. Participants were selected using purposive sampling. The inclusion criteria were registered TB patients who resided in Pattallassang District, had previously utilized or were currently utilizing TB healthcare services, and provided informed consent to participate. Patients who were unable to be interviewed due to their health condition, could not be contacted during the data collection period, or declined to participate were excluded from the study.

2.3. Variables and Data Collection

The dependent variable was utilisation of TB healthcare services. The independent variables included knowledge, attitudes, family support, accessibility to healthcare facilities, and trust.

Primary data were collected through face-to-face interviews and, for a subset of participants, through an online questionnaire (Google Form), using a structured questionnaire developed by the researchers based on a review of relevant literature on tuberculosis health service utilisation. The questionnaire consisted of 43 items covering five domains: knowledge (10 items; dichotomous response format, correct = 2, incorrect = 1), attitude (10 items; four-point Likert scale, strongly agree = 4 to strongly disagree = 1), family support (10 items; four-point Likert scale), accessibility to healthcare facilities (3 items; dichotomous response format, yes = 2, no = 1), and trust (10 items; four-point Likert scale). Responses were categorised as “adequate” or “poor” for the knowledge, attitude, family support, and trust domains, and as “close” or “far” for the accessibility domain, based on a cut-off score derived using the class-interval method (cut-off = highest possible score – interval, where interval = range / number of categories). Construct validity was tested using the Pearson product-moment correlation, comparing the item-total score correlation (r -calculated) against the r -table value at a 5% significance level (r -table = 0.361 for $n = 30$, $df = 28$); all items across the five domains yielded r -calculated values exceeding the r -table value and were therefore considered valid. Reliability was assessed using Cronbach's alpha, yielding coefficients of 0.824 for knowledge, 0.915 for attitude, 0.799 for family support, 0.673 for accessibility, and 0.822 for trust, all exceeding the acceptable threshold of 0.60. Both the validity and reliability tests (construct validity only, without a separate expert judgment/content validity procedure) were conducted among 30 community members in Polongbangkeng Utara Subdistrict, an area outside the main study location, prior to the main data collection. Secondary data were obtained from the Takalar District Health Office, the South Sulawesi Provincial Health Office, and relevant literature.

2.4. Data Analysis

Univariate analysis was performed to describe respondents' characteristics and the distribution of study variables. Associations between independent variables and TB healthcare service utilisation were examined

using the Chi-square test. Variables meeting the selection criteria were subsequently entered into a binary logistic regression model to identify factors independently associated with TB healthcare service utilisation. The findings are presented as odds ratios (ORs) with 95% confidence intervals (95% CIs).

2.5. Ethical Considerations

This study was approved by the Health Research Ethics Committee, Faculty of Public Health, Hasanuddin University (Approval No. 696/UN4.14.1/TP.01.02/2026). Written informed consent was obtained from all participants prior to data collection. Participant confidentiality and anonymity were maintained throughout the study.

3. Results

Respondents' characteristics included age, sex, occupation, religion, and educational level. The distribution of respondents' characteristics is presented in Table 1. Most respondents were aged 46–55 years (24.4%), followed by those aged 36–45 years (22.4%) and 26–35 years (19.4%). Female respondents accounted for the majority of the sample (59.2%), while males comprised 40.8%. More than half of the respondents were unemployed (52.2%), followed by farmers, fishermen, or livestock workers (20.9%) and self-employed individuals or traders (11.9%). Regarding educational attainment, the largest proportion had completed primary school or its equivalent (21.9%), followed by junior secondary school or its equivalent (20.9%).

Table 1: Characteristics of the Study Participants (n = 201)

Characteristic	n	%
Age (years)		
17–25	16	8.0
26–35	39	19.4
36–45	45	22.4
46–55	49	24.4
56–65	34	16.9
>65	18	9.0
Sex		
Male	82	40.8
Female	119	59.2
Occupation		
Unemployed	105	52.2
Civil servant	1	0.5
Farmer/Fisherman/Livestock breeder	42	20.9
Daily laborer	13	6.5
Self-employed	24	11.9
Retired	6	3.0
Private employee	10	5.0
Educational level		
No formal education/Incomplete primary school	26	12.9
Primary school	44	21.9
Junior high school	42	20.9

Source : Primary data, 2026

The associations between knowledge, attitudes, family support, trust, accessibility to healthcare facilities, and TB healthcare service utilisation were examined using the Chi-square test. The results of the bivariate analysis are presented in Table 2.

As shown in Table 2, knowledge ($p = 0.001$), attitudes ($p = 0.025$), family support ($p = 0.049$), and accessibility to healthcare facilities ($p = 0.001$) were significantly associated with TB healthcare service utilisation. In contrast, trust was not significantly associated with TB healthcare service utilisation ($p = 0.123$).

Table 2: Bivariate Analysis of Factors Associated with Tuberculosis Health Service Utilization (n = 201)

Variables	Tuberculosis Health Service Utilization	Total	p-value
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	Yes (n=105)	No (n=96)		
Knowledge				
Poor	36 (87.8)	5 (12.2)	41 (100.0)	0.001
Adequate	69 (43.1)	91 (56.9)	160 (100.0)	
Attitude				
Poor	12 (80.0)	3 (20.0)	15 (100.0)	0.025
Adequate	93 (50.0)	93 (50.0)	186 (100.0)	
Family Support				
Poor	14 (73.7)	5 (26.3)	19 (100.0)	0.049
Adequate	91 (50.0)	91 (50.0)	182 (100.0)	
Trust				
Poor	4 (100.0)	0	4 (100.0)	0.123
Adequate	101 (51.3)	96 (48.7)	197 (100.0)	
Accessibility to Health Facilities				
Far	59 (41.3)	84 (58.7)	143 (100.0)	0.001
Near	46 (79.3)	12 (20.7)	58 (100)	

Note: *p*-values were obtained using the Chi-square test. Statistical significance was set at $p < 0.05$

The multivariable binary logistic regression analysis (Table 3) identified knowledge and accessibility to healthcare facilities as significant factors associated with TB healthcare service utilisation. Respondents with adequate knowledge were 8.38 times more likely to utilise TB healthcare services than those with inadequate knowledge (adjusted odds ratio [AOR] = 8.38; 95% confidence interval [CI]: 2.97–23.62; $p < 0.001$). Conversely, respondents with poor accessibility to healthcare facilities had lower odds of utilising TB healthcare services (AOR = 0.19; 95% CI: 0.09–0.40; $p < 0.001$). Although attitudes and family support were significantly associated with TB healthcare service utilisation in the bivariate analysis, these associations were no longer statistically significant after adjustment for other variables in the multivariable model (attitudes: $p = 0.368$; family support: $p = 0.651$).

Table 3: Multivariable Logistic Regression Analysis of Factors Associated with Tuberculosis Health Service Utilization (n = 201)

Variable	Adjusted OR	95%CI	p-value
Knowledge	8.38	2.97–23.62	<0.001
Attitude	1.96	0.46–8.46	0.368
Family Support	1.34	0.38–4.77	0.651
Accessibility to Health Facilities	0.19	0.09–0.40	<0.001

Note: OR, odds ratio; CI, confidence interval

4. Discussion

This study showed that knowledge, attitude, family support, and accessibility to health facilities were associated with TB health service utilization in the bivariate analysis. However, after adjustment, only knowledge and accessibility remained independent determinants, supporting Andersen's Behavioral Model, which explains healthcare utilization through predisposing, enabling, and need factors (9).

Knowledge was the strongest predictor of TB health service utilization. Adequate knowledge of TB symptoms, transmission, diagnosis, and treatment enables individuals to seek timely care and adhere to treatment. This finding aligns with the concept of health literacy and previous studies showing that inadequate TB knowledge contributes to delayed healthcare seeking, delayed diagnosis, and poor treatment adherence (10). Similar evidence from high-burden countries and Indonesia demonstrates that better TB knowledge and continuous health education improve healthcare-seeking behaviour, treatment adherence, and outcomes (11–14).

Although knowledge remained significant in the multivariable analysis, respondents with poorer knowledge appeared more likely to utilize TB services. Because all participants had already been diagnosed and were receiving treatment, they may have acquired TB-related knowledge during counselling, reflecting reverse temporality, a common limitation of cross-sectional studies.

Attitude and family support were significant only in the bivariate analysis, suggesting that their effects may depend on adequate knowledge and healthcare accessibility, as proposed by Andersen's Behavioral Model (9). Positive attitudes encourage healthcare seeking, whereas stigma and misconceptions discourage service

utilization (10,12). Likewise, family support improves treatment adherence, motivation, and continuity of care, although its influence may be indirect rather than independent (15,16).

Trust was not independently associated with TB service utilization, indicating that confidence in healthcare services alone is insufficient when structural barriers persist. Financial constraints, stigma, and self-medication remain important obstacles despite awareness of available TB services (13,17).

Accessibility to health facilities remained an independent determinant of TB health service utilization. Geographic distance, transportation costs, travel time, and financial barriers continue to delay diagnosis and treatment, consistent with Andersen's Behavioral Model (9). Previous studies and systematic reviews similarly identified transportation costs, fragmented services, weak health system capacity, and catastrophic health expenditure as major barriers to TB care worldwide (5,18–20). These findings emphasize the need to strengthen primary healthcare, decentralize TB services, reduce transportation costs, and expand social protection to improve equitable access.

Overall, these findings support the WHO End TB Strategy, which prioritizes patient-centred care, universal health coverage, equitable access, and social protection (19). Improving TB health service utilization therefore requires integrated interventions combining community health education, improved healthcare accessibility, reduced financial barriers, stronger primary healthcare, and active case finding.

This study has several limitations. Self-reported questionnaire data may be affected by recall and social desirability bias, while the cross-sectional design limits causal inference. Future longitudinal studies integrating self-reported data with medical records or routine TB programme data are needed to strengthen the validity and generalizability of these findings.

5. Conclusion

This study demonstrates that knowledge and accessibility to health facilities are the two key determinants of tuberculosis health service utilization in Takalar Regency. Although attitude and family support were associated with TB service utilization in the bivariate analysis, these factors did not remain significant after adjustment for potential confounders. The findings highlight that improving TB service utilization requires not only strengthening community knowledge through continuous health education but also reducing geographical and financial barriers to accessing healthcare. Interventions that integrate patient education with equitable access to quality TB services, strengthened primary healthcare, and community-based approaches may contribute to earlier diagnosis, improved treatment uptake, and support Indonesia's progress toward achieving the WHO End TB Strategy.

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REFERENCES

1. WHO. Global Tuberculosis Report 2024 [Internet]. 2024. Available from: <https://www.who.int/teams/global-programme-on-tuberculosis-and-lung-health/tb-reports/global-tuberculosis-report-2024>
2. Ministry of Health of the Republic of Indonesia. Indonesia Health Profile 2023. Jakarta, Indonesia; 2024.
3. Takalar District Health Office. Data on the Number of Tuberculosis Cases by Health Facility in Takalar Regency. 2025.
4. Andersen RM. Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? *J Health Soc Behav.* 1995 Mar;36(1):1. DOI: 10.2307/2137284
5. Teibo TKA, Andrade RL de P, Rosa RJ, et al. Barriers That Interfere with Access to Tuberculosis Diagnosis and Treatment across Countries Globally: A Systematic Review. *ACS Infect Dis.* 2024;10(8):2600–14. DOI: 10.1021/acsinfecdis.4c00466
6. Heuvelings CC, Greve PF, Vries SG de, et al. Effectiveness of service models and organisational structures supporting tuberculosis identification and management in hard-to-reach populations in countries of low and medium tuberculosis incidence: a systematic review. *BMJ Open.* 2018;8. DOI: 10.1136/bmjopen-2017-019642
7. Zwama G, Diaconu K, Voce AS, et al. Health system influences on the implementation of tuberculosis infection prevention and control at health facilities in low-income and middle-income countries: a scoping review. *BMJ Glob Heal.* 2021;6. DOI: 10.1136/bmjgh-2020-004735
8. Aniza I, Fitra N, Zubir MZ, et al. Determinants of tuberculosis health service utilization in primary