

ASSOCIATION OF KNOWLEDGE AND PREVENTIVE BEHAVIOR WITH PULMONARY TUBERCULOSIS: A CASE-CONTROL STUDY AT SASI COMMUNITY HEALTH CENTER

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ABSTRACT

Pulmonary tuberculosis (TB) poses a significant public health challenge in Indonesia. This study aimed to analyze the relationship between knowledge and preventive behaviors and the incidence of pulmonary TB in the working area of the Sasi Community Health Center (Puskesmas). Employing a case-control design with 106 respondents (53 cases and 53 controls), data were collected via structured questionnaires and analyzed using the Chi-Square test. The results showed that all respondents (100%) possessed a good level of knowledge. However, a significant difference was observed regarding behavior: 17% of respondents in the case group exhibited poor preventive behaviors, compared to 0% in the control group. Bivariate analysis revealed no association between knowledge and pulmonary TB incidence ($p = 0.106$), whereas a significant association was found between preventive behaviors and pulmonary TB incidence ($p = 0.003$). Good knowledge does not always correlate directly with appropriate preventive behavior. Future health interventions should focus more on practical behavioral changes rather than merely improving health literacy.

Keywords : Knowledge, Preventive Behavior, Primary Health Care, Pulmonary Tuberculosis

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. To date, TB remains a priority health problem both globally and nationally. According to the 2023 Global TB Report, Indonesia has the second-highest TB caseload in the world after India. Recent data shows that the challenge of TB elimination in Indonesia remains significant, particularly with high rates of primary and post-primary TB, which require more comprehensive intervention strategies at the primary healthcare level (Pangaribuan, 2026). At the local level, North Central Timor (TTU) Regency recorded a significant increase in cases, with the Sasi Community Health Center (Puskesmas) having the third-highest number of cases, with 53 cases as of August 2025. Preventing pulmonary TB transmission depends heavily on individuals adopting clean and healthy living behaviors (PHBS) and proper cough etiquette. Theoretically, human behavior is influenced by predisposing factors, one of which is knowledge. However, several recent studies have shown a disconnect between what patients know and what they practice in their daily lives (Sinaga, 2021). Non-compliance with mask use, the habit of spitting up phlegm carelessly, and lack of adequate home ventilation are risk factors that accelerate bacterial transmission within families and communities (Sani et al., 2025). In addition to behavioral factors, physical environmental conditions, such as insufficient sunlight exposure and substandard indoor humidity, have been shown to be strong predictors, significantly increasing the risk of TB transmission in high-prevalence areas (Fahdhienie et al., 2024). This study focuses on behavioral prevention variables as the primary determinant of pulmonary TB incidence. By understanding the extent to which behavior contributes to patient health status, it is hoped that primary healthcare facilities can design more humane and applicable educational strategies to reduce the incidence of pulmonary TB.

METHODS

This is an observational analytical study using a case-control approach conducted in the Sasi Community Health Center (Puskesmas) working area from February to March 2026. The study population included all visitors to the community health center, both those diagnosed with pulmonary TB (case group) and those not diagnosed with TB (control group). The sample was drawn using a total sampling technique, with 53 respondents for the case group and the same number for the control group (a 1:1 ratio), resulting in a total sample size of 106 respondents. The research instrument was a validated questionnaire covering the dimensions of knowledge (14 items) and preventive behavior (8 items). Preventive behavior was measured through mask use, cough etiquette, phlegm disposal, and home ventilation management. Data were analyzed bivariate using the Chi-Square Test (Fisher's Exact Test) to examine the relationship between variables with a significance level of $p < 0.05$.

RESULTS

A. Respondent Characteristics

This study involved 106 respondents divided into two groups: 53 respondents in the case group (patients diagnosed with pulmonary TB) and 53 respondents in the control group (people without pulmonary TB). The respondents' backgrounds were mapped based on three main characteristics: age, gender, and occupation, which are presented in detail in Tabel 1.

Respondent Characteristics	Case (f)	Case (%)	Control (f)	Control (%)	Total (f)	Total (%)
Age						
≤ 25	3	5,7	0	0,0	3	2,8
28	4	7,5	17	32,1	21	19,8
30	5	9,4	2	3,8	7	6,6
33	8	15,1	4	7,5	12	11,3
35	13	24,5	12	22,6	25	23,6
58	6	11,3	8	15,1	14	13,2
60	8	15,1	3	5,7	11	10,4
65	4	7,5	7	13,2	11	10,4
70	2	3,8	0	0,0	2	1,9
Gender						
Man	29	54,7	31	58,5	60	56,6
Woman	24	45,3	22	41,5	46	43,4
Work						
ASN	3	5,7	7	13,2	10	9,4
Petani	22	41,5	9	17,0	31	29,2
Swasta	19	24,5	13	35,8	32	30,2
Ibu Rumah Tangga	18	28,3	15	34,0	33	31,1
Total	53	100,0	53	100,0	106	100,0

The majority of respondents in this study were in the productive and adult age group, with 25 respondents (23.6%) aged 35. Per group, the largest proportion of TB cases (13 TB patients) were aged 35. Meanwhile, in the healthy control group, the largest number of respondents was 17 respondents (32.1%) aged 28.

The gender distribution in this study showed a nearly identical trend. Of the 106 respondents, the majority were male (60 respondents, 56.6%), while 46 were female (43.4%). In the case group, pulmonary TB patients were predominantly male (54.7%), while in the control group, the proportion was 58.5% (31 respondents).

The occupational profiles showed quite contrasting variations. Of the total respondents, the housewife group (IRT) had the largest cumulative number, at 33 people (31.1%), followed by private sector workers at 32 people (30.2%), and farmers at 31 people (29.2%). However, specifically in the case group (TB sufferers), the majority of respondents worked as farmers, at 22 people (41.5%). In contrast, in the healthy control group, the majority worked in the private sector, at 19 people (35.8%).

B. Analysis of Knowledge and Behavior Variables

The frequency distribution results show an interesting picture of the knowledge and behavior variables (Table 2).

Table 2. Distribution of Respondents' Knowledge and Behavior

Variabel	Category	Control (n=53)	Case (n 53)	<i>p-value</i>
Knowledge	Good	53 (100%)	53 (100%)	0,106
	Not enough	0 (0%)	0 (0%)	
Behavior	Good	53 (100%)	44 (83%)	0,003
	Not enough	0 (0%)	9 (17%)	

The data above shows that all respondents (100%) had good knowledge about pulmonary TB. This is likely due to the intensive outreach and education programs conducted by health workers at the Sasi Community Health Center. However, this perfect level of knowledge does not guarantee perfect behavior. In the case group, 17% of respondents still engaged in poor preventive behaviors, such as inconsistent mask use or inappropriate sputum disposal.

C. Analysis of the Relationship between Knowledge and Behavior Factors (Bivariate Analysis)

The Chi-Square statistic (using Fisher's Exact Test) was performed at a 95% confidence level ($\alpha = 0.05$) to prove the hypothesis of a relationship between variables.

Table 3. Results of the Analysis of the Relationship between Knowledge and Behavior with the Incidence of Pulmonary TB

Variabel	Control (f/%)	Case (f/%)	Total (f/%)	<i>p-value</i>	Keterangan
Good Knowledge	53(100%)	53 (100%)	106 (100%)	0,106	Not significant
Good Behavior	53 (100%)	44 (100%)	97 (91,5%)	0,003	Significant
Poor Behavior	0 (0%)	9 (17%)	9 (8,5%)		

Statistical tests revealed a significant association between preventive behavior and the incidence of pulmonary TB ($p = 0.003$). Respondents with poor preventive behavior had a higher risk of becoming infected or transmitting the disease to others. This finding is supported by research by Rohmat & Rustandi (2025) which states that poor behavior in using masks and coughing etiquette is the main contributor to the increase in cases in the community health center area.

Interestingly, knowledge did not show a significant association with TB incidence ($p = 0.106$) due to a constant data distribution (all respondents had good knowledge). This phenomenon is often referred to as the "Knowledge, Attitude, and Practice Gap" (KAP Gap),

where individuals are aware of health risks but fail to implement preventive measures due to various factors such as convenience, social stigma, or environmental barriers (Juliasih et al., 2024). A recent study in Surabaya also confirmed that medication adherence and supportive behaviors significantly influence patient health outcomes more than mere knowledge scores (Nasution, 2022).

DISCUSSION

A. Analysis of Respondents' Sociodemographic Characteristics and Pulmonary TB Risk

The study results showed that certain patterns in respondent characteristics were closely related to the risk of transmission. The case group was dominated by those aged 35 years and older (24.5%). These individuals have high social mobility, leading to a higher frequency of contact with droplet nuclei outside the home. This is consistent with Nasution's (2022) study, which linked productive age to high exposure due to communal social interactions.

In terms of gender, pulmonary TB sufferers are predominantly male (54.7%). This condition is influenced by lifestyle factors such as smoking habits that can reduce the function of alveolar macrophages and respiratory tract cilia, facilitating bacterial colonization. This finding is supported by Sani et al. (2025) who stated that men are susceptible to TB due to the accumulation of smoking habits and the work environment. In addition, the type of occupation of the case group is dominated by farmers (41.5%). Heavy physical activity that occurs outdoors and group interactions while farming trigger physical fatigue that lowers the body's immunity, while accelerating transmission if there is close contact with other sufferers, according to the premise of Rohmat & Rustandi (2025).

B. Good Knowledge Is Not Enough to Prevent Pulmonary TB

This study shows that although statistical test results indicate no correlation between knowledge and the incidence of pulmonary TB ($p = 0.106$), the achievement of 100% good knowledge in Table 2 reflects the success of the health promotion and IEC (Communication, Information, and Education) education program implemented by the Sasi Community Health Center. This indicates that equitable distribution of health literacy in the Sasi Community Health Center area has been very successful, although it does not fully guarantee medical protection. Referring to the cognitive concept of Swarjana (2022), respondents have reached the comprehension stage (understanding) how germs are transmitted through the air. However, knowledge that remains in the brain often does not translate into concrete actions for self-protection. The equality in the level of insight between healthy and sick people proves that good health literacy is independent and does not guarantee absolute medical protection. The results of this study are consistent with Afrilya's (2024) study at the Pakis Aji Community Health Center, which stated that high knowledge does not correlate linearly with a reduced clinical risk of TB transmission.

This research finding is quite unique when compared to a study at the Pijorkoling Community Health Center, which showed that respondents with less knowledge were 2.75 times more likely to experience pulmonary TB (Nasution et al., 2022). While increasing public knowledge is certainly positive, it must be accompanied by strengthening attitudes to transform them into consistent preventive behaviors in daily life (Satriani et al., 2025; Tampubolon & Wulandari, 2025).

C. Real Daily Behavior: The Key to Breaking the Chain of TB Transmission

In significant contrast to cognitive aspects, preventive behavior was shown to be a real determinant of pulmonary TB incidence ($p = 0.003$). The emergence of a 17% behavioral gap in the case group in Table 2 represents the "Knowledge, Attitude, and Practice Gap" (KAP

Gap) phenomenon. Respondents knew the theory but failed to apply it in physical actions due to comfort or neglect. Preventive behavior carried out by respondents was strongly influenced by family support as a dominant factor providing psychosocial motivation to comply with health protocols (Hamsi et al., 2026). In addition to internal support, intensive exposure to health information media has also been shown to have a significant relationship in encouraging people to implement TB prevention behavior independently (Sari et al., 2024). This condition confirms that in some cases, actual behavior in the field is far more determinant of health status than merely theoretical knowledge scores, given the frequent imbalance between family understanding and preventive practices (Isnaeni & Sudrajat, 2025).

D. Real Daily Behavior: The Key to Breaking the Chain of TB Transmission

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Based on the situation analysis, the nine respondents in the case study who behaved poorly were proven to be inconsistent in wearing masks, ignoring coughing/sneezing etiquette, and still blowing sputum carelessly around their homes. Epidemiologically, this behavioral negligence directly releases infectious particles into the air and threatens the close contact population. In contrast, the control group managed to avoid the virus because they consistently implemented 100% of preventive measures. This finding is supported by Lawrence Green's theory in Notoatmodjo (2021) as well as studies by Rohmat & Rustandi (2025) and Juliasih et al. (2024) in Surabaya, which confirm that adherence to daily clinical practices has a far more significant impact on public health status than mere knowledge scores on paper.

CONCLUSION

This study concluded that preventive behavior is a significant determinant of pulmonary TB incidence in the Sasi Community Health Center (Puskesmas Sasi) work area. While good knowledge is insufficient to prevent transmission without consistent practice, public health interventions must shift from simply providing information to a more personalized, community-based approach to behavior change. It is recommended that health workers conduct direct support (home visits) to ensure that preventive practices are being implemented properly in patients' homes.

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