Original Research

KNOWLEDGE, PERCEPTION, AND STIGMA IN THE JAKARTA COMMUNITY TOWARD TUBERCULOSIS PREVENTION

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ABSTRACT

Introduction: The Corona Virus Infectious Disease (COVID)-19 pandemic has impacted tuberculosis (TB) diagnosis and treatment in Indonesia, making Indonesia rank second in the world's tuberculosis cases. Tuberculosis epidemiology worsened during the pandemic; an estimated 10.6 million people fell ill with tuberculosis worldwide in 2021, an increase of 4.5% from the previous year (Falzon et al., 2023). **Aims:** The purpose of this study was to determine the relationship between knowledge, perception, and stigma toward tuberculosis prevention in the community in Jakarta. **Methods:** Respondents in this study were selected using simple random sampling with the criteria at least 17 years of age and currently not diagnosed as a TB patient. Those who were diagnosed with active TB and were on treatment were excluded from the study. Using a cross-sectional design, this study was analyzed with logistic regression. **Results:** Two factors were found to be associated with the level of tuberculosis prevention behavior. Respondents with better knowledge about tuberculosis were 5.13 times more likely to make good prevention in tuberculosis (OR=5.129; 95% CI=2.341-11.238; p-value <0.001). In addition, having a positive perception of tuberculosis prevention was also associated with better tuberculosis prevention practices (OR=3.301; 95% CI=1.402-7.772; p-value=0.006). **Conclusion:** Knowledge and perceptions can also eventually lead to stigma, which results in delayed diagnosis, increases the source of transmission, and hinders efforts to reduce its prevalence. A possible recommendation is to educate the community about TB transmission, treatment, and prevention to dispel myths and negative perceptions.

Keywords: Tuberculosis, Knowledge, Perception, Stigma, Prevention

INTRODUCTION

In 2021, Indonesia ranked in second place with the highest number of tuberculosis sufferers in the world after India (Ministry of Health Republic of Indonesia, 2022b). This number has increased as in 2020 Indonesia was in third place in tuberculosis cases worldwide (Foundation, 2022). According to the World Health Organization (WHO), there were 10 million cases of tuberculosis (TB) worldwide in 2020. This number is slightly higher than the number of cases retrieved in 2019, namely 9.9 million. In terms of TB deaths, there were an estimated 1.5 million TB deaths worldwide in 2020, slightly lower than the number of deaths reported in 2019, which was 1.6 million. The COVID-19 pandemic has also impacted TB diagnosis and treatment in many countries, with some experiencing barriers to TB services.

Progress made in the years before the 2019 pandemic has decelerated, been derailed, or reverted, resulting in global TB targets not being met. The most notable and immediate impact is the declining number of people being reported and

diagnosed with TB (World Health Organization, 2022). The 2021 Health Profile shows that no province achieved a treatment coverage rate of ≥85% in 2021. In the Notification of All Tuberculosis Cases Per 100,000 Population by Province in 2021, DKI Jakarta was in first place in terms of most cases discovered. Although the WHO and its partners have worked to reduce barriers and ensure that TB sufferers continue to receive essential care and treatment, economic constraints can also influence well-being administrations for TB determination and completion of TB treatment (Ministry of Health Republic of Indonesia, 2022a). The diminishment within the number of individuals analyzed with TB in 2020 and 2021 shows that the number of individuals with TB who are undiscovered and untreated is expanding, increasing the number of TB deaths and greater transmission in the community (World Health Organization, 2022).

Based on research by Amalia et al. (2021), there is a relationship between age, knowledge, attitudes, access to information, housing conditions, availability of resources, family support, and health support on tuberculosis prevention behavior. Research conducted by Yulianti et al. (2022) found that urgent problems include stigma related to pulmonary TB and poor health behavior. In this study, it was also found that the majority of respondents still had poor behavior in preventing and controlling pulmonary TB, which was influenced by the availability of information received by the community (Yulianti et al., 2022).

Behaviors to prevent and control pulmonary TB disease that are considered good are when respondents know about pulmonary TB disease, and carry out preventative and control behaviors, for example, clean and healthy living behavior (PHBS), eating nutritious food, not smoking, cough etiquette behavior and how to get rid of phlegm correctly, as well as compliance with taking medication

(Asfiya et al., 2021). A previous survey found that parents who had children and also cared for tuberculosis sufferers in the same house did not know about the recommended time to wear masks (Rahmawati et al., 2024). Availability of information is one factor that can influence decision-making regarding the use of health services. However, the information obtained must be accurate and easy to access. If there is misinformation, it will give rise to wrong perceptions, thereby reducing compliance with the level of prevention and control of pulmonary TB (Nusawakan et al., 2019).

Based on the results of the study above, a problem was formulated, to carry out further studies regarding the relationship between knowledge, perception, and stigma toward tuberculosis prevention in the community in Jakarta. Therefore, this research aims to identify tuberculosis prevention in the community in Jakarta and the factors that influence it.

METHODS

This study employs a quantitative approach with a cross-sectional design to evaluate the relationship between knowledge, perception, and stigma toward tuberculosis prevention in the community of Kramat Jati sub-district in Jakarta. The population in this study was calculated based on the average number of visits during the last three months at the Kramat Jati District Health Center, East Jakarta, which was 363 patients. Using the Slovin formula, the sample obtained was 190 patients who were then randomly selected using the registration sequence number (odd number). The criteria for respondents included being at least 17 years old, not being a patient, and without seeing whether the respondent had a history of living in the same house with a tuberculosis patient. In this study, there was one respondent who did not complete the research instrument so that the final sample amounted to 189 patients. Key

variables of interest in this research include the independent variables of knowledge about TB, the community's perceptions and stigma towards the disease, and the dependent variable, which is the actual preventive behavior against tuberculosis. A multi-faceted questionnaire was developed as the data collection instrument, which captured a wide range of data.

The questionnaire used as an instrument is divided into five types. The first questionnaire contains the characteristics of respondents including age, gender, education level, and employment status which are asked directly by the researcher to the respondent. The second questionnaire is knowledge related to tuberculosis made by the researcher and tested for validity as well as reliability. The knowledge questionnaire totals 12 statements regarding pulmonary TB and its prevention. Positive statements amounted to five items (2, 5, 6, 9, 12) and negative statements amounted to seven items (1, 3, 4, 7, 8, 10, 11) with the choice of correct and incorrect answers, like a checklist with correct score as 1 and incorrect as 0. Then the results will be categorized into two levels, namely high knowledge level (7-14) and low knowledge level (0-6).

The third questionnaire was a questionnaire of individual perceptions of pulmonary TB which totaled 15 statements. Negative statements totaled seven points, including statement numbers 1-4-6-7-11-12-14 and positive statements totaled eight points, including numbers 2 3-5-8-9-10-13-15. This measurement scale uses a Likert scale in which the assessment or score on positive and negative statements is different. The assessment for positive statements is: "strongly agree" = 4, 'agree' = 3, 'disagree' = 2, 'strongly disagree' = 1. As for the assessment of negative statements, these are: "strongly disagree" = 4, 'disagree' = 3, 'agree' = 2, 'strongly agree' = 1. The results will be interpreted as positive perceptions if the respondent gets 25-40 correct answers

and negative perceptions if the respondent gets 10-24 correct answers.

The fourth questionnaire contains questions about the stigma variable that has been tested and used by the Stop TB Partnership - United Nations Office for Project Services (UNOPS) which totals 11 questions. The questionnaire consists of seven positive statements (1, 2, 4, 5, 7, 9, 10) and four negative statements (3, 6, 8, 11). The scale for measuring community stigma is using a *Likert* scale, which is used to measure a person's attitudes, opinions, perceptions about symptoms or problems that exist in society or are experienced. The value of this questionnaire on positive statements is strongly agree: 5, agree: 4, undecided: 3, disagree: 2, and strongly disagree: 1. While the score of the negative statement is strongly disagree: 5, disagree: 4, undecided: 3, agree: 2, and strongly agree: 1. The measurement result of this instrument is weak stigma if the score is 33-55 and strong stigma if the score is 11-32. The more scores obtained, the weaker the stigma in the respondent toward tuberculosis. Meanwhile, if the score obtained by the respondent is only a low score, it means that the respondent has a stigma toward tuberculosis. The score range is a minimum score of 11 and a maximum score of 55.

The fifth questionnaire was a questionnaire consisting of TB prevention efforts/behaviors of 18 questions with a Likert scale. This section contained 16 statements regarding efforts to prevent pulmonary TB by the community. Positive statements were nine items (1, 3, 6, 7, 8, 9, 10, 11, 12) and negative questions were items namely (2, 4, 5, 13, 14, 15, 16). The measurement scale uses a Likert scale where the assessment of positive questions is always: 5, often: 4, sometimes: 3, rarely: 2, never: 1. While the assessment of negative questions is worth never: 5, rarely: 4, sometimes: 3, often: 2, always: 1. The highest score and the lowest score are 80-16. The categories in this instrument

are good with a score of 48-80 and poor 16-47.

Regarding data analysis, the study used multivariate logistic regression to identify the relationships between characteristics, knowledge, stigma, perceptions, and prevention behavior concerning TB. Bivariate tests, including chi-square and Fisher's exact test, were employed to filter variables for the regression analysis. Upholding ethical considerations, the research received approval from the Binawan University Research Ethics Committee, indicated by the ethical clearance number EC.244/KEPK/STKBS/VIII/2023.

RESULT

A total of 189 respondents completed the questionnaires. In this study, age was grouped into three groups, namely 10-19 years, 20-59 years, and 60-65 years which the largest proportion of respondents were aged 20 to 59 years (88.9%). In the gender characteristic, slightly over half of respondents were male (55.6%). The respondents studied were divided into several levels of education, most of whom had completed high school education (60.8%). Whereas, the employment rates of the respondents were nearly similar, 49.2% of them were employed, while the rest, 50.2%, were unemployed (Table 1). The variables studied including knowledge, perception level, stigma, and prevention about tuberculosis are presented in different tables.

Knowledge about Tuberculosis

The knowledge level of people in the community is mostly at a high level (Table 2). Of 189 people in the community, 157 (83%) correctly answered the question about the cause of TB by saying that the cause is bacteria, 135 (71.4%) saying that TB could be prevented by covering the mouth when sneezing and coughing, performing BCG immunization on children under 5 years (130; 68.7%), as well as providing a balanced diet of rice, side dishes, vegetables, and fruit (137;72.4%) in daily consumption. However, there were several respondents who answered incorrectly on several statements, including TB is a hereditary disease from parents (123; 65.07%) and family members who do not live in the same household as a person with TB are at greater risk of developing or contracting TB disease (115; 60.8%).

Table 1. Participant Characteristics (n =189)

Characteristics	n	%
Age groups (years)		
10-19	10	5.3%
20-59	168	88.9%
60-65	11	5.8%
Gender		
Female	84	44.4%
Male	105	55.6%
Latest education		
Elementary School	9	4.8%
Junior High School	36	19.0%
Senior High School	115	60.8%
College/University	29	15.3%
Employment		
Employed	93	49.2%

Characteristics	n	%
Unemployed	96	50.8%

Table 2. Knowledge Level about Tuberculosis in Community

Knowledge level	n	%
Low	67	35.4%
High	122	64.6%

Perception about Tuberculosis

From Table 3, it can be said that the majority level of perception on TB is at a positive level (78.8%). Across the respondents studied, some of them still have misperceptions about TB, among others agreeing that TB patients must take medication for a lifetime (64; 33.8%) and tend to be lazy to check themselves if they have symptoms of TB (62; 32.8%). Correct perception of TB is reflected by agreeing that TB bacteria will die when exposed to sunlight (76; 40.2%); TB patients should wear a mask when talking to others (69; 36.5%), disagree that children of TB patients must have been infected with TB disease (72; 38.09%); and transmission of TB is contracted by skin contact and blood from TB patients (77; 40.7%).

Table 3. Perception Level about Tuberculosis in Community

Perception	n	%
Negative	40	21.2%
Positive	149	78.8%

Stigma about Tuberculosis

Satisfactory results were also obtained on the stigma variable, where the level of stigma in the community related to TB was at a weak level (Table 4). Of eleven statements related to stigma, stigma regarding tuberculosis is still less found in the community, of which respondents answered strongly disagree that they don't want to eat or drink with friends who have tuberculosis (74; 39%);feel uncomfortable around people with tuberculosis (62; 32.8%); if a person is known to have tuberculosis, the surrounding community will behave differently for the rest of the person's life (64; 33.8%); keeping their distance from people with tuberculosis, and also scared of people with tuberculosis (54; 28.5%). While there was a stigma on the respondents, there were some respondents who could not determine whether they agreed or disagreed with some of the statements. Some of these respondents answered neutral in several statements such as don't want people with tuberculosis to play with their child (55; 29%); think that people with tuberculosis are gross (52; 27.5%); don't want to talk to people with tuberculosis (47;24.8%); and try not to touch people with tuberculosis (48;25.3%).

Table 4. Stigma Level about Tuberculosis in Community

Stigma level	n	%
Strong	59	31.2%
Weak	130	68.8%

Prevention Level

The level of preventive showed most respondents reported a good level of TB preventive behaviors (148; 78.3%) (Table 5). Most of the respondents have made good prevention efforts, with answers

cover the mouth when sneezing and coughing (140; 74.07%); use a mask when talking to people with tuberculosis (104; 55%); keep the house clean every day, such as sweeping and mopping the living room, bedroom, kitchen, and other rooms (118; 62.4%); serve healthy and nutritionally balanced meals every day (99; 52.3%)l and wash the hands before and after activities (107; 56.6%). In contrast to preventive efforts that have been done well, some respondents still always disposed of sputum in any place (99; 52.3%); had a daily smoking habit

(113; 59.7%), used the same cutlery as the person with tuberculosis (117; 62%); never attended any educational sessions on tuberculosis by health workers at the health center (72; 38%); and 115 of respondents socially excluded people with tuberculosis to avoid contracting the disease. Some respondents also did not know the appropriate prevention of tuberculosis, proven by only 39 (20.6%) of them always doing regular check-ups and as many as 44 (23.2%) respondents bought medicine at the medicine stall.

Table 5. Prevention Level about Tuberculosis in Community

TB-related characteristics	n	%
Good	148	78.3%
Poor	41	21.7%

Factors Associated with Tuberculosis Preventive Level

A multivariable logistic regression was performed to determine the associations of sociodemographic factors and knowledge, stigma, and perception regarding TB with the TB preventive behaviors. Bivariate tests were conducted to select variables to be included in the logistic regression analysis. Finally, two factors were found to be associated with TB preventive behavior level. Respondents

with a higher level of knowledge regarding TB were 5.13 more likely to have good behaviors for TB prevention (OR=5.129; 95% CI=2.341-11.238; p value = <0.001). Moreover, increasing positive perception on TB prevention was also associated with increased likelihood of having good TB preventive behaviors (OR=3.301; 95% CI=1.402-7.772, p value=0.006). The summary of bivariate and multivariate analyses is presented in Table 6.

Table 6. Factors Associated with Tuberculosis Preventive Level

Variables	Preventive level					Multivariate analysis #	
	Good		Poor		p value	Odds Ratio (95% CI)	p value
	n	%	n	%			
Constant						1.017	
Demographic characteristics							
Age (years)							
10 – 19 (ref)	9	6.1%	1	2.4%	0.104[a]	NE	
20 – 59	133	89.9%	35	85.4%			
60 – 65	6	4.1%	5	12.2%			
Gender							
Male (ref)	64	43.2%	20	48.8%	0.595[b]	NE	
Female	84	56.8%	21	51.2%			

Variables	Preventive level					Multivariate analysis #	
	Good		Poor		*p* value	Odds Ratio (95% CI)	*p* value
	n	%	n	%			
Education attainment							
Elementary school	4	2.7%	5	12.2%	0.022[a]	0.211 (0.030-1.477)	0.117
Junior high school	25	16.9%	11	26.8%		0.385 (0.096-1.542)	0.178
Senior high school	94	63.5%	21	51.2%		0.762 (0.215-2.697)	0.674
College/University (ref)	25	16.9%	4	9.8%		1	
Employment							
Employed (ref)	68	45.9%	25	61.0%	0.112[b]	NE	
Unemployed	80	54.1%	16	39.0%			
TB-related characteristics							
Knowledge level							
Low (ref)	39	26.4%	28	68.3%	<0.001[a]		
High	109	73.6%	13	31.7%		5.129 (2.341-11.238)	<0.001*
Stigma level							
Strong (ref)	52	35.1%	7	17.1%	0.035[b]	NE	
Weak	96	64.9%	34	82.9%			
Perception							
Negative (ref)	23	15.5%	17	41.5%	<0.001[b]		
Positive	125	84.5%	24	58.5%		3.301 (1.402-7.772)	0.006*

[a] Chi-square test; [b] Fisher's exact test
CI: confidence interval; ref: reference category of categorical variable.
NE: not entered into the logistic regression analysis; *: significant at $\alpha < 0.05$

DISCUSSION

Most respondents in this study had good knowledge (64.6%). In the characteristics of the education, the respondents were at the highest level of education, namely senior high school. The results of multivariate analysis showed that the presence of good knowledge would increase by five times in preventing tuberculosis transmission. Education is a process that a person or group undergoes in changing attitudes or behavior, through teaching that aim to mature humans and the quality of a person in interpretation and application according to the five senses will be higher if the education is higher (Siregar & Tampubolon, 2018). The benefits of a high level of education are the ability to absorb the information provided and knowledge to lead a healthy life and handling health problems more easily (Hasudungan, 2020). Research by Mahmud et al. (2022) found a relationship between demographic status, among which are education level with knowledge (p-value 0.001) and TB prevention actions (p-value 0.001) regarding pulmonary tuberculosis.

Research carried out by Rahmawati et al. (2024) also suggests that the lack of family knowledge about TB transmission prevention behavior affects family members ability to maintain personal

hygiene, exposing children and toddlers to disease. According to Nasution et al. (2023), in order to care for family members with pneumonia tuberculosis, families must expand their knowledge of the disease and develop their intellect about it. The foremost vital obstacle for the family is giving openings for getting pneumonia tuberculosis, propelling sufferers to recoup from their tribulation requires a basic deal of thought from the family.

Research conducted by Cumayunaro and Hidayati (2020) found that the majority of respondents have good knowledge of TB, due to the large amount of exposure to information from health workers, the government, as well as print or electronic media that has been socialized by the government. Luba et al. (2019) also suggested that better knowledge and attitudes toward TB can be obtained from information sourced from mass media since the mass media campaign usually plays a major part to play in upgrading the regular detached case-finding technique by reaching an expansive number of the populace at once and giving data on the most punctual indications, causes, transmission, avoidance and treatment (Gelaye et al., 2020).

Education level affects students' knowledge, attitudes, and behavior toward TB prevention and treatment. Study found that postgraduate students had better knowledge, attitudes, and preventive behavior than undergraduate students (Puspitasari et al., 2022). This was moreover the case in a study in Bangladesh, which detailed that those with lower levels of instruction tended to have less satisfactory information around TB (Hossain et al., 2015).

A review showed that knowledge also influences people to receive inadequate health services regardless of gender, area of residence (urban or rural), or country (Craciun et al., 2023). In addition, low socioeconomic and educational levels are associated with poor knowledge of TB. An investigation in South Africa and Nigeria found a link between better knowledge about TB and higher levels of education and income (Badane et al., 2018). For patients with TB relapse, household income decreases significantly before the first episode compared to patients without TB relapse, and this trend of income reduction continues after TB relapse. As a result, TB patients who have a low household income during their first episode are at a greater risk of recurrence (Chung et al., 2024). Highly educated people have better health resulting in lower rates of morbidity, mortality and disability. In contrast, people with low levels of education have poorer health, shorter life expectancies, and shorter survival rates if they get sick (Raghupathi & Raghupathi, 2020). The likelihood of an adult with secondary education having a higher overall knowledge score about TB infection was significantly positive. Regardless of their place of residence, they had almost higher knowledge scores than those who had never attended school or only had informal education (Kazaura & Kamazima, 2021).

Lack of knowledge about tuberculosis can lead to stigma and hinder the community in preventing disease transmission. This is in line with research on knowledge of tuberculosis stigma in China which found that knowledge of pulmonary tuberculosis has a significant influence on the level of stigma where respondents in this study had a low level of knowledge and strong stigma toward tuberculosis (Yin et al., 2018).

Perception is the way a person interprets or understands messages that have been processed by the sensory system. There are two kinds of perceptions, namely, positive perceptions, perceptions that are in accordance with existing theories or rules, and negative perceptions, perceptions that are contrary to theory. Based on the results obtained in this study, people who have positive

perceptions are likely to have 3x better prevention in tuberculosis.

Research on perceptions in tuberculosis also informs counselors' actions where perceptions are consistent with the health belief model theory by combining constructs such as perceived disease susceptibility and severity, triggers related to non-beneficial treatments (perceived benefits), and triggers of low treatment benefits (perceived liabilities), we can identify barriers to treatment adherence and treatment success. Furthermore, self-efficacy involves identifying triggers that interfere with cues to act when undergoing treatment (Rosenstock et al., 1988). As part of achieving successful treatment, inspiration should be given as necessary in order to enable patients to overcome the triggers of treatment boundaries starting with the Wellbeing Conviction Show, so that correct contemplations and discernments about treatment can emerge (Parwati et al., 2021).

Another research found that respondents had a positive level of perceived self-examination because they were exposed to pulmonary TB events often enough to have more experience. This can have a good effect on TB disease control prevention in the area. With a high number of TB patients in the area, there is a perceived seriousness and perceived susceptibility in the community, resulting in a perceived threat. If someone already feels threatened about their health with actual risks, then health behavior will change for the better as evidenced by positive perceptions in respondents (Sandha & Sari, 2017).

Stigma is society's tendency to judge others. Stigma can be experienced as shame or guilt, or can be broadly expressed as discrimination. This can lead to decreased self-confidence, loss of motivation, withdrawal from social life, avoidance of work, interactions in health and loss of future planning (UNAIDS, 2023). The bivariate analysis conducted in this study found that most respondents who had strong stigma had good prevention against tuberculosis (35.1%) with a Fisher exact value of 0.035 (p>0.25) so that the bivariate test results did not qualify for multivariate testing. According to research, this study is valid in that the higher the stigma value, the higher the stigma felt by patients with pulmonary TB (Rizqiya, 2021). Related research conducted by Cremers et al. (2015) stated that people with tuberculosis are subject to stigma after disclosing that they have tuberculosis such as facing ridicule, derogatory comments, discrimination, social exclusion, and social isolation.

As a profound phenomenon that occurs in society, stigma is closely related to the value placed on different social identities. Stigmas can also be considered defects or blemishes found in a person and a negative characteristic attached due to the influence of the environment (Hariadi et al., 2022). Self-stigma is a negative perception held by individuals that they are socially unacceptable, which can lead to decreased self-esteem. The existence of self-stigma can have a negative impact on TB clients, one of which is the delay in diagnosis and treatment, increasing the risk of transmission (Loh et al., 2023).

People's views on the disease can significantly affect their level of engagement in preventive measures. In contrast, the presence of positive attitudes in this study included respondents' support for pulmonary tuberculosis prevention, their understanding of how the disease is transmitted, and an understanding of the risk factors that can lead to pulmonary tuberculosis.

In order to effectively control TB, stigmatization of TB patients requires special interventions that are informed by the community's knowledge, attitudes, and perceptions. Research by Junaid et al. (2021) regarding the stigma of tuberculosis explained that the perceived stigma related to TB was more prevalent when patients were in the intensive treatment stage. In

addition to stigmatizing attitudes toward s people with Lung TB, about one-fifth of respondents said they did not feel sorry for them, and that they should not eat or drink with others. According to the researcher's assumption, respondents who have a weak stigma toward TB will tend to be more active in involving themselves in pulmonary TB prevention. The existence of social support can encourage individuals to comply with existing social norms. In relation to strengthening social norms so that the community does not tend to give negative opinions to the patients, comprehensive efforts are needed to provide reinforcement that tuberculosis has an impact not only as a burden to patients and their families.

Many actions must be made to jointly reduce the prevalence of TB. Policy makers are expected to increase TB-related educational programs through health campaigns that involve mass media and social media to reach various levels of society. In addition, health workers can be provided with ongoing training to ensure they are able to provide appropriate information and promote positive perceptions of TB prevention in the community. Implementing community-based intervention programs such as support groups can also be established to help reduce stigma and improve community adherence to TB prevention and treatment. In spite of the results found, this study still has limitations such as the research is restricted to the relationship between variables, whereas the research can be improved to provide interventions to improve tuberculosis prevention in the community. Especially on the stigma variable studied, it has not been able to describe in detail because this research was conducted with a quantitative approach.

CONCLUSIONS

This study revealed that educational attainment emerged as a key demographic factor influencing tuberculosis (TB) prevention. Additionally, among the independent variables assessed, knowledge and perception were identified as significant determinants of TB prevention. Improving educational levels within the community appears critical, as it facilitates the assimilation of information, potentially enhancing TB prevention.

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