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Analysis of Tuberculosis Prevention Behavior: The Role of Knowledge and Attitude in Bantul

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ABSTRACT

Introduction: Tuberculosis is the leading cause of mortality and morbidity. When an infected individual coughs or sneezes without using a mask or personal protective equipment, transmission occurs, resulting in a rise in TB cases. This is significant because without sufficient measures by the diseased individual, the chance of disease transmission increases. This study aims to evaluate the link between knowledge, attitudes, and behaviour in avoiding TB transmission in the Bantul Health Service Work Area.
Methods: This is an analytical observational study using a cross-sectional research methodology. This research included 55 TB patients still being treated at the Health Center of the Bantul Health Service Work Area. This study used a comprehensive sample approach. Data was obtained via a questionnaire, and the results were analyzed using chi-square, logistic regression, and Rasch models.
Results: Knowledge (sig: 0.003; OR: 10.334) and attitudes (sig: 0.029; OR: 4.938) are associated with TB prevention behaviour in the Bantul Health Service Work Area. The most manageable behaviour to avoid transmission to those around them is taking medicine regularly and eating healthy food (logit: -2.10), while the most challenging activity is opening the home window (logit: 1.96).
Conclusion: Knowledge and attitude are risk factors for preventing TB transmission, thorough education about tuberculosis prevention is required through multiple health promotion media.

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INTRODUCTION

Tuberculosis (TBC) is the second most significant cause of mortality after COVID-19, killing an estimated 1.5 million people in 2020 (1). In 2022, the global TB case count is expected to reach 10.6 million, including 5.8 million men, 3.5 million women, and 1.3 million children. Of the 10.6 million instances, 6.4 million (60.3%) were reported and treated, whereas 4.2 million (39.7%) were not discovered, identified, or recorded (2). According to Ministry of Health statistics, Indonesia had the third highest number of TB cases in 2021, after only India and China. In 2021, Indonesia's predicted total number of TB cases was 969,000, equivalent to 354 cases per 100,000 people. It is estimated that TB caused 144,000 fatalities, which equates to 52 deaths per 100,000 people. Although the TB fatality rate did not rise much, cases increased between 2020 and 2021 (3).

TB cases in the Special Region of Yogyakarta fluctuate. The number of new TB cases discovered in 2019 was 604, which reduced to 429 in 2020 before increasing to 477 in 2021 (4). According to statistics from the Central Statistics Agency of the Special Region of Yogyakarta, Bantul is one of the five districts in the Special Region of Yogyakarta with a high proportion of tuberculosis patients (5). According to preliminary research at the Bantul Health Office, 1144 tuberculosis patients were discovered between January and November, equating to one TB patient per 1000 Bantul Regency citizens. Age, gender, area of residence, education, and geography can all contribute to an increase in tuberculosis (TB) cases. Other factors can contribute to a rise in TB cases, such as living in the same house as a TB patient, allowing transmission to occur. Health personnel diagnose pulmonary TB. According to these characteristics, TB can be produced by various circumstances, resulting in increased cases in a specific location (6). Someone has contact touch with a pulmonary TB patient who is consistently positive for acid-fast bacteria, the likelihood of transmission increases. This is due to repeated inhalation of air-carrying TB bacteria, which can allow numerous germs to enter the lungs, increasing the chance of developing pulmonary tuberculosis. The amount of risk can rise with the frequency of family contact with pulmonary TB patients since more exposure to pulmonary tuberculosis germs increases the chance of developing the disease. So, having a history of contact with pulmonary TB patients can increase risk by up to 9.3 times compared to individuals who have not had contact (7). Tuberculosis can spread when patients do not practice preventative behavior. Patients who do not follow normal preventative behavior, such as wearing masks, covering their mouths when coughing, or sneezing and spitting everywhere, contribute to the spread of tuberculosis infections in the community (8). TB is a disease that can be transmitted through the air, so if a person with TB coughs in a public place without wearing a mask or covering their mouth with their hands, the bacteria will come out and spread in the air, infecting anyone who inhales it. As a result, implementing TB transmission prevention behavior is critical for TB patients to limit the number of cases (9).

The efficacy of initiatives to combat and prevent the spread of pulmonary TB is determined by various variables, including information, attitudes, and behavior. This is because these factors play a vital role and significantly influence both individual and community health. The conduct of pulmonary TB patients, their families, and the community in preventing the spread of the disease influences how the germs that cause pulmonary tuberculosis spread. Tuberculosis patients can prevent transmission by covering their mouths when coughing and sneezing, spitting on infected areas, avoiding cold air, spending the day in bed, and eating carbohydrates and protein-rich foods (10).

One of the main issues found is the gap between the level of knowledge and the implementation of preventive measures. Several studies show that although individuals have good knowledge about TB, not all of them apply the recommended preventive behaviors, such as proper coughing etiquette or adherence to medication. For example, a qualitative study in Jakarta found that TB patients who experienced a relapse faced challenges in undergoing treatment, which could affect their adherence to therapy. This shows that knowledge alone is not enough to ensure effective preventive behavior (11).

In addition, external factors such as family support and the social environment also influence the relationship between knowledge, attitudes, and TB prevention behaviors. The same study in Jakarta highlights the importance of family support in the success of TB treatment. The lack of social support can hinder individuals from implementing appropriate preventive behaviors, even if they have knowledge and a positive attitude towards TB. Further research that considers contextual and social factors is needed to comprehensively understand the relationship between knowledge, attitudes, and TB prevention behaviors, as well as to develop more effective interventions in TB control (12).

According to research that has been conducted, knowledge, attitudes, and behavior are related to the prevention of pulmonary TB transmission, pulmonary TB transmission with a good category is more, namely 18 people (60%); most respondents have knowledge about pulmonary TB with a suitable category, namely 23 people (76.7%); respondents who have a positive attitude toward preventing pulmonary TB are more, namely 21 people (70%); respondents who have pulmonary (13). The study of Wanma et al., (2020) discovered a link between attitudes and behavior to avoid TB with a p-value of 0.000. However, this study found no association between knowledge and behavior to prevent tuberculosis, with a p-value of 0.214. According to the researchers, respondents with a degree of knowledge of less than 42 individuals (48%), sufficient 32 people (36%), and a good 14 people (16%). There are 65 people with unfavorable views (74%) and 23 with good attitudes (26%). There are 49 respondents with good behavior (56%), 25 with lousy behavior (28%), and 14 with good behavior (16%).

Based on the results of the preliminary study show that TB cases in Bantul have increased. Previous research has shown that the increase in TB cases can occur due to transmission from TB sufferers. Transmission can occur if sufferers do not implement TB transmission prevention behaviour. From the results obtained from the preliminary study of TB sufferers in the Bantul District Health Office work area, especially in the Pleret Health Center and several other health centres, some still do not carry out prevention, and the success rate of taking medication is also low. This is because patients are terrified of the stigma that occurs in society, sufferers are uncomfortable wearing masks, and sufferers already feel healthy, so they do not engage in preventative behavior and discontinue therapy. The idea explains how information and attitudes may impact people's conduct. Seeing this, the author wishes to gain a thorough grasp of the beliefs and attitudes that drive TB transmission prevention behavior in the Bantul Health Office Work Area.

METHODS

This cross-sectional analytical observational study assessed the link between knowledge, attitudes, and behaviour in tuberculosis prevention. From January to August 2024, this study was carried out at the Bantul District Health Office Work Area in Yogyakarta's Special Region. This study included all pulmonary tuberculosis patients still being treated in the Bantul Health Office Work Area health centre, totalling 65 people. Purposive sampling yielded 55 participants who were getting treatment, aged 15 or older and resided in Bantul Regency. This study used a questionnaire to assess knowledge, attitudes, and preventative behaviour. The preventative behaviour, knowledge, and attitudes questionnaire adapts earlier research. The preventive behaviour questionnaire consists of 10 question items, the knowledge questionnaire consists of 15 items covering the constructs of understanding, symptoms, causes, transmission, prevention, and treatment with a Cronbach alpha value of 0.846, and attitudes consist of 10 question items covering the construct of attitudes toward preventive behaviour, awareness of the importance of preventing transmission with a Cronbach alpha value of 0.811. This study uses both bivariate and multivariate data analysis. Bivariate analysis uses the chi-square test to assess the connection between knowledge, attitudes, and TB prevention behaviour. The logistic regression test is then utilized for multivariate analysis, followed by the Rasch model to determine if preventative behaviour is simple or complex for respondents to implement. The Ahmad Dahlan University Ethics Committee (registration number 012406117) undertook an ethical review of this project.

Ethical Approval

Ethical approval was obtained from Research and Community Service Ethics Committee of the Faculty of Public Health, Universitas Indonesia, as stated in the Certificate Number of Ket-583/UN2.F10.D11/PPM.00.02/2024. All respondents provided written informed consent prior to enrolment in the study and the publication of the data obtained.

RESULTS

Based on statistical analysis, knowledge (sig=>0.001) and attitude (sig=>0.001) are associated with TB prevention behaviour in Bantul Regency (Table 1). The proportion of respondents with low knowledge and poor preventive activity is 89.7%, with an OR value of 2.59. This suggests that knowledge is a risk factor for preventative behaviour. While the proportion of respondents with unfavourable attitudes and poor preventive activity is 82.4%, with an OR value of 2.47, this suggests that attitude is also a risk factor for preventative behaviour. Respondents with

little knowledge are 2.59 times more likely to engage in poor preventative activity than those with high knowledge (OR=2.59; 95% CI=1.505-4.456). Following multivariate analysis, the likelihood of low knowledge motivating inappropriate preventive behaviour increases (OR=10.334; CI95%=2.261-47.222). The attitude variable, like the knowledge variable, has the potential to be a risk factor for bad preventive behaviour. Respondents with negative attitudes are 2.47 times more likely to have bad preventive behaviour than respondents with positive attitudes (OR=2.47; CI95%=1.323-4.614) and increases after multivariable analysis (OR=4.938; CI95%=1.179-20.676).

Table 1. Knowledge, attitudes and tuberculosis preventive behavior

Variable	Preventive behavior				OR (CI 95%)		Sig
	Not Good		Good				
	n	%	n	%	COR	AOR	
Knowledge							
Low	26	89.7	3	10.3	2.59	10.33	
High	9	34.6	17	65.4	(1.505-4.456)	(2.261-47.222)	<0.001*
Attitude							
Negative	28	82.4	6	17.6	2.47	4.93	
Positive	7	33.3	14	66.7	(1.323-4.614)	(1.179-20.676)	<0.001*
Total	35	63.6	20	36.4			

Figure 1 depicts how TB patients avoid tuberculosis transmission. The data suggest that all respondents can readily answer the behavioural questionnaire items. The items with the lowest logit (logit -2.10) are P4, "regularly seek treatment at a health centre or hospital?" and P10, "consume healthy and nutritious food?" suggesting that the majority of respondents believe that these behavioural items are simple to implement every day. It is critical to reduce transmission to others by taking medicine and eating healthy foods to heal and break the transmission cycle. On the other hand, the item with the highest logit is P5, which states, "always close the window during the day" (logit 1.96), indicating that, while it is important to open the window every day, it is difficult to do so because many sufferers and their families work, making it impossible.

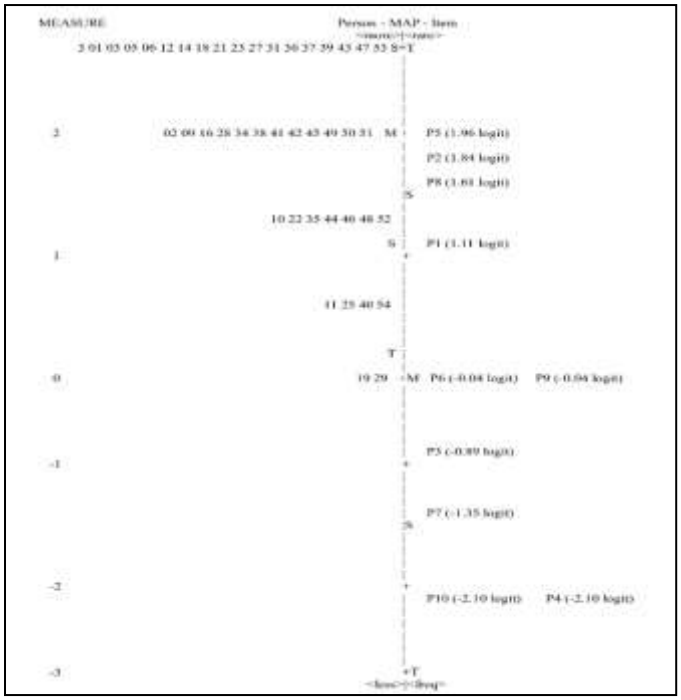

Figure 1. Visualization maf of tuberculosis transmission prevention behavior

DISCUSSION

Respondents in this study had inadequate conduct and understanding regarding avoiding TB spread. This research examined four components of tuberculosis knowledge: definition, symptoms, causative causes, transmission, prevention, and therapy. Based on data from the four knowledge areas, respondents' knowledge of prevention had the lowest average value. Based on these findings, it is clear that the relationship between knowledge and preventive behavior is linked because respondents lack excellent information about the preventative element. Hence, they do not engage in prevention activities. Knowledge is essential in shaping a person's conduct (overt behavior). Knowledge may also be defined as human behaviours in pursuing the truth or addressing issues that reflect the individual's character, desires, or fundamental nature (15). Based on this remark, we may infer that knowledge significantly impacts a person's conduct, including reducing tuberculosis spread.

Knowledge and attitudes are cognitive and affective factors that play an important role in shaping an individual's health behavior, including in the prevention of tuberculosis (TB). According to the Health Belief Model (HBM), individuals are more likely to take preventive actions if they have a good understanding of the disease, including its causes, symptoms, as well as its transmission and prevention methods. Adequate knowledge about TB allows individuals to recognize their level of perceived susceptibility and perceived severity of the disease, thereby increasing the likelihood of them taking preventive actions such as receiving the BCG vaccine, maintaining environmental cleanliness, and following preventive therapy if necessary (8).

Besides knowledge, attitude also plays a role in influencing a person's behavior in preventing TB. Based on the Theory of Planned Behavior (TPB), a positive attitude towards TB prevention actions, supported by subjective norms (social support) and perceived behavioral control, will increase the likelihood of individuals adopting healthy behaviors. Previous studies have shown that individuals with a positive attitude towards preventive actions tend to be more disciplined in applying cough etiquette, maintaining good home ventilation, and undergoing health checks if they experience TB symptoms. Attitudes formed from a good understanding can also strengthen a person's intention to act, especially if supported by a conducive environment (8).

This study supports Lawrence Green's idea that information influences people's conduct. Education, information/mass media, social, cultural, economic variables, the environment, experience, and age all impact knowledge. Respondents' knowledge about tuberculosis (TB), including the causes, symptoms, transmission, and prevention of TB transmission, might make them more cautious in their actions, such as practising clean and healthy living practices to avoid transmission. Previous research has found that knowledge influences preventative behavior (16–18).

Respondents may help avoid transmission by wearing masks, cleaning their hands with soap, eating fruits and vegetables, keeping the atmosphere clean and sanitary, and taking medication regularly (19). Knowledge promotes behavior to prevent tuberculosis transmission because it is supported by several elements, including family and community support, the involvement of health workers, and confidence in the advantages of preventative actions (20).

Patient knowledge of TB can be obtained by formal and informal education (17). Someone with sufficient information to ensure that the majority of responders are self-aware enough to seek treatment and take preventative measures so that they do not spread tuberculosis to others around them, particularly their families. According to the study, health personnel's roles significantly impact preventative behavior and patient awareness. Several respondents said they did not know much about tuberculosis (TB). Therefore, health professionals can perform routine counselling and collaborate with cadres and community leaders to raise respondent understanding (18).

The findings of this study show a substantial link between individual attitudes toward avoiding tuberculosis spread and preventative activities. This conclusion supports the Health Belief Model (HBM) theory, which claims that a person's attitude toward disease and beliefs about the advantages of preventive interventions impact their health behaviours (21). Individuals with a good attitude about the importance of tuberculosis prevention are more likely to adopt behaviours such as wearing masks, maintaining hygiene, and taking medicine regularly. This study is consistent with other prior studies that have found that attitudes are associated with TB prevention behavior, and attitudes are defined as a person's description when evaluating the knowledge of their surroundings (20,22). Many elements can impact a person's good or bad conduct, including information, attitudes, emotional drive, and contextual influences. The environment has a significant impact on how information enters individuals.

This study's results align with the findings of Kaka et al., (2021) which claimed that there is a link between attitudes and conduct in avoiding TB transmission. Research suggests that conducting research based on information is better than behavior not backed by knowledge. Individuals with good knowledge do not always exhibit positive behavior, and vice versa. Several elements impact a person's behavior, including experience, motivation, availability of resources, and beliefs. The degree of information a person possesses is one aspect that influences their attitude; the higher the level of knowledge, the more positive the attitude. In keeping with the preceding, most respondents with positive attitudes had decent expertise. Various elements, including visual perception, learning, cognition, environmental effects, and public opinion, can influence a person's attitude (24).

Patient compliance in taking anti-tuberculosis medications (OAT) regularly is critical for recovery and preventing future transmission. Previous research found that 90.9% of pulmonary tuberculosis patients who took their medicine consistently had positive attitudes and reasonable behavioural control, which helped considerably in their recovery(25). Furthermore, another study discovered that factors such as family support, medication compliance, patient attitudes, patient behavior, the role of medication supervisors, health worker attitudes, patient perceptions, and belief in recovery were significantly related to the recovery status of productive-age pulmonary tuberculosis patients (26). This compliance behavior also helps break the tuberculosis transmission cycle in the community. Patients who take OAT regularly improve their chances of recovery and help prevent the spread of Mycobacterium TB germs.

Consuming a healthy diet has a significant role in preventing and treating tuberculosis (TB). A well-balanced food intake can boost the immune system, improving the body's ability to combat tuberculosis infection. According to the Republic of Indonesia's Ministry of Health, implementing Clean and Healthy Living Behavior (PHBS), such as eating balanced nutritional foods, effectively reduces tuberculosis transmission (27).

Furthermore, preventative practices such as opening windows in the morning to allow proper air circulation and sunshine help to reduce the risk of tuberculosis transmission. Sunlight can destroy tuberculosis-causing germs, but proper air circulation reduces the concentration of bacteria inside. Opening windows every morning can help reduce tuberculosis transmission (28). Individuals can boost their chances of recovering from tuberculosis and breaking the disease's transmission chain by combining the habits of eating healthy food and providing proper air circulation by opening windows. To get the best outcomes in tuberculosis control, education and public understanding of the significance of these two behaviours must be strengthened.

Three elements contribute to behavior: propensity, enabling, and reinforcement. Attitudes and knowledge are elements that contribute to predisposition. Enabling elements include the physical environment and the availability or lack of work safety facilities or methods, such as supporting tools and training. The last aspect is the reinforcing factor, which comprises rules, regulations, and oversight (15). There is a positive correlation between the level of health literacy and individual adherence to TB treatment and prevention measures. Therefore, public health interventions that focus on improving education and changing attitudes are very important in the efforts to control TB in various populations.

CONCLUSION

Tuberculosis patients exhibit inadequate preventative activity (63.6%), with 26 having limited knowledge and 28 having unfavorable attitudes. According to Rasch's analysis, the most manageable preventive behavior against TB transmission is to take medication and eat healthy food, whereas the most difficult is to open the home window. Knowledge and attitude are elements that influence TB prevention behavior in Bantul Regency. Intensive education continues to be provided to raise knowledge and attitudes in order to minimize TB transmission.

AUTHOR'S CONTRIBUTION STATEMENT

The first author contributed to data collection, data analysis, and drafting the article on methods, results, discussion, and conclusion. The second author contributed to research permits on location, validity of the instrument, data collection, data analysis and drafting the article on background and result. The third author contributed to data processing, data analysis, and drafting the article on background, method and results. The fourth author contributed

to the data analysis and drafting the article on method and discussion. The fifth author contributed to the data analysis and drafting the article on method and discussion.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

In the preparation of this manuscript, the authors used AI-assisted tools, specifically Grammarly and QuillBot, solely to improve grammar, spelling, and sentence clarity. The authors take full responsibility for the content and integrity of the manuscript.

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