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Factors Associated with Willingness for Sputum Examination Among Tuberculosis Suspects and Risk Groups at Ambarita Health Center, Samosir Regency

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ABSTRACT

Tuberculosis (TB) is an infectious disease that remains an important global and Indonesian public health problem. Optimizing case finding is one of the strategies to control TB in Indonesia, but TB case finding only reached 74.7 percent out of a target of 90 percent in 2022. The delay in case finding is due to the lack of public awareness to check themselves to health care facilities and many people refuse to have their sputum examined. This study aims to determine the factors associated with the willingness to conduct sputum examination in suspected TB and at-risk groups at the Ambarita Health Center, Samosir Regency. This type of research is quantitative with a cross sectional design. The study population was TB suspects and people who have household contact with TB patients. A sample of 118 people was selected using simple random sampling. The results showed that age (p=0,021; PR=2,433; 95% CI= 1,198–4,943), knowledge (p=0,016; PR=2,523; 95% CI= 1,243–5,120), and perception (p=0,009; PR=3,061; 95% CI= 1,316–7,118) were associated with the willingness to conduct sputum examination among TB suspects and at-risk groups at the Ambarita Health Center, Samosir Regency, while gender (p=1,000), education (p=0,110), occupation (p=0,211), and income (p=0,145) were not. The health center is expected to provide education and counselling to the community and form a group of TB survivors to help provide social support and share experiences about the course of TB disease to increase knowledge and build good perceptions of TB disease.

KEYWORDS

sputum test; knowledge; perception; willingness.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by a bacteria called *Mycobacterium tuberculosis*, which can affect the lungs (pulmonary TB) as well as other organs (extra pulmonary TB) (Alsayed & Gunosewoyo, 2023). Tuberculosis remains a major public health problem and a global challenge. According to the Global Tuberculosis Report 2023, the number of newly diagnosed TB cases reported in 2022 was 7.5 million, increasing from 6.4 million cases in 2021. An estimated 10.6 million people were living with TB in 2022, and an estimated 1.13 million TB deaths occurred worldwide (WHO, 2023).

The South-East Asia region accounts for about 46% of global TB cases in 2022. Indonesia, one of the countries in this region, is the second largest contributor to global TB cases in 2022, accounting for 10% of all TB cases, after India (27%). The incidence of TB in Indonesia is estimated to reach 1.06 million cases (385 new cases per 100,000 population) in 2022, increasing by about 9% from 969,000 cases (354 new cases per 100,000 population)

in 2021. There were an estimated 134,000 deaths from TB disease in Indonesia in 2022 (WHO, 2024).

Optimizing case finding is one of the implementations of the third strategy for TB control in Indonesia (Presidential Regulation of the Indonesian Republic Number 67 of 2021 on Tuberculosis Control). Passive TB case finding is done by examining patients with TB symptoms who present to health services, while active TB case finding is done through contact investigation and screening. TB case finding in Indonesia in 2022 was the highest in the past decade, at 724,309 cases, but still only reached 74.7% out of the 90% target. North Sumatra Province has the sixth highest TB case detection rate in Indonesia, with 41,057 cases out of an estimated TB incidence of 72,738 cases, but its coverage also failed to meet the target, reaching only 56.5 percent of the 90 percent target (Kemenkes RI, 2023).

Law of the Indonesian Republic Number 17 of 2023 on Health states that the community (including people with infectious diseases) is obliged to prevent disease transmission through clean and healthy living, control of risk factors and other preventive efforts. Laboratory examination of sputum by microscopy and rapid molecular tests is a standard procedure for confirming the diagnosis and early detection of TB, evaluating treatment and determining the potential for TB transmission, which plays a role in efforts to prevent transmission and TB control as an infectious disease, but awareness of the importance of sputum examination is still very low in the community. According to the 2022 TB Control Program Report, barriers to TB case finding in Indonesia include a lack of public awareness about testing and seeking treatment at health facilities, and many people still refuse contact investigations. In addition, many TB suspects who have been contact investigated and given a referral letter still do not return to the health center for sputum examination.

Research by Bukan et al. (2020) shows that there are still many people who have the wrong perception that TB disease is hereditary and can cure itself, so they choose to go to traditional medicine or buy their own medicine and treat it at home. This is related to the low level of knowledge in the community, leading to misconceptions about TB disease. Hariadi et al. (2023) found that stigma in the community was associated with TB case finding in their study in Bengkulu City. The stigma, which is still very high in the community, followed by rejection, exclusion and discrimination of people with TB, can create poor perceptions, such as fear of being isolated, talked about and ostracized by the community, colleagues and family if diagnosed with TB, so that they tend to hide their disease, do not want to check themselves and refuse to have sputum examination (Maibvise et al., 2022).

Sociodemographic factors (age, gender, ethnicity, socioeconomics), personality, sociopsychology, knowledge and various structural factors can influence perceptions and indirectly affect health behavior (Champion & Skinner, 2008). Research by Rahim et al. (2020) found that TB suspects with low education were more likely not to seek health care because they tended to have poor knowledge and poor perception of the importance of TB testing. In contrast, Arodah & Setiyadi (2023) in their study suggested that TB suspects with good knowledge of TB had a high intention to have their sputum tested.

Samosir Regency is one of the districts in North Sumatra Province where the number of TB cases continues to rise. The number of pulmonary TB cases with a positive acid-fast bacillus smear in 2022 is 544 cases, an increase from 2020 and 2021, which were 286 and 228 cases respectively. The increasing trend in the number of TB cases in Samosir Regency is very important to control as this area is one of the tourist destinations in North Sumatra Province, so there is high individual mobility, which can increase the potential for TB transmission. Ambarita Community Health Centre, as one of the health centers in Samosir Regency, also experienced an increase in TB case finding from 10 patients in 2022 to 17 patients in 2023. Interviews with the TB program manager mentioned that TB case finding

conducted at Ambarita Health Center is through contact investigation and sputum collection, but many people refuse to have a sputum examination because they believe they cannot be infected with TB and are afraid that if they are examined, they will be diagnosed with TB. Based on this description, the researcher is interested in conducting a study on the factors associated with willingness to conduct sputum examination among TB suspects and risk groups at Ambarita Health Center, Samosir Regency.

RESEARCH METHODS

The type of research used in this study was observational analytical quantitative research with a cross-sectional design, that is, measuring the independent and dependent variable at the same time. The study was conducted at Ambarita Health Center, Samosir Regency. Data collection was performed from March to April 2024.

The study population was all suspected TB patients and people who had household contact with TB patients in the working area of the Ambarita Health Center, Samosir Regency, which was 140 people. Suspected TB patients are individuals with signs and symptoms suggestive of TB, defined as chronic cough (≥ 2 weeks) with or without other symptoms such as coughing up phlegm, coughing up blood, chest pain, shortness of breath, weight loss, fever and night sweats, found through contact investigation and screening or who directly visit the health center. By calculating the sample size using the Lemeshow formula, a sample size of 118 people was obtained. The sample was selected using simple random sampling with inclusion criteria:

1. Suspected adult TB patients aged 15 years and above residing in the working area of Ambarita Health Center, Samosir Regency; and
2. Willing to participate in the study by signing the informed consent form.

Exclusion criteria for this study are:

1. Suspected TB patients who have already been diagnosed with TB or are undergoing TB treatment; and
2. Suspected TB patients who have died, who have mental and psychiatric disorders, and who cannot communicate well.

The dependent variable in this study was the willingness to conduct a sputum examination as a method of diagnosing TB disease and was categorized as willing and unwilling. The independent variables in this study were age, gender, education, occupation, income, knowledge and perception. Age was categorized as <45 years and ≥45 years, gender was categorized as female and male, education was categorized as high (high school and university) and low (no education, primary school, and junior high school), occupation was categorized as working and not working, while income was categorized as high, which is equal to or higher than the Samosir regency minimum wage (≥2,800,000 IDR), and low (<2,800,000 IDR). Knowledge and perception variables were measured using a modified questionnaire consisting of 15 and 19 questions, respectively, which had been tested for validity and reliability by the researcher. Knowledge was categorized as good (≥75% of total score) and poor (<75% of total score). Perception variables were categorized based on the median perception score as good (score≥41.00) and poor (<41.00).

Data were analyzed through univariate analysis to describe the frequency distribution of respondents based on characteristics, independent and dependent variables. Bivariate analysis was used to determine the association between each independent variable and the dependent variable using the chi-square statistical test with a 95% confidence level, or significantly associated if the p-value <0.05).

RESULTS AND DISCUSSION

Univariate Analysis Results

The results of univariate analysis are presented as frequency distributions of respondent based on research variables.

Table 1. Univariate Analysis Results

Variable	n = 118	Percentage (%)
Age		
≥45 years	73	61.9
<45 years	45	38.1
Gender		
Male	66	55.9
Female	52	44.1
Education		
Low	42	35.6
High	76	64.4
Occupation		
Not working	33	28.0
Working	85	72.0
Income		
Low	106	89.8
High	12	10.2
Knowledge		
Poor	74	62.7
Good	44	37.3
Perception		
Poor	58	49.2
Good	60	50.8
Willingness for Sputum Examination		
Unwilling	93	78.8
Willing	25	21.2

Based on Table 1 above, the majority of the respondents were 45 years old or older, that is 73 people (61.9%), while the rest were less than 45 years old, that is 45 people (38.1%). Most of the respondents were male, namely 66 people (55.9%) and the rest were female, that is 52 people (44.1%). Most of the respondents had high education, as many as 76 people (64.4%), while 42 people (35.6%) had low education. Among the 76 people with high education, 66 people (55.9%) had completed high school and 10 people (8.5%) had completed university. Among the 42 people with low education, 18 people (15.3%) had completed primary and junior high school, respectively, while 6 people (5.1%) had no education.

In terms of occupation, the majority of the respondents in this study were working, as many as 85 people (72.0%). Most of the respondents were entrepreneurs, that is 42 people (35.6%), and farmers, which were 37 people (31.4%), while 2 people (1,7%) worked as government employees, 3 people (2.5%) worked as private employees, and 1 person (0.8%) worked as fishermen. There were 33 people (28.0%) of the respondents who did not have an occupation, including retired workers and housewives. Most of the respondents had low income, 106 people (89.8%), and only 12 people (10.2%) had high income.

Majority of the respondents had poor knowledge about TB disease, that is 74 people (62.7%), while the remaining 44 people (37.3%) had good knowledge. Most respondents

had a good perception of TB disease, as many as 60 people (50.8%), but not much different from those who had a bad perception, namely 58 people (49.2%). Most of the respondents were unwilling to conduct sputum examination, which were 93 people (78.8%), and only 25 people (21.2%) were willing to conduct sputum examination for TB diagnosis.

Bivariate Analysis Results

The results of bivariate analysis in this study provide information on factors associated with the willingness of sputum examination among TB suspects and risk groups at Ambarita Health Center, Samosir Regency.

Table 2. Bivariate Analysis Results

Variabel	Willingness for Sputum Examination				Total		*p – value*	PR (95% CI)
	Unwilling		Willing					
	n	%	n	%	n=118	%		
Age								
≥45 years	63	86,3	10	13,7	73	100	0,021	2,433 (1,198 – 4,943)
<45 years	30	66,7	15	33,3	45	100		
Gender								
Male	52	78,8	14	21,2	66	100	1,000	0,997 (0,495 – 2,010)
Female	41	78,8	11	21,2	52	100		
Education								
Low	37	88,1	5	11,9	42	100	0,110	2,211 (0,895 – 5,462)
High	56	73,7	20	26,3	76	100		
Occupation								
Not working	29	87,9	4	12,1	33	100	0,211	2,038 (0,757 – 5,490)
Working	64	75,3	21	24,7	85	100		
Income								
Low	86	81,1	20	18,9	106	100	0,145	2,208 (1,015 – 4,804)
High	7	58,3	5	41,7	12	100		
Knowledge								
Poor	64	86,5	10	13,5	74	100	0,016	2,523 (1,243 – 5,120)
Good	29	65,9	15	34,1	44	100		
Perception								
Poor	52	89,7	6	10,3	58	100	0,009	3,061 (1,316 – 7,118)
Good	41	68,3	19	31,7	60	100		

The results of bivariate analysis using the chi-square test showed that the factors associated ($p<0.05$) with the willingness of sputum examination in TB suspects and risk groups at the Ambarita Health Center, Samosir Regency were age ($p=0.021$), knowledge ($p=0.016$), and perception ($p=0.009$), while the variables of gender ($p=1.000$), education ($p=0.110$), occupation ($p=0.211$), and income ($p=0.145$) were not associated ($p>0.05$) with the willingness of sputum examination.

Age

The results of bivariate analysis using chi–square test showed that age was associated with willingness for TB sputum examination with a p–value of 0.021 ($p<0.05$) and a prevalence ratio of 2.433 (95% CI=1,198–4,943), which means that TB suspects and risk groups aged 45 years and older were 2.433 times more likely to be unwilling for sputum examination than those under 45 years of age.

The results of this study are in line with research conducted by Odume et al. (2023), who found that there was an association between age and the choice of health facilities by TB suspects (p=0.001). The study reported that respondents aged 40 years and below preferred to go to health facilities for health check-ups rather than the informal sector such as traditional medicine or buying their own medicines from pharmacies compared to the age group above 40 years. Another study conducted by Lolong et al. (2021) on a total of 8,388 samples of TB suspects in Indonesia also found that age was associated with TB treatment seeking, but in contrast, individuals aged 55 years and above were 1.3 times (95% CI = 1.21–1.46) more likely to seek treatment than those under 55 years.

Gender

The results of bivariate analysis showed that there was no association between gender and willingness to conduct sputum examination with p–value of 1.000 (p>0.05). The results of this study are consistent with the study conducted by Rahim et al. (2020), which showed that gender was not associated with the behavior of TB suspects to seek health care (p=0.593). Ruditya (2015) in his study also found that gender was not associated with sputum examination behavior of TB patients during treatment (p=0.446). Men and women have the same opportunity to receive emotional, informational, and instrumental support, both positive and negative, from their environment. These external factors are also influenced by internal factors such as personality, perception, knowledge, and individual motivation, so that these factors play different roles in shaping a person's behavior regardless of demographic characteristics such as gender.

In contrast, the results of this study are not in line with research conducted by Lolong et al. (2021), who found that women were 1.3 times (95% CI=1.09–1.45) more likely to seek TB treatment than men. A study by Danarastri et al. (2022) based on secondary data from the Integrated Tuberculosis Information System (SITT) and the Indonesian Demographic and Health Survey (DIHS) also found that women (33%; n=16,377) were more likely to seek TB treatment at health facilities compared to men. This is possibly due to the behavior of women, who tend to be more active in seeking information on disease prevention and have relatively healthier lifestyles compared to men.

Education

The results of bivariate analysis showed that education was not associated with the willingness to conduct sputum examination, with a p–value of 0.110 (p>0.05). The results of this study are not in line with the research conducted by Arivany (2017) who found that education was associated with sputum examination actions among pulmonary TB suspects in Kamoning Community Health Center, Sampang Regency (p=0.013; OR=0.156; 95% CI= 0.032–0.771). Research conducted by Rahim et al. (2020) also found that one of the dominant factors influencing the behavior of suspected TB patients to seek examination at health facilities was education (OR=1.981; 95% CI=1.181–3.325; p=0.010). Education is indirectly related to a person's knowledge. The higher a person's education, the easier it tends to be to obtain information about health conditions and to engage in healthy behaviors. A person's education can also affect perceptions and attitudes about illness and health and plays an important role in decision making.

The results of this study showed that among the 42 respondents who had low education, most of them did not have the willingness to conduct sputum examination, as much as 37 people (88.1%), while among the 76 respondents who had high education, only 20 people (26.3%) had the willingness to conduct sputum examination. This shows that there is no difference in the willingness for TB sputum examination between respondents with low and

high education, which explains that education is not related to the willingness for conducting sputum examination.

Occupation

The results of the bivariate analysis showed that occupation was not associated with the willingness to conduct sputum examination, with a p–value of 0.211 (p>0.05). This is not in line with the study conducted by Arivany (2017), who found that employment status was associated with the behavior of sputum examination among suspected pulmonary TB patients in Kamoning Health Center (p=0.041; OR=3.8; 95% CI=1.006–14.351). Rahim et al. (2020) in their study also suggested that occupation affects the health examination behavior of TB suspects (OR=1.738; 95% CI=1.140–2.681; p=0.010). On the other hand, the results of this study are consistent with the findings of Ruditya (2015), which showed that occupation did not affect the behavior of TB patients to sputum examination during TB treatment (p=0.859).

Individuals who are working tend to take health actions or behaviors needed to be able to maintain their productivity and achieve optimal health status, but different work environments based on the type of work will also provide differences in the level of information acquisition and social support for a person to influence the decision making in performing health actions or behaviors. The results of this study showed that among the respondents who worked, the majority (75.3%) did not have the willingness to conduct sputum examination, and among the respondents who did not work, the majority (87.9%) did not have the willingness to conduct sputum examination. This shows that there is no difference in the willingness for TB sputum examination based on the occupation, which explains that occupation does not associated with the willingness for TB sputum examination.

Income

The results of the bivariate analysis showed that there was no association between income and willingness to conduct a sputum examination with a p–value of 0.145 (p>0.05). This is not in line with the study conducted by Rahim et al. (2020), which showed that income is associated with the behavior of TB suspects to seek health examination at health facilities (p=0.017). Arivany (2017), also suggested that there is an association between income level and sputum examination behavior of pulmonary TB suspects (p=0.031). Higher income is associated with an increase in a person's ability to access better health goods, services, and information that can support a healthier lifestyle and environment and increase access to better health services.

In contrast, the results of this study are consistent with the study conducted by Ruditya (2015), who found that income did not affect the behavior of TB patients to have sputum examination during treatment (p=0.294). The results of this study showed that the majority of the respondents (89.8%) had low income. Most of the respondents, both those with low (81.1%) and high (58.3%) incomes were unwilling to do sputum examinations. This shows that there is no difference between respondents with low and high income, which explains that income is not associated with willingness to have sputum examination.

Knowledge

The results of bivariate analysis using chi–square test showed that knowledge was associated with willingness to conduct sputum examination with a p–value of 0.016 (p <0.05) and a prevalence ratio of 2.523 (95% CI = 1.243–5.120), which means that TB suspects and risk groups who have less knowledge about TB are 2.433 times more likely to be unwilling to

conduct sputum examination than those with good knowledge. This is in line with the findings of Arodah & Setiyadi (2023) who found that knowledge was associated with intention to have a sputum examination in the TB suspect group in Margoyoso Community Health Center (p=0.003; OR=3.492; 95% CI=1.597–7.634). Wijaya (2021) in his research also suggested that there is a relationship between knowledge and sputum examination behavior among TB suspects in Brabasan Health Center, Mesuji Regency (p=<0.001). Another study conducted by Arivany (2017) also showed that pulmonary TB suspects with low knowledge about TB disease had a 3.6 times (95% CI= 1.003–12.919; p=0.042) higher risk of not taking a sputum examination, compared to those with high knowledge.

Knowledge is a cognitive domain, which plays an important role in shaping behavior. Intentions that result from good knowledge will be more sustainable than those that result from poor knowledge. The higher a person's level of knowledge about a disease state, the better their understanding in making decisions related to health behavior, both in efforts to prevent and treat the disease (Notoatmodjo, 2014). Furthermore, based on the Health Belief Model theory, knowledge is one of the modifiable factors that play a role in shaping individual perceptions. The better a person's knowledge about a disease, it is expected that a good perception can be developed and indirectly affect his willingness and behavior in preventing the disease (Champion & Skinner, 2008).

Perception

The results of bivariate analysis showed that there was an association between perception and willingness to conduct sputum examination with a p–value of 0.009 (p<0.05) and a prevalence ratio of 3.061 (95% CI=1.316–7.118). This means that TB suspects and risk groups who have a poor perception of TB disease are 3.061 times more likely unwilling to conduct sputum examination than those who have a good perception. This is in line with a study conducted by Thariq (2019), who found that pulmonary TB suspects with a positive perception of TB disease were 14.167 times more likely to seek treatment than those with a negative perception (p=0.001). Meanwhile, misperceptions of TB disease lead to low awareness of sputum examination among high-risk communities and those with symptoms (Hariswan, 2021).

Kurniawan (2015) in his research also stated that perceived susceptibility (p=0.010), perceived severity (p=0.013), and perceived benefits (p=0.005) among family members of TB patients were associated with the behavior of screening household contacts in the Kadipaten Community Health Center. An individual's perception of their vulnerability to a disease risk (perceived susceptibility), the severity of the disease (perceived severity), the belief in the benefits of taking action to prevent or treat the disease (perceived benefits), the belief that there is not too great an obstacle to doing the action (perceived barriers), and the confidence in oneself to take the action (self-efficacy) determine their behavior in the prevention, early detection, and treatment of disease (Champion & Skinner, 2008).

CONCLUSION

Based on the research conducted on the factors associated with willingness for sputum examination among TB suspects and risk groups, it can be concluded that age (p=0,021), knowledge (p=0,016), and perception (p=0,009) were associated with willingness to conduct sputum examination among TB suspects and risk groups at Ambarita Health Center, Samosir Regency, while gender (p=1,000), education (p=0,110), occupation (p=0,211), and income (p=0,145) were not associated with the willingness for sputum examination.

Suggestion

1. Local governments are expected to issue regulations on sanctions against people who refuse sputum examinations as part of efforts to prevent and control infectious diseases based on Law of the Indonesian Republic Number 17 of 2023 on Health to increase public willingness to conduct sputum examinations as an early detection of TB.
2. Ambarita Health Center is expected to provide training for health workers to improve effective communication skills and the selection of educational methods to provide better and more interesting counseling about TB to increase the acceptance of the population, and to form a group of TB survivors (TB patients who completed treatment) to provide social support and share experiences about the course of TB to increase knowledge and build positive perceptions toward TB.
3. The community is advised to maintain a healthy lifestyle, keep the environment clean, and have regular health check-ups at health facilities.
4. Future researchers should consider using other research designs and analyzing other factors that have not been studied for the prevention and control of TB disease.

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