

## ANALYSIS OF RISK FACTORS FOR DELAYED DIAGNOSIS IN PULMONARY TUBERCULOSIS CASES IN BENGKULU CITY

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### ABSTRAK

Penelitian ini bertujuan untuk menganalisis faktor-faktor yang berhubungan dengan keterlambatan diagnosis Tuberkulosis Paru dan distribusi frekuensi penderita TB. Metode penelitian adalah analitik-observasional dengan pendekatan cross sectional. Sampel penelitian adalah pasien yang berada di Kota Bengkulu berjumlah 64 responden. Hasil analisis menunjukkan bahwa penderita TB mayoritas adalah Jenis kelamin laki-laki, kelompok umur 16-25 tahun, orang yang mempunyai pekerjaan, dan berpendidikan menengah, memiliki gejala awal batuk, tinggal di daerah tengah kota, jarak dari rumah ke fasyankes terdekat 1- < 2 km, memiliki tingkat pengetahuan yang baik, mayoritas memiliki stigma yang rendah terhadap penyakit TB. Tidak ada hubungan yang signifikan antara keterlambatan diagnosis dengan jenis kelamin, usia, pendidikan, pendapatan, pekerjaan, jarak rumah ke yankes, lokasi tempat tinggal, gejala awal, tindakan pertama yankes, pelayanan kesehatan yang pertama kali pasien kunjungi. Terdapat hubungan yang signifikan antara waktu antara gejala awal sampai pasien mencari pengobatan dengan kejadian keterlambatan diagnosis. Namun, tidak ada hubungan yang signifikan antara keterlambatan diagnosis, stigma pasien tentang penyakit TB dengan pengetahuan.

### ABSTRACT

**Risk Factor Analysis of Delayed Diagnosis in Pulmonary Tuberculosis in Bengkulu City.** This study aims to analyse the factors associated with delayed diagnosis of Pulmonary Tuberculosis and the frequency distribution of TB patients. The research method was analytic-observational with cross sectional approach. The research sample was patients in Bengkulu City total of 64 respondents. The results of the analysis showed that the majority of TB patients were male, age group 16-25 years, people who had jobs, and secondary education, had initial symptoms of cough, lived in the central area of the city, the distance from home to the nearest health facility was 1 < 2 km, had a good level of knowledge, the majority had low stigma towards TB disease. There was no significant association between delay in diagnosis and gender, age, education, income, occupation, distance from home to health centre, location of residence, initial symptoms, first action of health centre, first health service visited. There was a significant association between the time between initial symptoms and seeking treatment and the incidence of delayed diagnosis. However, there was no significant association between delayed diagnosis, patient stigma about TB disease and knowledge.

## INTRODUCTION

Tuberculosis (TB) is a public health problem throughout the world that is of particular concern, especially in low and middle income countries. According to the World Health Organization (WHO), in 2019 it is estimated that one third of the world's population or 10 million new cases of TB will occur and in 2018 1.5 million deaths due to TB will be reported. <sup>1</sup> Pulmonary tuberculosis is a disease caused by TB bacteria, namely *Mycobacterium tuberculosis*, and is one of the most difficult health challenges to overcome in low and middle income countries. <sup>2</sup>

TB in Indonesia in 2022 is reported to occur 842,000 cases per year with a death rate of 98,000 and there are notifications of TB cases of 569,899 cases with treatment success of 85%, so there are still around 32% or 283,000 who have not been notified and who have not been reached, have not been detected or not reported<sup>3</sup>. The high prevalence of TB can be caused by a lack of public knowledge, poverty, inadequate TB service organizations, and inadequate health infrastructure, especially in countries experiencing an economic crisis or social problems.<sup>4</sup>

TB control needs to prioritize early diagnosis and adequate treatment. An effective national TB control program has as its main goal early diagnosis and prompt treatment. A person who has signs and symptoms of TB must be immediately examined and diagnosed so that they can immediately receive therapy. However, if there is a delay in deciding to visit a TB treatment facility, the process of establishing diagnosis and therapy will be delayed and disrupted. This problem of delays has been widely reported in developing countries, one of which is Indonesia, with a high rate of TB cases.<sup>5</sup>

Delays in TB diagnosis and therapy can lead to a more complex disease and cause many complications, increasing the severity of the disease and the risk of death. Delayed diagnosis of pulmonary TB is the time interval between the appearance of initial symptoms until the patient is declared to be suffering from pulmonary TB.<sup>6</sup> These delays can occur at the patient level or at the health system level. Patient delay refers to the time from the onset of TB symptoms to the first visit to a health facility of more than 3 weeks. Delay in diagnosis refers to the time from first visit to a health facility to TB diagnosis of more than 2 weeks. Limited knowledge about the signs and symptoms of TB, poor health-seeking behavior, and poor disease diagnosis and management in health facilities result in delays in TB diagnosis and treatment, thereby increasing the risk of TB transmission.<sup>7</sup>

Internal factors of the patient or health system are factors that mutually influence health behavior in visiting health service facilities and receiving treatment. Changes in behavior towards visiting health facilities and timely treatment indicate that these factors can be categorized into patient or health system factors. So based on this background, it is necessary to analyze the risk factors that influence the delay in diagnosis of pulmonary tuberculosis in patients in Bengkulu City.

## METHOD

This research method is analytical-observational with a cross-sectional approach. This study included tuberculosis patients at M.Yunus Hospital Bengkulu, Pasar Ikan Health Center, Muara Bangkahulu Health Center, Nusa Indah Health Center, Sawah Lebar Health Center, and Sukamerindu Health Center who met the inclusion criteria, totaling 64 patients. The independent variable in this study is the risk factor for tuberculosis in patients in Bengkulu City. The dependent variable in this study is the delay in diagnosis of tuberculosis in patients in Bengkulu City. The data obtained was analyzed using univariate analysis in the form of ordinal data which will be displayed in a frequency distribution to describe the distribution of data for each variable. Bivariate analysis was used to determine the relationship between risk factors and late diagnosis in patients at M. Yunus Hospital, Bengkulu City, Pasar Ikan Health Center, Muara Bangkahulu Health Center, Nusa Indah Health Center, Sawah Lebar Health Center, and Sukamerindu Health Center. The statistical test according to

the ordinal data used in this research is the Chi-square test according to the research variables. And the next analysis is a multivariate analysis obtained from bivariate analysis whose p value is <0.05

**RESULTS**

In this study there were a total of 68 respondents. Of the 68 respondents, based on the analysis, there were 8 who did not experience a delay in diagnosis and 60 people who experienced a delay in diagnosis. Based on gender, there were 43 male respondents and 25 female respondents. Based on data analysis in this study, there was no statistically significant relationship between delay in diagnosis and gender (p = 0.133). More male respondents experienced delays in diagnosis (66.7%) than female respondents (33.3%) can be seen in Table 1.

**Table 1. Association between delayed in diagnosis based on gender**

Sex	Delayed diagnosis		Total	p value
	No n (%)	Yes n(%)		
Man	3 (37,5)	40 (66,7)	43 (63,2)	0,133
Woman	5 (62,5)	20 (33,3)	25 (36,8)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 2), there was no statistically significant relationship between late diagnosis and age group (p = 0.601). The age group experiencing the most late diagnosis was 16-25 years (23.3%) and the least was the age group > 65 years (5.0%)

**Table 2. Association between delayed diagnosis based on age.**

Age	Delayed diagnosis		Delayed diagnosis	p value
	No n (%)	Yes n (%)		
16-25 year	2 (25,0)	14 (23,3)	16 (23,5)	0,6
26-35 year	0 (0,0)	11 (18,3)	11 (16,2)	
36-45 year	1 (12,5)	12 (20,0)	13 (19,1)	
46-55 year	1 (12,5)	9 (15)	10 (14,7)	
56-65 year	3 (37,5)	11 (8,3)	14 (20,6)	
> 65 year	1 (12,5)	3 (5,0)	4 (5,9)	
Total	8 (100,0)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 3), there was no statistically significant relationship between late diagnosis and employment (p = 0.715). People who had jobs experienced more late diagnosis (58.3%), while respondents who were not working only 25 respondents (41.7%) experienced late diagnosis.

**Table 3. Association between delayed diagnosis based on profession**

Pekerjaan	Delayed diagnosis		Delayed diagnosis	p value
	No n (%)	No n (%)		
Working	4 (50,0)	35 (58,3)	39 (57,4)	0,715
Not working	4 (50,0)	25 (41,7)	29 (42,6)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 4), there was no statistically significant relationship between late diagnosis and income ( $p = 0.715$ ). It was seen that respondents who were able experienced more late diagnosis as many as 48 respondents (80.0%) compared to those who were unable as many as 12 respondents (20.0%).

**Table 4. Association between delayed diagnosis based on income**

Financially capable	Delayed diagnosis		Delayed diagnosis	p value
	No n (%)	Yes n (%)		
No	1 (12,5)	12 (20)	13 (19,1)	0,715
Ye	7 (87,5)	48 (80)	55 (80,9)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 5), there was no statistically significant relationship between delayed diagnosis and education ( $p = 0.240$ ,  $p > 0.05$ ). The level of education that experienced the most delays was secondary education level of 24 respondents (40.0%) compared to low education level of 21 respondents (35.5%) and higher education level of 15 respondents (25.5%), but it was seen from all respondents with higher education of 15 respondents, all of them experienced delayed diagnosis.

**Table 5. Association between delayed diagnosis based on education**

Education	Delayed diagnosis		Delaye d diagno sis	p value
	No n (%)	Yes n (%)		
Based	3 (37,5)	21 (35,5)	24 (35,3)	0,24
Middle	5 (62,5)	24 (40)	29 (42,6)	
High	0 (0)	15 (25)	15 (22,1)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 6), there was no statistically significant relationship between late diagnosis and home area ( $p = 0.795$ ). It can be seen that the respondents who experienced the most late diagnosis were those whose homes were located in the city center, as many as 37 respondents (61.7%) compared to those whose homes were located in the suburbs, 16 respondents (26.7%) and 7 respondents in rural areas (11.7%).

**Table 6. Association between delayed diagnosis based on house location**

Education	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
Downtown	4 (50,0)	37 (61,7)	41 (60,3)	0,795
Suburban	3 (37,5)	16 (26,7)	19 (27,9)	
Village	1 (12,5)	7 (11,7)	8 (11,8)	
Total	8 (100,0)	60 (100,0)	68 (100)	

Based on the data analysis in this study (Table 7), there was no statistically significant relationship between late diagnosis and first symptoms ( $p = 0.856$ ,  $p > 0.05$ ). The initial symptom that most often experienced late diagnosis was cough (81.7%). Only 2 respondents experienced coughing up blood and this was included in the late diagnosis.

**Table 7. Association between delayed diagnosis based on early symptom**

Education	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
Cough	6 (75)	49 (81,7)	55 (80,9)	0,856
Hemoptisis	0 (0,0)	2 (3,3)	2 (2,9)	
Febris	1 (12,5)	4 (6,7)	5 (7,4)	
Angina	1 (12,5)	5 (8,3)	6 (8,8)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 8), there was no statistically significant relationship between delayed diagnosis and patient actions ( $p = 0.187$ ). The actions of patients who visited hospitals/clinics were the most delayed (40.0%). There were no respondents who visited specialist doctors and did self-medication.

**Tabel 8. Association between delayed diagnosis based on house location**

Education	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
General Practitioner	0 (0,0)	12 (20,0)	12 (17,6)	0,187
Dokter spesialis	0 (0,0)	0 (0,0)	0 (0,0)	
Traditional treatment	0 (0,0)	2 (3,3)	2 (2,9)	
Primary public health center	6 (75,0)	22 (36,7)	28 (41,2)	
Self Therapy	0 (0,0)	0 (0,0)	0 (0,0)	
Hospital or Clinic	2 (25,0)	24 (40,0)	26 (38,2)	
<b>Total</b>	<b>8 (100,0)</b>	<b>60 (100,0)</b>	<b>68 (100,0)</b>	

Based on the data analysis in this study (Table 9), there was a statistically significant relationship between delayed diagnosis and estimated time ( $p = 0.000$ ), with the estimated time of the majority of respondents being > 2 months, as many as 30 respondents (50.0%).

**Table 9. The relationship between diagnostic delay based on estimated time**

Time	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
< 1 month	8 (100,0)	9 (15)	17 (25)	0,000
1 - 2 month	0 (0,0)	21 (35)	21 (30,9)	
> 2 month	0 (0,0)	30 (50)	30 (44,1)	
<b>Total</b>	<b>8 (100,0)</b>	<b>60 (100,0)</b>	<b>68 (100)</b>	

**Analysis of Delays in Diagnosis and Action in Health Facilities**

Based on the data analysis in this study (Table 10), there was no statistically significant relationship between delayed diagnosis and health service actions ( $p = 0.072$ ). The administration of drugs experienced the most delayed diagnosis of 32 respondents (53.35%). It was seen that sputum examination did not experience the most delayed diagnosis of 6 respondents (75.0%).

**Table 10. The relationship between delayed diagnosis and actions in health facilities**

Diagnosis	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
Sputum detection	6 (75,0)	15 (25,0)	21 (30,9)	0,072
Blood detection	0 (0,0)	1 (1,7)	1 (1,5)	
X-ray detection & sputum detection	0 (0,0)	10 (16,7)	10(14,7)	
Drug	2 (25,0)	32 (53,3)	34(50)	
Refferal	0 (0,0)	2 (3,3)	2(2,9)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 11), there was no statistically significant relationship between late diagnosis and stigma ( $p = 0.128$ ). Most of the respondents who had low stigma experienced more late diagnosis, namely 33 respondent (55.5%) compared to respondents who had high stigma, namely 27 respondent (45.0%).

**Table 11. The relationship between delayed diagnosis based on stigma**

Stigma	Delayed diagnosis		Total	p value
	No n (%)	Yes n (%)		
Low	7 (87,5)	33 (55,5)	40 (58,5)	0,128
High	1 (12,5)	27 (45,0)	28 (41,2)	
Total	8 (100)	60 (100)	68 (100)	

Based on the data analysis in this study (Table 12), there was no statistically significant relationship between late diagnosis and knowledge ( $p = 0.416$ ). It was seen that some respondents who had good knowledge experienced late diagnosis as many as 30 respondents (50%) compared to respondents who had moderate knowledge (35%), and poor knowledge (15%).

**Table 12. The relationship between delayed diagnosis based on knowledge**

Knowledge	Delayed diagnosis		Total	p value
	Yes n (%)	No n (%)		
Good	5 (62,5)	30 (50,0)	35 (51,5)	0,416
Middle	1 (12,5)	21 (35,0)	22 (32,4)	
Low	2 (25)	9 (15,0)	11 (16,2)	
Total	8 (100)	60 (100)	68 (100)	

**Analysis of Diagnosis Delay and Distance from Residence to Health Facilities**

The relationship between diagnosis delay and distance from residence to the nearest health facility was analyzed using the chi-square test in Table 4.13 and Table 14. Based on the data analysis in this study, there was no statistically significant relationship between diagnosis delay and distance from home to health facilities ( $p = 0.748$ ). The distance from the respondent's home to the nearest health facility with a distance

of 1-2 km was the group that experienced the most diagnosis delays, namely 19 respondents (31.7%). And the least were respondents with a distance of >5 km, 12 respondents (20.0%).

**Table 13. The relationship between delayed diagnosis based on distance from residence to health facilities**

Residence distance	Delayed diagnosis		Total	p value
	No n (%)	No n (%)		
< 1 km	3 (37,5)	14 (23,3)	17 (25,0)	0,748
1-2 km	2 (25,0)	19 (31,7)	21 (30,9)	
2-3 km	1 (12,5)	15 (25,0)	16 (23,0)	
> 5 km	2 (25,0)	12 (20,0)	14 (20,6)	
Total	8 (100,0)	60 (100,0)	68 (100,0)	

**Table 14. Multivariate analysis of factors influencing delayed diagnosis**

Risk Factor	P value
Sex	0,998
Education	0,996
Time prediction	0,991
Patient tindakan	0,997
Health Services	0,999
Stigma	1.000

## DISCUSSION

### Responden Characteristic

Most of the respondents in this study were male, namely 63.2%. This is in accordance with data from the World Health Organization, which states that in general, men have a higher risk of being infected with TB, with a mortality rate that is also significantly higher than women. Data in 2017 showed that around 6 million men were infected with TB and around 840,000 of them died. This figure is much higher than the incidence in women, which is around 3.2 million with a mortality rate of around 500,000<sup>4</sup>. This can be caused by differences in habits and lifestyles, namely smoking and consuming alcohol. More men than women are active smokers in some countries. This is in accordance with data published by the Indonesian Ministry of Health, which states that Indonesian smokers occupy the third largest position in the world after India and China. In addition, Indonesian male smokers are the largest in the world (Sulistiyawati, 2022). Smoking habits can cause damage to the lung parenchyma due to toxins produced, and reduce the function of immune cells so that individuals will be more susceptible to respiratory infections. Alcohol consumption habits have also been associated as a risk factor for TB infection due to its immunosuppressive effects.<sup>8</sup>

Most of the respondents in this study were aged 16-25 years. Amount 16 respondents (23.5%), followed by the age range of 56-65 years, namely 14 respondents (20.6%), and 36-45 years, namely 13 respondents (19.1%). The results of this study differ from the data presented by the Indonesian Ministry of Health in 2020, which found that the majority of TB sufferers came from productive ages, where 17.3% of TB sufferers were aged 45-54 years, followed by 16.8% of TB sufferers aged 25-34 years. Another study by Snow et al. (2020) stated that the incidence of TB in adolescents and young adults varies greatly because it is influenced by several hormonal factors, changes in social contact patterns, and immunological status<sup>9</sup>. This causes a lower prevalence compared to the elderly population because it is generally known that an individual's immune system will decline with age<sup>10</sup>.



In this study, it was found that most respondents had sufficient income so that they were classified as not poor or capable, namely 55 (80.9%) respondents. This finding is in line with research by Kusumaningrum, Wulandari and Kautsar (2023) find that 91,1% respondent have good financial. The high income results in this study can also be supported by the number of respondents who are mostly of productive age, so they are still actively working and have a steady source of income. Education level, most of the respondents in this study, amount 29 (42.6%) have a secondary education level.<sup>11</sup>

The findings of this study are in line with research conducted by Jiamsakul et al., (2018) which found that most respondents had a high school education level (56.0%). There have been many studies explaining the relationship between socioeconomic factors and health seeking behavior, or behavior in seeking health services. Individuals with high incomes and good education tend to be more self-aware in paying attention to their health status. They also have more access to various health services, access to obtain health-related information online, and access to other activities that can support a better quality of life such as healthier food choices and access to sports facilities.<sup>12</sup> In the context of TB, individuals with high incomes in particular have better access to diagnostic services. In contrast, in individuals with low incomes and those living in remote areas, available health facilities may be inadequate, leading to delayed diagnosis, poorer prognosis, and financial barriers.<sup>12</sup>

### **Clinical Characteristic of Respondeen**

The most common early symptom found in TB patients in this study was coughing, which was 80.9%. This finding is in accordance with research where as many as 49.5% of patients referred with a diagnosis of TB had initial symptoms of persistent cough that persisted for more than 10 days, followed by 46% of patients with initial symptoms of fever.<sup>13</sup> Guidelines by the National Health Service (NHS) also state that cough is one of the initial manifestations of TB.<sup>14</sup>

Most of the respondents in this study, namely 40 (58.8%) respondents, had a low stigma towards TB. This is in line with research by Junaid 2021 which stated that 77.3% of respondents were found to have a bad or low stigma towards TB.<sup>15</sup> It was stated that the low stigma in TB sufferers regarding TB is related to the level of knowledge and exposure of individuals to the education they receive regarding the condition. Most of the respondents in this study, namely 36 (52.9%) respondents, had a good level of knowledge about TB. This finding is also in line with research conducted by Kaaffah et al which found that most Indonesians have good attitudes and knowledge about TB. It was also stated that independent indicators of high knowledge about TB cases are age 26-35 years, marital status, and income. These indicators are in accordance with the results of this study where most respondents were aged 26-35 years and had high incomes, so they can support the high level of knowledge in this study.<sup>16</sup>

Most of the respondents in this study, namely (54.4%) respondents, live in the city center. As many as 21 (30.9%) respondents in this study also have a distance to health services that are relatively close to their homes, which is around 1 - <2 km. Research related to this has not been found. However, in the demographic location where this study was conducted, namely at M. Yunus Bengkulu Regional Hospital, Pasar Ikan Health Center, Muara Bangkahulu Health Center, Nusa Indah Health Center, Sawah Lebar Health Center, and Sukamerindu Health Center. Judging from their demographic location, all of these health facilities have fairly easy access and are located in or near the city center, making it possible that most of the respondents who visit these health services also live in the city center.

Most patients visited the health center for the first time, namely 28 (41.3%) respondents, then 26 (38.2%) patients who first went to the hospital or clinic. This finding is in accordance with research Lestari et al where 76.8% of patients initially went to the health center.<sup>17</sup> As many as these patients then continued their treatment at private hospitals (32.4%), but the diagnosis of TB was generally made when they first visited the health center for the first time. This may be due to the easy modality for establishing a TB diagnosis, namely through sputum examination, and is generally available in most primary health facilities<sup>18</sup>. In accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 67 of 2016

concerning TB control, it is stated that the Central Government and Regional Governments must guarantee the availability of health laboratory facilities and infrastructure in all health centers which function to establish a TB diagnosis, including the availability of facilities for sensitivity and resistance testing.<sup>14</sup>

Most patients needed more than 2 months to seek treatment, which was 30 (44.1%). Meanwhile, the first action given by health services was generally the provision of medication, which was 34 respondents (50.0%), followed by sputum examination carried out on 21 (30.9%) respondents. This finding is also in accordance with research conducted by Lestari et al., 2020 where the average estimated time needed for patients to seek treatment, especially to the health center, was 68 days or around 2 months 1 week.<sup>17</sup> It was also found that 99% of patients received antibiotic treatment before the diagnosis of TB was established, and the most frequently performed supporting examinations to establish a diagnosis of TB were sputum examination and chest radiology examination. This may be due to the clinical manifestations of TB which resemble other acute respiratory infections, so that in the early phase of TB infection patients tend to refuse to seek treatment directly at health facilities and prefer alternative treatment or treatment with generic drugs (over the counter). Patients generally seek treatment at health services when their clinical manifestations are already severe, such as when there is a cough with blood or a long fever. Other studies also state that individual trust factors play a role in determining the average estimated time needed for patients to seek treatment, where patients with TB symptoms will generally visit several health facilities before a diagnosis is made, so it can be concluded that there are still many TB patients who waste resources (both time and finances) for treatment because they refuse to be diagnosed with TB.<sup>19</sup>

### Factors Affecting Delayed Diagnosis

Bivariate analysis in this study regarding delayed diagnosis and gender, found that as many as (66.7%) male patients and (33.3%) female patients had delayed diagnosis. The results of this study are in accordance with the study conducted by Paramasivam et al., 2017 where there were more male respondents (63.6%) than female respondents (62.0%) who were diagnosed late for more than 28 days<sup>20</sup>. Similarly, other studies conducted in India also showed that there was a higher proportion of men who experienced delayed diagnosis compared to women.<sup>21</sup>

However, bivariate analysis showed no significant relationship between the two variables. A study conducted by Thompson et al., 2016 found that health seeking behavior is closely related to gender. Women generally have higher self-awareness regarding their health status, both physical and psychological, and tend to be more active in seeking information regarding their condition and more proactive in seeking treatment. In general, the prevalence of TB is higher in male. This may contribute to the gender imbalance of respondents in this study, so that the research results are not statistically significant.<sup>22</sup>

Bivariate analysis in this study regarding late diagnosis and age, it was found that as many as (23.3%) patients were in the 16-25 year age group. However, bivariate analysis showed no significant positive relationship between the two variables. In accordance with research conducted by Santos *et al.*, 2021, Delays in diagnosis generally increase with age. Patients over 45 years of age visit health services for a longer period of time compared to younger patients.<sup>23</sup> This is because older people generally have more comorbidities, so misdiagnosis of TB often occurs. In addition, older patients also tend to have atypical TB manifestations, making TB diagnosis even more difficult. In this study, it was found that most patients were under 45 years of age. In the study Datiko et al., 2020 it was stated that the 16-25 year old age group often has a high level of mobility, such as students or migrant workers.<sup>24</sup> This high mobility can make it difficult to monitor symptoms and seek medical help consistently. This age is still included in the productive age so that researchers assume that respondents are more active in seeking treatment and have typical TB manifestations, so there is no delay in diagnosis.<sup>25</sup>

Bivariate analysis in this study regarding delayed diagnosis and employment, found no significant positive relationship between the two variables. This finding is not in line with research conducted by Kunjok et al., 2021, which stated that respondents who work have a higher risk of delayed diagnosis because they

tend not to want to waste their time looking for income, so they prioritize their work over seeking adequate treatment.<sup>26</sup> Individuals with higher intensive working hours also tend to feel too busy to pay attention to their health conditions until the course of the disease worsens, which then causes delayed diagnosis.<sup>26</sup>

Contrast to these findings, another study conducted in India showed that there was no significant relationship between employment status and delayed TB diagnosis<sup>20</sup>. This may be because most patients are still young and productive, so they are more aware of their health status and are better able to use technological facilities to find health-related information, preventing delayed diagnosis.<sup>27</sup>

### **Delayed Diagnosis and Income**

Bivariate analysis in this study regarding delayed diagnosis and income, found no significant positive relationship between the two variables. Many studies have proven a significant relationship between low income and delayed diagnosis. Research Jiang et al., 2022, states that patients with low income have limited financial access to obtain health services.<sup>28</sup> These marginalized patients will be forced to self-medicate themselves and not visit adequate health services as they should. Statistically, there is no significant relationship between income and delayed diagnosis, which could be due to the lack of samples and the uneven distribution of research locations conducted by researchers.<sup>20</sup>

### **Delayed Diagnosis and Education Level**

Bivariate analysis in this study regarding delayed diagnosis and education, found no significant positive relationship between the two variables. A study by Kunjok et al., 2021 found that low education levels were closely related to delayed diagnosis.<sup>26</sup> People with higher levels of education tend to have higher knowledge and better access to health facilities. People with higher levels of education also tend to have better ability to search for and examine new information, especially related to health, so they will be more aware of their health conditions. According to (WHO, 2020) Individuals with a history of secondary education may be less educated about the symptoms of TB and the risks of the disease. This can lead to a lack of knowledge and understanding of the early signs of TB, which in turn can delay the recognition of symptoms and seeking medical help. Social and economic factors associated with secondary education levels, such as poverty or lack of access to adequate health facilities, can contribute to delayed TB diagnosis. This is in accordance with the findings in this study where most patients were classified as having secondary education, so that delayed diagnosis can be prevented.<sup>6</sup>

### **Delay in Diagnosis and Estimated Time to Treatment**

A study in 2023 stated that most patients had an estimated time to treatment of more than 21 days, which exceeds the WHO recommendation. However, the estimated time to treatment varies widely across studies and depends on socioeconomic factors and facilities available at health services. Most patients were only diagnosed at the second visit. The researchers assume that in this study, health service-related factors contributed to the delay in diagnosis, emphasizing the importance of innovation in health systems to reduce the number of late diagnoses to prevent local transmission and support adequate management.<sup>29</sup>

### **Delay in Diagnosis and Health Service Action**

Bivariate analysis in this study regarding delay in diagnosis and health service action, there was no significant positive relationship between the two variables. This can be caused by several factors such as self-awareness of health status, access to health services, and cultural factors such as the tendency of patients to seek alternative treatments. Atypical clinical manifestations of TB and resembling other respiratory infections can cause patients to be non-compliant with diagnostic procedures, so that even though the health service actions provided are adequate, patients will continue to seek alternative treatments and diagnoses until TB symptoms are quite severe. In a study conducted in India, it was stated that patients tend to visit several

health facilities before receiving a TB diagnosis because of fear of the cost of treatment and the belief that TB can heal on its own.<sup>9</sup>

### **Delayed Diagnosis and Stigma**

The bivariate analysis in this study regarding delayed diagnosis and stigma, found that there was no significant positive relationship between the two variables. These results are contrary to research by (Sardana and Khurana 2020) which showed that social stigma has a significant impact on health seeking behavior, where patients become more afraid to seek treatment. Stigma also affects the prospects of marriage and household life, especially in female patients. The stigma of TB disease tends to make patients afraid to seek treatment, contributing to delayed diagnosis.<sup>30</sup>

This study found that more patients with low stigma had delayed diagnosis. This is in line with research conducted by Sims, et al. 2021 where there was a higher proportion of patients with low stigma who had delayed diagnosis, so no significant correlation was found.<sup>31</sup> This could be due to the influence of external factors, such as waiting times at health services, lack of samples in the study and uneven distribution of research sampling locations. Higher waiting times tend to lead to delayed diagnosis and increased financial burden for patients. Researchers assume that individuals who experience positive stigma may ignore or underestimate symptoms that should be taken seriously or seek medical help. Research by Hamilton, et al. 2022 said that individuals with low stigma may fear being labeled as weak or vulnerable if they admit or seek help for mental health problems.<sup>32</sup> This can lead to delays in seeking diagnosis. There are also other variables that contribute to delayed diagnosis regardless of the stigma they have, such as self-motivation or self-efficacy, which were not examined in this study.<sup>33</sup>

### **Delay in Diagnosis and Knowledge**

Bivariate analysis in this study regarding delay in diagnosis and knowledge, there was no significant positive relationship between the two variables. Research by Freund, et al. 2023 showed that patients with a good level of knowledge tend to have better health seeking behavior.<sup>34</sup> Good knowledge of the disease and their personal health status makes individuals more self-aware and proactive in seeking treatment. There has been no research that specifically states that good knowledge can cause delays in diagnosis. Statistically, this study was not significant, it could be due to the lack of samples in the study and the uneven distribution of sampling locations. In this study, the researcher assumes that there are other factors that contribute to delays in diagnosis apart from patient knowledge because most patients who have good knowledge also have delays in diagnosis such as being too confident in their own knowledge so that they make self-diagnoses based on information obtained from the internet or other sources without medical validation and Good knowledge about a particular disease or medical condition may make someone afraid of getting a negative diagnosis, this can cause a delay in seeking professional help.<sup>35</sup>

### **Delayed Diagnosis and Distance to Health Facilities**

Access to health facilities, especially those providing TB diagnostics, may be lacking in rural areas. Rural residents also tend to have lower levels of health literacy, resulting in poorer health status and outcomes. However, the concept of urban-rural is dynamic and context-dependent, driven by migration, population, and economic growth over time. In this study, it was found that the respondents' distance to health facilities was quite homogeneous, where the distance was almost the same. This can cause bias, which is a factor that can influence the final results of the study that is not right (study error), so that there is no significant relationship between the two variables.<sup>28</sup>

## **CONCLUSION**

The characteristics of TB patients in Bengkulu City are mostly male. TB patients who experience late diagnosis and those who do not experience late diagnosis in Bengkulu City mostly have low stigma towards

TB disease. There is no significant relationship between late diagnosis and gender, age, education, income, occupation, distance from home to health services, location of residence, initial symptoms, first health service action, health service that the patient first visited. The time between initial symptoms until the patient seeks treatment for TB disease has a significant relationship with the occurrence of late diagnosis.

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