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Original Research

Social Stigma As a Determinant Of Tuberculosis Treatment Adherence In Public Health Centers

Retno Dewi Wulandari[1*], Diana Tri Lestari[1], Muhamad Jauhar[1]

[1] Faculty of Health Sciences, Muhammadiyah University of Kudus, Kudus, Central Java, Indonesia

ABSTRACT

Introduction: *Tuberculosis (pulmonary TB) is the leading infectious disease cause morbidity and mortality in Indonesia, ranking first. This is due to poor treatment adherence related to social stigma. Pulmonary TB has physical, economic, and social impacts, while self-efficacy and social stigma contribute to treatment adherence.*
Objective*: This study aims to analyze the relationship between social stigma and adherence to tuberculosis treatment in the productive age group.*
Method*: The study used a descriptive correlational design with a cross-sectional approach. The independent variable was social stigma, while the dependent variable was medication adherence. The study was conducted in the Japan Community Health Center Working Area from June to August 2025 with a sample of 59 respondents using a purposive sampling technique. The research instrument was a questionnaire on social stigma and medication adherence. Data analysis used the Spearman rank test.*
Result*: The results of the study showed that there was a statistically significant relationship between social stigma and adherence to treatment of pulmonary TB clients with a p-value of 0.000 ($p < 0.05$). The research results indicate a negative relationship between social stigma and adherence to pulmonary tuberculosis treatment, meaning that the higher the level of social stigma perceived by pulmonary TB patients, the lower their adherence to treatment.*
Conclusion*: Treatment adherence is influenced by social stigma. TB patients are expected to adhere to treatment, avoid social stigma, and utilize family and community support to promote healing.*

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CONTACT
*Muhamad Jauhar
muhamadjauhar@umkudus.ac.id
Faculty of Health Sciences, Universitas Muhammadiyah Kudus, Indonesia

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INTRODUCTION

Tuberculosis (pulmonary TB) ranks first as an infectious disease causing the most deaths in Indonesia. Human resource development can be threatened by the number of cases and the spread of pulmonary TB. The global pulmonary TB pandemic can be ended by the global health program, the Sustainable Development Goals (SDGs). Mortality rates can increase if pulmonary TB sufferers are not treated or receive medication. This leads to greater problems such as Multiple Drug-Resistant Tuberculosis (MDR-TB), which is pulmonary TB resistant to drugs. Furthermore, if untreated, the risk of pulmonary TB will increase due to the high risk of pulmonary TB transmission (28).

Treatment for drug-resistant pulmonary TB is more expensive than treatment for drug-sensitive pulmonary TB. The cost for a drug-sensitive pulmonary TB client is 900 thousand to 1.2 million rupiah per client, while the cost for an RO TB client is 222.36 million rupiah. According to the WHO, clients with pulmonary TB can experience difficulties such as losing work for 3 to 4 months and potentially losing between 20% and 30% of household income for one year. Pulmonary TB and poverty are closely related because densely populated conditions with low economic and sanitation levels, unhealthy home environments, and inadequate nutrition are potential for TB infection. Pulmonary TB can cause burdens for family members such as changes in social activities that disrupt family members, reduced free time, increased financial expenses, and feelings of worry, anger, fear, and guilt. The burden of TB can be measured by the number of cases and deaths that occur (21).

The 2023 Global TB Report published by the World Health Organization shows that Indonesia has the second-highest number of pulmonary TB cases after India, with 1,060,000 cases and 134,000 deaths. Every hour in Indonesia, 15 people die from pulmonary TB (45). Data from the Indonesian Ministry of Health in 2023 showed 969,000 cases of pulmonary TB, with 821,314 cases (84.8%) found and 147,686 cases (15.2%) not found (21). Pulmonary TB is estimated to have caused 134,000 deaths, with 17 deaths every hour. The estimated number of pulmonary TB cases increased by approximately 13% in 2024 compared to 1,092,000 cases in 2023. In 2022, the discovery of pulmonary TB cases in Indonesia reached its highest level since the last year, namely 724,309 cases. According to (39), Central Java had 118,184 reported pulmonary TB cases in 2023, exceeding the national target of 90% of the projected 73,856 cases. In 2021, 1,900 pulmonary TB cases were found. Pulmonary TB increased to 2,385 in 2022, 2,693 in 2023, and 2,923 in early 2024. The Japan Community Health Center contributed 99 of the most pulmonary TB cases in 2023 (21).

Mycobacterium tuberculosis infection, which causes pulmonary TB, is a common health problem in the community because it is spread through droplets. Conditions such as coughing, sneezing, and spraying contaminated saliva can contribute to the spread of the virus. (21). Pulmonary TB affects the lives of clients physically, economically, and socially. The physical impacts include physical weakness, decreased appetite, weight loss, persistent cough, and a pale appearance. This also has economic impacts, such as affecting the client's ability to work and decreasing income, making them the responsibility of healthy family members. Social impacts experienced by clients with pulmonary TB include ostracism due to the stigma of society believing they can be infected by being near the client. These

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impacts cause clients with pulmonary TB to experience stress due to the long treatment period and the side effects of consuming medications.

The incidence of pulmonary tuberculosis (TB) is increasing due to the long duration of treatment, which often leads to patients stopping medication before completion (41). This can pose a risk of disease, and many pulmonary TB patients have acid-fast bacilli (AFB) that are resistant to treatment. Treatment adherence is crucial because failure to follow treatment routinely can lead to microbial resistance to tuberculosis drugs. High adherence rates were 76.47%, moderate adherence 20.58%, and low adherence 2.95% (3). Understanding instructions, quality of interactions, family support, beliefs, attitudes, and personality are factors that influence adherence to treatment in pulmonary TB patients. Treatment failure can lead to disease transmission, requiring treatment to be restarted (42).

Pulmonary TB treatment, which lasts for 6-8 months, causes behavioral issues related to adherence. Several factors influence non-adherence among TB patients, including knowledge level, family support, and stigma (46). Stigma often occurs in pulmonary TB due to lack of knowledge, transmission, care, and relationships with certain groups (20). Social stigma originates from family and society. Social stigma results in negative perceptions such as social unacceptability and can lead to decreased self-esteem. Pulmonary TB patients experience social stigma in the form of loss of self-esteem, shame, fear, despair, and guilt. Stigma from society causes TB patients to be irregular in their treatment, lead to treatment failure, and reduce the success rate (30).

The results of the research conducted by (7) Analysis of Public Stigma with Treatment Compliance of Pulmonary TB Clients in the Community Health Center area in Nagan Raya Regency, a type of analytical observational research using a case-control design approach. The population of this study were all pulmonary TB clients who did not undergo complete treatment in the Community Health Center area in Nagan Raya Regency; the number of samples was 114 people, consisting of 57 cases and 57 people as controls. Based on the p-value, it shows a high stigma variable (p-value = 0.001) so that it is related to compliance with pulmonary TB client treatment with an odds ratio value of 4.4 times (95% CI; 1.88-10.6).

Meanwhile, the results of the study by (4) examined the self-stigma of pulmonary TB clients and its relationship with self-efficacy in adherence to pulmonary TB treatment at 18 community health centers in Jeneponto Regency. This study used a cross-sectional design with a sample size of 157 people. The data analysis used by the researcher was descriptive analysis, univariate, and bivariate. The results showed that 52.4% of respondents with high self-stigma had low self-efficacy towards medication adherence; of respondents with low self-stigma, 23.3% showed low self-efficacy towards medication adherence. This means there is a relationship between self-stigma and self-efficacy towards medication adherence with a p-value of 0.001.

From the two studies, it was stated that there were differences between the researchers. According to research by (4), factors associated with non-adherence to pulmonary TB treatment include education, employment, social support, family support, perceived support from healthcare providers, and high levels of stigma. Meanwhile, research by (4) revealed a correlation of self-stigma with self-efficacy. TB client treatment compliance takes into account self-stigma factors such as TB control management, providing information, and emotional support.

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The Health Belief Model (HBM) explains that individual health behavior is influenced by perceptions of disease threat and barriers encountered when performing health-related actions. Within the HBM framework, social stigma experienced by pulmonary tuberculosis patients is considered part of perceived severity and perceived barriers. Social stigma perceived by pulmonary TB patients—such as feelings of shame, discrimination, and fear of social rejection—can strengthen individuals' perceptions of the disease's impact as well as the psychosocial barriers to undergoing treatment. Adherence to pulmonary TB treatment represents an individual health behavior within the HBM framework. High levels of perceived social stigma can increase treatment barriers and negatively affect treatment adherence. Therefore, social stigma plays a role in influencing adherence to pulmonary TB treatment through perceived severity and perceived barriers (17).

Based on a preliminary study conducted at the Japan Community Health Center, Mejobo District, Kudus Regency, on January 4, 2024, through interviews with Lung program holders, three clients experienced Loss To Follow-Up (LTFU) because the client cannot control side effects such as nausea, loss of appetite, and weakness, so it is necessary to understand self-efficacy. In addition, as many as 4 patients died in the early phase of treatment due to a history of heart disease and diabetes mellitus. Clients with LTFU feel disappointed with themselves because they have pulmonary TB. Pulmonary TB clients limit themselves because they feel inferior to others who do not have pulmonary TB. In addition, pulmonary TB clients lack family support regarding treatment and still doubt themselves to complete treatment. Based on this phenomenon, it can be concluded that social stigmas regarding adherence to pulmonary TB treatment are still lacking.

The above research was conducted in different location settings, with different research type targets, sampling techniques, and data analysis, so the researcher specifically wanted to find out whether social stigma influences treatment compliance in the productive age group at the Japan Health Center, Mejobo District, Kudus Regency, by using different location settings, sample sizes, sample techniques, and data analysis by looking at social stigma in pulmonary TB treatment compliance in productive age clients to reduce cases and mortality rates. The focus of this study is to analyze the effect of social stigma on adherence to pulmonary tuberculosis treatment among clients of productive age, with the aim of reducing cases and mortality rates. The productive-age group is considered to be at high risk of contracting pulmonary tuberculosis. This underscores that individuals of productive age constitute a vulnerable group to this disease (24).

The results of this study will provide scientific insight for nurses to focus not only on clinical aspects but also on social aspects, namely reducing social stigma. Nurses can use a holistic educational or counseling approach to improve treatment adherence in pulmonary TB clients. The relationship between social stigma and pulmonary TB treatment adherence has important implications for planning health interventions. These interventions aim to reduce social stigma in pulmonary TB clients, such as psychosocial support. Increasing public awareness, treatment adherence, and health outcomes in pulmonary TB patients can help reduce social stigma.

The roles of nurses in this study include educators, care providers, and researchers. Nurses act as educators by providing health education to patients and

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their families to prevent disease transmission, educate them about risk factors for pulmonary TB, and increase knowledge about TB prevention. Nurses act as care providers by monitoring client adherence to treatment, providing emotional support, and conducting visits to assess client progress in adherence. Furthermore, nurses act as researchers by conducting direct research and identifying phenomena related to pulmonary TB. This study aims to analyze the relationship between social stigma and adherence to tuberculosis treatment in the productive age group.

METHOD

This study used a descriptive correlational design and a cross-sectional approach to analyze the relationship between social stigma and tuberculosis treatment adherence in the Japan Community Health Center working area, Mejobo District, Kudus Regency. Social stigma was the independent variable, and pulmonary TB treatment adherence was the dependent variable. The social stigma variable within the Health Belief Model (HBM) theoretical framework falls under the components of perceived severity and perceived barriers in pulmonary tuberculosis treatment. The treatment adherence variable within the Health Belief Model (HBM) framework is classified under the component of individual health behavior. This study was conducted from June to August 2025, with a population of 70 pulmonary TB clients and a sample of 59 clients determined through purposive sampling using the Slovin formula. Pulmonary TB clients diagnosed by a doctor, aged 19 years and over, undergoing initial or advanced treatment, able to read and write, and without complications were included in the inclusion criteria. Conversely, clients who were uncooperative or did not complete the study were excluded.

This study used the Internalized Stigma of Mental Illness Scale (ISMI) to measure social stigma. The ISMI instrument consists of 28 questions with Likert-scale response options (1–4) and has a score range of 28–112. Higher scores indicate a greater level of self-stigma. The ISMI questionnaire has been tested for validity and reliability by (23), with the validity test showing that all items had Pearson correlation values above 0.62 ($\alpha = 0.05$), thus confirming their validity. The reliability test yielded a Cronbach's alpha value of 0.964, indicating that the instrument is highly reliable.

The Morisky Medication Adherence Scale (MMAS-8) was used to measure medication adherence. The MMAS-8 questionnaire has been tested for validity and reliability by Rosyida (2015). The validity test of the MMAS-8 questionnaire was conducted by comparing the correlation value of each item with the r table value at a 5% significance level (r table = 0.355). The analysis results indicated that all items had correlation values above the r table threshold; therefore, all questionnaire items were declared valid. Furthermore, reliability testing was performed only on the valid items, resulting in a Cronbach's alpha value of 0.729, which is higher than the minimum threshold of 0.6. Thus, it can be concluded that the MMAS-8 questionnaire is a reliable instrument and can be used to measure medication adherence.

The research permit process began with academics, the Kudus District Health Office, the National Unity and Politics Agency, and the Japan Community Health Center. After obtaining the permits, the researchers coordinated with the TB program holders to collect data. The researchers conducted door-to-door visits to

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meet with clients, then explained the purpose, benefits, and procedures of the study to the clients and guaranteed their confidentiality. After the clients understood and agreed to participate, the researchers asked them to sign an informed consent form as a sign of their agreement. Data were collected through medication adherence and social stigma questionnaires, which were completed independently, with assistance from the researchers if necessary. The researchers ensured that all questionnaire items were completed completely to ensure no missing data. After all questionnaires were collected, the researchers conducted a data check (editing) to ensure the completeness and consistency of the answers. Then the code is given (coding) on each question item to facilitate the data input process. Next, data entry is carried out. The data was entered into the Statistical Package for the Social Sciences (SPSS). Data cleaning was performed to ensure there were no input errors.

Data analysis consisted of univariate analysis to describe the study variables and client characteristics. Bivariate analysis employed the Kolmogorov–Smirnov normality test because the sample size was 59 clients. The normality test results for medication adherence ($p = 0.000$) and social stigma ($p = 0.000$) showed significance values ≤ 0.05, indicating that the data were not normally distributed. Therefore, the researchers used the Spearman correlation test with a 5% significance level. Variables were considered to be related when the p-value was greater than 0.05. Respondent participation was voluntary, with full rights to refuse or withdraw from the study at any time without consequences. Confidentiality was ensured through the use of special codes without including personal identifiers. All data were stored securely and accessed only by the researchers, and will be destroyed in accordance with regulations after the study is completed. This research has been declared to have passed the ethical test by the Health Research Ethics Commission (KEPK) of Muhammadiyah University of Kudus with Number: 324/Z-7/KEPK/UMKU/V/2025 on June 12, 2025.

RESULTS

Table 1. Age of Pulmonary TB Clients (n = 59)

Variables	Mean	Median	Min-Max	SD
Age (years)	42.59	44	19-79	15.28

Table 1 shows that the average age of pulmonary TB clients is 42.59 years with a Standard Deviation (SD) of 15.28. The median age of pulmonary TB clients is 44 years, with the youngest being 19 years old and the oldest being 79 years old.

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Table 2. Gender, Marital Status, Education, Occupation, Income, and Duration of Illness of Pulmonary TB Clients (n = 59)

Characteristics	f	%
Gender		
Man	27	45.8
Woman	32	54.2
Marital status		
Not/Not Married	11	18.6
Marry	47	79.7
Widow/Widower	1	1.7
Education		
Never Went to School	8	13.6
Elementary School/Equivalent	24	40.7
Junior High School/Equivalent	5	8.5
High School/Equivalent	21	35.6
College	1	1.7
Work		
Doesn't work	5	8.5
Housewife	4	6.8
Self-employed	19	32.2
Trader	3	5.1
Laborer	28	47.5
Income		
No Income	9	15.3
< RMW (IDR 2,680,485.72)*	27	45.8
≥ RMW (IDR 2,680,485.72)*	23	39
Length of Illness		
1-2 Months	14	23.7
3-6 Months	45	76.3
Total	**59**	**100**

*) Regional Minimum Wage Kudus Regency in 2025

Table 2 shows that the majority of characteristics of pulmonary TB clients were female, 32 clients (54.2%); married, 47 clients (79.7%); graduated from elementary school/equivalent, 24 clients (40.7%); worked as laborers, 28 clients (47.5%); had income mostly <UMR, 27 clients (45.8%); and had the duration of illness mostly of 3-6 months, 45 clients (76.3%).

Table 3. Social Stigma and Treatment Compliance of Pulmonary TB Clients (n = 59)

Characteristics	Median	Minimum	Maximum
Stigma Social	70	66	85
Treatment Compliance	6	4	8

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Table 3 shows that the median total stigma score for pulmonary TB clients is 70, with a minimum total social stigma score of 66 and a maximum score of 85. The median social stigma score of 70 is included in the high social stigma category. According to research by (36), the median total stigma score is 66 with a minimum of 57 and a maximum of 74, indicating a high stigma category if the median value is close to the maximum value. The median total score of treatment adherence among pulmonary TB patients was 6, with a minimum score of 4 and a maximum score of 8. A median adherence score of 6 falls into the category of moderate adherence. The total treatment adherence score was classified into three levels: non-adherent if the total score was <6, moderately adherent if the total score was between 6 and <8, and adherent if the score was ≥8. (33).

Table 4. Relationship between Social Stigma and Treatment Compliance in Pulmonary TB Clients (n = 59)

	Treatment Adherence Score
Social Stigma Score	r = -0.512
	p = 0.000
	n = 59
Spearman Correlation Test	

Table 4 shows that there is a statistically significant relationship between social stigma and adherence to treatment of pulmonary TB clients with a p-value of 0.000 ($p<0.05$). The strength of the relationship between social stigma and treatment adherence was −0.512, indicating a moderate negative correlation. This suggests that the higher the level of social stigma experienced by pulmonary TB patients, the lower their treatment adherence.

DISCUSSION

Based on the results of pulmonary TB clients in the Japan Community Health Center work area, the average age of clients is productive adults. Based on data from the Indonesian Health Survey reported in 2023, 0.34% of the total population is aged 35-44 years (39). The results of the study are in line with research conducted by (12) which stated that pulmonary tuberculosis patients at Dirgahayu Hospital Samarinda are of productive age, 26-35 years. Based on this, the productive age group is one of the groups at risk of contracting pulmonary TB. This study is also in line with research (24) which shows that the age group most diagnosed with pulmonary TB at the Muliorejo Community Health Center is the productive age group 15-55 years. Based on the results of the study, it can be concluded that the productive age group is a group at high risk of contracting pulmonary TB. This is because at the productive age, humans are physically and biologically mature. Furthermore, people are at their peak of activity, engaging in more activities such as work and socializing, thus facilitating the increased transmission of pulmonary TB. Based on age group, the older a person is, the higher the risk of developing pulmonary TB. As age increases, the immune system also declines, making them more susceptible to the disease. A person aged over 40 years is 1.28 times more likely to develop pulmonary TB than someone aged under 40 years (6).

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Based on the research results, the gender of pulmonary TB clients is predominantly female. Based on (39) the majority of pulmonary TB clients are female, amounting to 434,270 people. This is in line with research by (43) which shows that the majority of female respondents, 9 people (60%), suffer from pulmonary TB, and a small portion of respondents, 6 people (40%), suffer from MDR-TB. These results are in line with research from (18) which shows that the study involved 30 respondents and the majority of female respondents, 18 people (60%), at the Totoli Community Health Center, Majene Regency. Based on this study, it can be concluded that women are at greater risk of contracting pulmonary TB. This may be influenced because women are indeed in a vulnerable position to pulmonary TB, especially if they are in low socio-economic conditions, have limited access to health care, and face a double workload.

Based on the research results, the majority of pulmonary TB clients are married. This finding is consistent with a study by (22), which found that the majority of pulmonary TB clients, approximately 88.2%, were married. This finding is also supported by a study by (11) which shows that the majority of the marital status is married, namely 25 people (73.5%) of pulmonary TB patients in the working area of the Ende City District Health Center. This study concludes that marital status is related to a person's susceptibility to pulmonary TB. Married individuals are generally of productive age, a period characterized by high levels of social activity and mobility, thus increasing the risk of exposure to pulmonary TB. Furthermore, after marriage, individuals tend to live in households with a spouse, children, or extended family. Transmission within families is also common, with one household member with pulmonary TB infecting others through close daily contact.

The research results show that the highest level of education for pulmonary TB clients is elementary school/equivalent. This research is in line with research by (35) which shows that as many as 36 people (45%) out of 80 people. The research results are also supported by research by (36) entitled "The Relationship Between Community Stigma and Medication Compliance of Pulmonary TB Patients at the Puhjarak Community Health Center, Plemahan District, Kediri Regency." The method used was a quantitative method with a descriptive correlational design. The probability sampling technique was used to determine the sample, and 45 pulmonary TB patients were obtained at the Puhjarak Community Health Center, Plemahan District, Kediri Regency. The results showed that the majority of clients' education was elementary school/equivalent, as many as 20 (44.4%) of the 45 pulmonary TB clients. One of the factors causing the increase in pulmonary TB is education. The higher the education, the higher the knowledge about health, thus raising awareness to behave in a healthier lifestyle. This suggests that education influences adherence to treatment for pulmonary TB. Education can also influence medication adherence, leading to successful treatment and recovery from pulmonary TB (9).

Based on the research results, the majority of clients with pulmonary TB work as laborers. This study is in line with research by (37) which stated that the majority of clients work as laborers, with a percentage of 46%. Similarly, research by (38) showed that the characteristics of respondents based on occupation were found to be almost half working as laborers (12 people) (38.7%). Occupation can influence whether a person is affected by the disease or not. According to (16)

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someone who does not work and spends more time at home will be more protected from exposure to pollution, dust, and germs that cause pulmonary TB, both from the environment and those caused by human-to-human transmission. Therefore, someone who works must pay more attention and avoid things that can cause exposure to pulmonary TB. From this study, it can be concluded that the high number of pulmonary TB cases in clients, the majority of whom are laborers, is caused by their work, work environment factors, physical burdens, socio-economic conditions, and limited access to health care, which makes clients more vulnerable to pulmonary TB.

Based on the research results, the majority of pulmonary TB clients' incomes are <UMR. This research is supported by research conducted by (32) which found that there were 47 clients with incomes <RMW (77%). The results of the study are in line with research by (40) which stated that the number of clients' incomes <RMW was 89.2%. Low economic status is closely related to an increase in the incidence of pulmonary TB (27). Based on this study, it can be concluded that factors related to low economic status are limited access to health services, inadequate housing conditions, poor nutrition, lack of education, and social stigma. Based on this study, it can be concluded that factors associated with low socioeconomic status include limited access to health care services, inadequate housing conditions, malnutrition, low educational attainment, and social stigma.

Based on the research results, the majority of clients experienced pulmonary TB for 3-6 months. This is in line with research by (27) which explained that the majority of characteristics of pulmonary TB clients had undergone treatment for 3-6 months, amounting to 28 people (46.7%). This research is in line with research by (4) which showed that based on the length of treatment, pulmonary TB clients had entered continuation treatment as many as 109 times (69.4%). Pulmonary TB treatment lasts for 6 months and consists of two phases, namely the intensive phase for the first 2 months and the continuation phase for the next 4 months. Based on the research results, it can be concluded that clients in the 3-6 month stage are more common because the continuation phase has a longer duration than the intensive phase, so naturally the number of clients distributed in this phase is greater.

Based on research conducted on TB patients in the Japan Community Health Center working area, the majority of TB patients experienced high levels of social stigma. The findings of this study indicate that high public stigma is the most dominant factor associated with non-adherence to pulmonary tuberculosis treatment (OR = 4.4; p = 0.001), in line with (4), who emphasized the relationship between self-stigma and self-efficacy. In contrast to (7), this study places greater emphasis on the impact of public stigma, highlighting the need for psychosocial interventions and family support to improve treatment adherence. This study aligns with research by (4), which showed that researchers at 18 community health centers in Jeneponto Regency, South Sulawesi, had self-stigma *in* the high category as many as 52.4% and in the low category as many as 23.3%. This study is strengthened by (19) which shows that the public stigma towards pulmonary TB disease in Bengkulu City is in the positive category for as many as 44 people (40.7%) and in the negative category for as many as 64 people (69.3%), so that most of the public stigma towards pulmonary TB disease in Bengkulu City is in the negative category. The source of stigma comes from fear of disease (pulmonary TB), fear of transmission, and fear of death (19). Feelings of stigma are related to

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fear of something real or societal attitudes that have the potential to cause discrimination originating from characteristics, diseases, or existing reality (15). Stigma is often a very strong phenomenon that occurs in society and is closely related to the values placed on social identity 10). Stigma is also associated with defects or flaws that exist in a person and a negative characteristic that is attached due to environmental influences (20).

In the Health Belief Model (HBM), stigma is considered a psychosocial factor that influences health beliefs and behaviors. Social stigma associated with pulmonary tuberculosis can increase perceived severity, as individuals view the disease not only as having medical consequences but also as leading to negative social consequences (17). Discrimination and feelings of shame often arise among pulmonary TB patients, causing them to perceive the disease as a serious threat to their social and psychological well-being. Stigma also functions as a perceived barrier to health. It can generate fear, concern about negative judgment, and low self-confidence in accessing health services (44). This may delay individuals from seeking treatment or lead to non-adherence, even when they understand the benefits of treatment. Therefore, stigma reduction efforts are a crucial component of HBM-based interventions to improve adherence to tuberculosis treatment (2).

Based on research conducted on pulmonary TB clients in the Japan Community Health Center Work Area, the majority of pulmonary TB clients' medication adherence was categorized as compliant. This research aligns with research by (36) which showed that the results of researchers in the Puhjarak Community Health Center Work Area, Plemahan District, Kediri Regency, regarding medication adherence in pulmonary TB patients conducted using a questionnaire showed that adherence to taking pulmonary TB medication was in the high category (57.8%), moderate category (22.2%), and low category (20%). This is also in line with research (24) that showed that 35 (58.3%) of 60 pulmonary TB clients had high medication adherence. Medication adherence can determine the success of treatment aimed at eliminating pulmonary TB germs (30). Adherence is a behavior that must be possessed by everyone undergoing treatment for chronic diseases, especially pulmonary TB (14). Medication adherence in pulmonary TB clients is an effort to increase cure rates, reduce mortality rates, and suppress the increase in the number of pulmonary TB cases (5).

The Health Belief Model (HBM) states that treatment adherence is influenced by individuals' beliefs regarding perceived susceptibility, disease severity, and the benefits of treatment. The higher the perceived risk and perceived benefits, the greater the likelihood that individuals will adhere to treatment to prevent complications and disease-related consequences. Conversely, perceived barriers such as medication side effects, long treatment duration, social stigma, and limited access to health services can reduce adherence. HBM emphasizes that adherence behavior is more likely to occur when the perceived benefits of treatment outweigh the perceived barriers (17).

This study specifically evaluates the relationship between community-derived social stigma and adherence to pulmonary tuberculosis treatment at Puskesmas Jepang, an aspect that has not been widely explored in this region. The findings emphasize the importance of implementing psychosocial interventions to improve patient adherence in completing treatment. In addition, this study analyzes the influence of sociodemographic factors such as productive age, gender, and

Gaster, 24 (1) 2026, 48-64
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socioeconomic status, which exacerbate the impact of stigma and provide a holistic picture of the vulnerability of tuberculosis patients. Therefore, a comprehensive approach that integrates psychosocial support and tailors interventions based on patient characteristics is required to address these challenges more effectively.

Research on pulmonary TB clients in the Japan Community Health Center Work Area indicates a statistically significant relationship between social stigma and TB treatment adherence. The majority of social stigma among pulmonary TB clients in the Japan Community Health Center Work Area is categorized as high. This is in line with the findings of (4) entitled "Does Self-Stigma Affect Self-Efficacy on Treatment Compliance of Tuberculosis Clients?" This study was conducted in Jeneponto Regency, South Sulawesi, at 18 Community Health Centers. This study used a cross-sectional study design, and a sample size of 157 was determined using a purposive sampling method. Based on the results of the study, there is a significant relationship between self-stigma and self-efficacy of treatment compliance ($p = 0.001$). The results of this study have implications for handling treatment compliance issues for pulmonary TB clients, which need to consider the issue of self-stigma. Controlling self-stigma to increase self-efficacy of treatment compliance can be done with a nursing approach. Nurses have a role in addressing the problem of self-stigma in pulmonary TB clients related to self-efficacy of treatment compliance by providing a number of nursing interventions. One of the nursing interventions that can be provided by nurses is through family support.

This study is also in line with the study by (8) entitled "The Relationship Between Stigma and Patient Compliance in TB Treatment at Bhakti Asih General Hospital, Ciledug in 2024." The research method used random sampling with a sample of 44 pulmonary TB patients at Bhakti Asih Hospital, Ciledug. The results showed that the majority of stigma was high (30%), low stigma (13%), and medication adherence was 97.7% categorized as high. The results of the analysis using the chi-square test found a significant relationship between stigma and adherence to taking pulmonary TB medication at Bhakti Asih General Hospital. Previous studies were also conducted in semi-urban areas.

The level of adherence to treatment in pulmonary TB patients is influenced by health behaviors such as knowledge, attitudes, the role of healthcare workers, and the role of medication supervision (47). Research findings indicate that medication adherence is influenced by factors within the patient's own desire for recovery. The client's desire for recovery encourages and motivates them to continue taking medication according to the rules and instructions of healthcare workers (8). Furthermore, the role of family, friends, and the environment also encourages clients to adhere to their treatment (1). Medication adherence may also decrease due to stigma associated with depression. Psychosocial factors constitute important barriers to treatment adherence behavior (29). Efforts to increase public knowledge about pulmonary tuberculosis, reduce stigma, and promote healthy behaviors are crucial for more effective tuberculosis control, underscoring the importance of collaboration among academics, communities, and key stakeholders.

Psychosocial support in tuberculosis treatment should not be overlooked. Mental health interventions, such as counseling and therapy, should be integrated as a standard component of TB care. Peer-to-peer programs, in which recovered TB patients mentor newly diagnosed patients, are particularly valuable because they

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provide emotional support, reduce feelings of isolation, and demonstrate that recovery is achievable (34). The development of a comprehensive self-esteem model enables nurses to deliver effective psychosocial support, thereby increasing patient motivation and adherence to TB treatment. Training for health care providers also strengthens stigma management and improves patients' physical, mental, and emotional quality of life. Tuberculosis-related stigma can be addressed through comprehensive health education campaigns involving the government, academics, non-governmental organizations, and local communities. These campaigns should incorporate psychosocial support, enhancement of patient self-esteem, and training for health care workers to deliver more effective education (13).

Addressing the challenges of tuberculosis requires a comprehensive approach that includes education, improved access to health care services, the use of technology for treatment monitoring, and regular evaluation. Close collaboration and the adaptation of strategies to local conditions are essential for effective tuberculosis control (31). This study was conducted to emphasize the importance of comprehensive management of pulmonary tuberculosis. Enhancing public knowledge and awareness, reducing stigma, and optimally involving families and health care providers can promote treatment adherence and improve health outcomes. Collaboration among academics, communities, and stakeholders is a key strategy for effective prevention and treatment, requiring continuous education and social support to achieve optimal results.

One limitation of this study was that some respondents did not understand the questionnaire items, so the researchers provided brief explanations and examples without influencing their responses. Furthermore, respondents' failure to attend scheduled treatment made data collection at the community health center more difficult. Therefore, the researchers used an effective door-to-door approach to explain the study's objectives and ensure the questionnaire was completed correctly. This study was conducted in a single primary health care center (Puskesmas); therefore, the findings may not be generalizable to other populations with different social or economic contexts. In addition, the study relied on self-report data to measure treatment adherence, without verification using clinical data such as sputum test results, treatment records, or pill counts. Furthermore, stigma and medication adherence data collected through questionnaires may be subject to reporting bias, as patients may be reluctant to disclose information honestly due to fear or social desirability. The use of additional data collection methods, such as in-depth interviews or direct observation, could help validate the responses and strengthen the findings.

CONCLUSION

This study found a significant relationship between social stigma and adherence to pulmonary tuberculosis treatment among individuals of productive age in the working area of Puskesmas Jepang ($p = 0.000$; $p < 0.05$). These results indicate that patients who experience social stigma tend to have lower treatment adherence, highlighting the critical importance of stigma-reduction interventions. Efforts to improve treatment adherence should involve family support, community education, and the active role of health care providers particularly nurses as educators, care providers, and monitors of patient adherence. Stigma reduction

strategies can be implemented through family education, community awareness programs, and community empowerment to ensure that patients feel accepted and motivated to complete their treatment. In addition, educational institutions are expected to integrate pulmonary tuberculosis education into their curricula and establish collaboration with health care institutions.

For future research, the use of a longitudinal design is recommended to observe the dynamics of stigma and treatment adherence over time. Experimental interventions aimed at reducing stigma, including educational programs and psychosocial support, may be implemented to assess their effectiveness. The use of digital technology as a tool for monitoring treatment adherence also represents a potential innovation to support therapeutic success. Through the implementation of these strategies, it is expected that social stigma can be minimized, treatment adherence improved, and health outcomes for pulmonary tuberculosis patients in the productive-age group optimized.

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