# THE RELATIONSHIP BETWEEN MEDICATION COMPLIANCE AND RECURRING PULMONARY TUBERCULOSIS INCIDENTS IN THE WORKING AREA OF THE KAMONING PUBLIC HEALTH CENTER

**Elok Alfiah Mawardi [1]\*, Atika Jatimi[2], Ahmadi[3], Jumrotul Aqobah[4]**

1.  Department of Nursing, Universitas Nazhatut Thullab Al-Muafa Sampang
2.  Department of Nursing, Universitas Wiraraja
3.  Department of Nursing, Universitas Nazhatut Thullab Al-Muafa Sampang
4.  Department of Nursing, Universitas Nazhatut Thullab Al-Muafa Sampang
*Corresponding Author: mawardielok99@gmail.com

***ABSTRACT***

Tuberculosis is an infectious disease caused by the bacterium Mycobacterium tuberculosis, which is spread through the inhalation of droplets. Transmission occurs through airborne particles called droplet nuclei, measuring 1-5 microns. This disease is highly contagious and carries a risk of developing treatment resistance if medication is not taken regularly. Tuberculosis patients must undergo treatment for 6-9 months to prevent the transmission of the disease to others around them. This study aimed to determine the relationship between medication adherence and relapse in tuberculosis patients. The research design used in this study was an analytical cross-sectional design with a population of 49 respondents. The 44 respondents were sampled using a probability sampling technique, specifically a random sampling technique. This study used a medication adherence questionnaire. The research results were processed through editing, coding, scoring, and tabulation, and then analyzed using SPSS using the chi-square test. The results of the study showed that 40 respondents (90.9%) took medication regularly, so they did not need to repeat the treatment. The results of secondary data related to recurrent pulmonary tuberculosis occurred in 2 respondents, with a presentation of 4.5%. A total of 42 respondents, with a presentation of 95.9% were declared completely cured and did not experience a relapse. The results of the chi-square test p-value 0.006 (< 0.05). It was concluded that there is a relationship between medication adherence and the incidence of pulmonary tuberculosis in the work area of the Kamoning Community Health Center.

**Keywords:** Infectious disease, Medication adherence, Tuberculosis

## INTRODUCTION

Tuberculosis (TB) is one of the ten leading causes of death worldwide. This disease is caused by the bacterium Mycobacterium tuberculosis, which primarily attacks the lungs but can also affect other organs such as the bones, kidneys, and central nervous system (Ministry of Health, 2020). According to a report by the World Health Organization (WHO, 2023), TB remains a serious global health problem, especially in developing countries with high population densities and suboptimal health systems. Globally, the highest incidence of pulmonary TB in Asia occurs in India with 2,324,590 cases, followed by Indonesia with 658,543 cases (WHO, 2023;

Health Research, 2023). These figures indicate that Indonesia has the second-highest TB burden in the world. At the national level, East Java Province is recorded as having around 74,000 pulmonary TB sufferers, while Sampang Regency has 1,365 cases (Sampang Health Office, 2023). According to data from the Kemuning Community Health Center, the number of pulmonary TB patients reached 96 in 2023. This high figure underscores the need for intensive prevention, treatment, and monitoring of therapy adherence to suppress transmission and complications.

TB transmission occurs through droplet nuclei or phlegm containing TB bacilli when an infected person coughs or sneezes, which are then inhaled by others (Corwin, 2010). After infection, Mycobacterium tuberculosis can remain dormant until the immune system weakens, causing TB nests to form in the lungs. Common symptoms of TB include coughing for more than two weeks, fever for more than a month, weight loss, shortness of breath, chest pain, loss of appetite, and night sweats without physical activity (Rahmaniati & Apriyani, 2018). If not treated thoroughly, TB can cause serious complications such as meningitis, spinal pain, joint damage, and disorders of the liver, kidneys, and heart (Puspasari, 2019). Treatment for pulmonary TB is carried out by administering Anti-Tuberculosis Drugs (OAT), which include Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Ethambutol (E), and Streptomycin (S) (Ministry of Health Regulation, 2016). However, the use of these drugs is not without side effects such as fever, nerve disorders, fatigue, muscle pain, vision and hearing impairment, and liver injury (Gilman, 2019). Furthermore, treatment failure often occurs due to poor patient compliance with regular medication use.

Factors influencing the success of TB therapy include medical and non-medical factors. Medical factors include initial complaints, comorbidities, drug side effects, and drug retention. Non-medical factors include age, gender, occupation, health worker attitudes, information and education communication (IEC), ease of access to health facilities, and the presence of Drug Monitors (PMOs) (Erawatyningsih et al., 2020). To reduce the incidence of pulmonary TB and improve therapy success, a comprehensive strategy is needed that includes improving health education, strengthening the medication monitoring system through PMOs, and improving primary health care services. Furthermore, coordination between health workers, patients, and families is necessary to ensure treatment is completed. A community-based approach is also crucial to raise public awareness of the dangers of TB and the importance of early detection. By implementing this strategy, it is hoped that the incidence and complications of pulmonary TB can be significantly reduced.

## METHODS
### Study design
This research is an analytical study using a cross-sectional study design. This design was chosen because the researcher wanted to determine the relationship between medication adherence variables and the incidence of recurrent pulmonary tuberculosis at the same time, without any follow-up. This study was conducted at the Kamoning Community Health Center, Sampang Regency. Data collection was carried out over two months, from June to July 2024.

### Population and sample
The population in this study was all patients with recurrent pulmonary tuberculosis registered in the work area of the Kamoning Community Health Center. The sample size in this study was 44 respondents who met the inclusion and

exclusion criteria set by the researcher. Sampling was carried out using a simple random sampling technique, so that each member of the population had an equal opportunity to be selected as a research respondent.

**Data collection**

The authors must disclose at the submission stage any restrictions on the availability of materials or information. New methods and protocols should be described in details, while well-established methods can be briefly described and appropriately cited. Research manuscripts reporting large datasets that are deposited in a publicly available database should specify where the data have been deposited and provide relevant accession numbers. If the accession numbers have not yet been obtained at the time of submission, the authors must state that they will be provided during review stages. They must be provided prior to publication. Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples. Temperatures should be in degrees Celsius. Blood pressures should be in millimetres of mercury unless other units are specifically required by the journal. In manuscripts that report on randomized clinical trials, the authors may provide a flow diagram in CONSORT format, including all of the information required by the CONSORT checklist.

**Data analysis**

The research instrument used was a closed questionnaire compiled by the researcher based on the theory and guidelines for tuberculosis treatment adherence. This questionnaire contains several questions to measure medication adherence in patients with recurrent pulmonary tuberculosis. Respondents were asked to complete the questionnaire independently with the assistance of the researcher to avoid bias in understanding the questions. The collected data were analyzed using univariate and bivariate analyses. Univariate analysis was used to describe respondent characteristics, while bivariate analysis was used to examine the relationship between medication adherence and the incidence of recurrent pulmonary tuberculosis. The statistical test used was the chi-square ($\chi^2$) test with a significance level of $\alpha = 0.05$.

**Ethical statement**

This research has been declared to have passed the ethical review by the research ethics commission of Nazhatut Thullab Al-Muafa University, Sampang, with the number 080/KEP/UNT/DEA/VII/2024.

**RESULTS**

Table 1. Table of general characteristics of research respondents.

| Characteristic | Indicators | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 16 | 36.4 |
| | Female | 28 | 63.6 |
| | Total | 44 | 100.0 |
| Age (year) | 15-30 | 17 | 38.6 |
| | 31-45 | 12 | 27.3 |
| | 46-60 | 9 | 20.5 |
| | 61-75 | 6 | 13.6 |

| Characteristic | Indicators | Frequency | Percentage |
|---|---|---|---|
| | Total | 44 | 100.0 |

The majority of respondents were female, totaling 28 individuals (63.6%), while males accounted for 16 individuals (36.4%). Based on age, most respondents were between 15–30 years (38.6%), followed by 31–45 years (27.3%), indicating that younger participants dominated the total of 44 respondents.

Table 2. Specific data of research respondents.

| Characteristic | Indicators | Frequency | Percentage |
|---|---|---|---|
| Medication adherence | Adherent | 33 | 75 |
| | Non-Adherent | 11 | 25 |
| | Total | 44 | 100.0 |
| Distribution of CDR achievement | 2021 | Not in accordance with the national standard | 56 |
| | 2022 | Not in accordance with the national standard | 47 |
| | 2023 | In accordance with the national standard | 93 |
| Distribution of SR achievement | 2021 | Not in accordance with the national standard | 79 |
| | 2022 | Not in accordance with the national standard | 66 |
| | 2023 | In accordance with the national standard | 95 |

The data show that most respondents were adherent to medication, with 33 individuals (75%) following treatment regularly, while 11 (25%) were non-adherent. The CDR achievement increased significantly from 56% in 2021 and 47% in 2022—both below the national standard—to 93% in 2023, meeting the national target. Similarly, SR achievement improved from 79% and 66% to 95% in 2023, aligning with national standards.

**DISCUSSION**

A study conducted in the working area of Kemuning Health Center revealed that among 44 tuberculosis (TB) patients who were still undergoing treatment, 33 individuals (75%) adhered to their prescribed medication regimen, while 11 patients (25%) were non-adherent. The majority of compliant patients demonstrated a strong commitment to recovery and avoided treatment interruption to prevent relapse, whereas non-adherent patients often cited forgetfulness or failure to carry medication during travel as primary reasons for non-compliance. From program performance data between 2021 and 2023, the Case Detection Rate (CDR) for TB fluctuated, starting at 68% in 2021, decreasing to 49% in 2022, and rising significantly to 93% in 2023, surpassing the national standard of ≥70%. The treatment Success Rate (SR) also varied, reaching 79% in 2021, dropping to 66% in

2022, and increasing markedly to 95% in 2023—exceeding the national target of 91.05% (Ministry of Health, 2016). These findings indicate improvements in TB control efforts in the region, particularly regarding patient recovery and detection performance.

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis, a rod-shaped bacterium measuring 1–4 microns that does not produce spores or toxins (Infodatin, 2018). This bacterium is acid-resistant (ABC) due to the high lipid content in its cell wall. TB primarily attacks the lungs, although it can spread to other organs such as the bones, kidneys, and brain. The main symptoms of pulmonary TB include a cough with phlegm for two weeks or more, accompanied by additional symptoms such as fever, shortness of breath, weight loss, night sweats, and loss of appetite (Basra, Hariadi, & Murniati, 2018).

The Indonesian government has implemented a national tuberculosis control program through the Directly Observed Treatment Shortcourse (DOTS) strategy since 1995. This strategy includes five main components: political commitment and funding support, TB diagnosis by microscopic examination, treatment using anti-tuberculosis drugs (OAT) directly supervised by a Drug Supervisor (PMO), drug availability, and a system for recording and reporting TB program results (Fitri, 2018). The implementation of DOTS aims to ensure regular treatment and prevent drug resistance. However, the success of this strategy depends heavily on patient compliance during therapy. Treatment adherence is defined as a patient's consistent adherence to the recommendations and treatment plan provided by healthcare professionals (Ministry of Health of the Republic of Indonesia, 2018). Adherence is a form of patient awareness and responsibility for the healing process, influenced by interactions between patients and healthcare professionals, their level of knowledge, and family support. According to Notoatmodjo (2015), a person's adherence can be measured through observing behaviors that demonstrate compliance with medical instructions.

Non-adherence in pulmonary TB patients is a major problem, resulting in low cure rates, an increased risk of relapse, and the emergence of drug resistance, including multidrug-resistant tuberculosis (MDR-TB). Several factors influencing non-adherence include a lack of understanding of the importance of completing treatment, boredom due to the long duration of therapy, drug side effects, and limited social support (Wahyuni, Widyastuti, & Padli, 2019). The results of this study align with this theory, as the majority of compliant patients demonstrated a high level of awareness of the importance of regular medication to prevent relapse. Non-compliant patients generally reported forgetting to take their medication, particularly when traveling or when they felt better. This suggests that behavioral and habitual factors play a significant role in the success of pulmonary TB therapy. Therefore, ongoing support from healthcare workers and PMOs is needed to ensure patients remain diligent in taking their medication until treatment is complete.

## CONCLUSION
The research results show that there is a clear relationship between drug compliance and relapse in tuberculosis sufferers.

## CONFLICT OF INTEREST
researchers have no particular interests.

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