MINH
MALAHAYATI INTERNATIONAL JOURNAL OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024
Nomor: 79/E/KPT/2023

ARTICLE INFORMATION
Received: February, 5, 2026
Revised: June, 7, 2026
Available online: June, 9, 2026
at : https://e-jurnal.iphorr.com/index.php/minh

Determinants of medication non-adherence among pulmonary tuberculosis patients: A cross-sectional secondary data analysis

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Abstract

Background: Pulmonary tuberculosis is an infectious disease that remains as a major public health problem in Indonesia. Successful tuberculosis treatment largely depends on patients' adherence to regular and continuous medication intake. Medication adherence behavior can be classified into adherence and non-adherence, with the medication non-adherence behavior increasing the risk of treatment failure, drug resistance, disease relapse, and ongoing transmission. This behavior is determined by a range of factors operating at the individual, social, and health system levels.
Purpose: To analyze the determinants associated with medication non-adherence behavior among pulmonary tuberculosis patients based on data from the 2023 Indonesian Health Survey.
Method: A cross-sectional observational study was conducted using secondary data from the 2023 Indonesian Health Survey, including 2,435 respondents, all of whom were pulmonary tuberculosis patients recorded in the SKI 2023 dataset. Independent variables consist of predisposing factors (age, gender, education, employment status, place of residence, perception of being cured, use of traditional medicine, intolerance to drug side effects, and boredom or reluctance to take medication regularly), enabling factors (limited availability of medication), and reinforcing factors (presence of a treatment supervisor). Medication non-adherence behavior was the dependent variable in this study and the bivariate analysis was performed using chi-square tests, with statistical significance set at $p < 0.05$.
Results: The findings showed significant associations between medication non-adherence behavior and several predisposing, enabling, and reinforcing factors ($p < 0.05$). Predisposing factors significantly associated with irregular medication intake including age, education, employment status, place of residence, perception of being cured, use of traditional medicine, intolerance to drug side effects, and boredom or reluctance to take medication regularly. Enabling factors, particularly limited availability of anti-tuberculosis medication at health facilities, were also significantly associated with irregular medication-taking behavior. In addition, reinforcing factors, namely the absence of a treatment supervisor, showed a significant association with irregular medication taking behavior.
Conclusion: Medication non-adherence behavior among pulmonary tuberculosis patients is influenced by predisposing, enabling, and reinforcing factors. Improving treatment adherence requires comprehensive strategies, including strengthened patient education, improved access and availability of tuberculosis services, and strengthened treatment supervision through the presence of a treatment supervisor.

Keywords: Cross-Sectional; Medication Non-Adherence; Pulmonary Tuberculosis.

DOI: https://doi.org/10.33024/minh.v9i3.2520

INTRODUCTION

Pulmonary tuberculosis is a chronic infections disease caused by *Mycobacterium tuberculosis* and still remains as a major public health problem worldwide. Based on the location of infection, tuberculosis is classified into pulmonary tuberculosis and extrapulmonary tuberculosis (Windiyaningsih, Abidin, & Murtiani, 2018). Transmission of pulmonary tuberculosis occurs through airborne particles when infected individuals expel respiratory secretions containing *Mycobacterium tuberculosis* during coughing or sneezing, allowing droplet nuclei to remain suspended in the air (Ulfah, Windiyaningsih, Abidin, & Murtiani, 2018). Although not all individuals exposed to the bacteria develop active disease, tuberculosis continues to pose a significant threat due to its high transmissibility and potential for widespread infection.

According to the World Health Organization (WHO), approximately one-quarter of the global population is infected with tuberculosis, with an estimated 10,8 million cases and 1,25 million deaths reported globally in 2023 (World Health Organization, 2024). Indonesia remains a major contributor to the global pulmonary tuberculosis burden, accounting for nearly 10% of cases and ranking second worldwide (Tarmizi, 2024). National data from the Indonesian Ministry of Health reported 1,092,000 tuberculosis cases with approximately 134,000 deaths annually in 2024, representing an increase of about 13% compared to 2023. Provincial distribution shows that tuberculosis cases are concentrated in several regions, with West Java, East Java, and Central Java contributing the highest proportions nationally (Ministry of Health of the Republic of Indonesia, 2024). These figures highlight the ongoing challenge of tuberculosis control in Indonesia.

Tuberculosis treatment relies on long-term administration of anti-tuberculosis drugs using standardized regimens recommended by WHO (Isbaniah, Burhan, Sinaga, Yanifitri, Handayani, Sugiri, 2021). For drug-sensitive tuberculosis, treatment consists of an intensive phase followed by a continuation phase lasting a total of six to nine months. Although effective therapy is widely available, treatment success is highly dependent on patient's adherence to regular and continuous medication intake. Medication non-adherence behavior increases the risk of treatment failure, disease relapse, and drug resistance, which may necessitate prolonged treatment with second-line drugs and lead to more severe complications (Komariah, Hamid, & Garus, 2023). Additionally, anti-tuberculosis drugs are associated with various side effects, including gastrointestinal disturbances, hepatotoxicity, neurological symptoms, and sensory impairments, which may further discourage patients from adhering to treatment (Ministry of Health of the Republic Indonesia, 2023).

Medication adherence behavior among pulmonary tuberculosis patients is influenced not only by medical factors but also by behavioral and environmental determinants. Health behavior is shaped by predisposing, enabling, and reinforcing factors. Predisposing factors refer to individual characteristics that exist prior to the occurrence of behavior and influence motivation to adopt health related actions. These include attitudes, perceptions, knowledge, beliefs, values, as well as socioeconomic and sociodemographic characteristics such as age, gender, education level, employment status, and place of residence (Green, Gielen, Kreuter, Peterson, & Ottoson, 2022). Attitudes reflect an individual's internal response toward an object involving opinions and emotions, while perceptions are cognitive processes that form subjective interpretations that may not always reflect actual conditions. Knowledge, largely acquired through sensory experiences particularly vision and hearing plays a crucial role in shaping health behavior, whereas beliefs represent convictions held by individuals or communities regarding disease causation, treatment, prevention, and health maintenance (Prayogo, 2013).

Sociodemographic characteristics further influence individual health conditions and behaviors. Age determines specific characteristics across life stages, gender reflects biological differences that may affect health outcomes, education influences the ability to access and apply health information, employment affects stress levels and access to resources, and place of residence determines environmental quality and access to health services. Economic status, including income and household wealth, also plays a critical role in determining access to basic needs and healthcare services, thereby

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directly or indirectly affecting health behavior and overall well being (Dhewi, Armiyati, & Supriyono, 2012). Based on the 2023 Indonesian Health Survey, medication non-adherence behavior among pulmonary tuberculosis patients is influenced by several predisposing factors, including patients' perceptions of being cured before completing treatment, the use of traditional medicine as an alternative due to misconceptions and inaccurate knowledge, intolerance to drug side effects, and feelings of boredom or reluctance to take medication regularly due to the long duration of tuberculosis treatment (Ministry of Health of the Republic Indonesia, 2023).

Enabling factors refer to resources, facilities, and skills that facilitate or hinder the implementation of desired health behaviors (Green et al., 2022). These include access to healthcare facilities, transportation, and the availability of essential medicines. Structural barriers such as long distances to healthcare facilities, limited transportation options, and inadequate availability of anti-tuberculosis drugs at health facilities have been identified as obstacles to optimal medication adherence behavior, particularly among patients residing in areas with limited healthcare infrastructure. Patients living far from health facilities are more likely to experience difficulties in maintaining regular treatment schedules, while inadequate transportation and limited drug availability further exacerbate barriers to consistent medication use (Ryansyah, Martilova, Putri, & Sinaga, 2023).

Reinforcing factors are external influences that strengthen or sustain behavior over time, including support from family members, healthcare providers, and treatment supervisors (Hanlon, 2019). Within tuberculosis control programs, the presence of a treatment supervisor plays a critical role in supporting medication adherence behavior. Treatment supervisors are responsible for directly supervising drug intake, providing treatment-related education, addressing concerns related to drug side effects, and offering emotional support to patients and their families as part of the Directly Observed Treatment Short-course (DOTS) strategy recommended by the World Health Organization (Isbaniah, Burhan, Sinaga, Yanifitri, Handayani, Sugiri, 2021) Several studies have consistently shown that the presence of a treatment supervisor is significantly associated with improved medication adherence behavior among pulmonary tuberculosis patients (Dhewi et al., 2012).

The 2023 Indonesian Health Survey provides nationally representative data that allow a comprehensive assessment of predisposing, enabling, and reinforcing factors related to medication adherence behavior among pulmonary tuberculosis patients. This study aimed to analyze the association between predisposing, enabling, and reinforcing factors and medication non-adherence behavior among pulmonary tuberculosis patients in Indonesia.

RESEARCH METHOD

A cross-sectional observational design was employed, collecting data at a single point in time to examine associations between risk factors and outcomes. The independent variables consisted of predisposing factors (age, gender, education level, employment status, place of residence, perception of feeling cured, use of traditional medicine, inability to tolerate drug side effects, and feelings of boredom or reluctance to take medication regularly), enabling factors (availability of anti-tuberculosis drugs at healthcare facilities), and reinforcing factors (presence of a treatment supervisor). The dependent variable in this study was medication non-adherence behavior among pulmonary tuberculosis patients.

This study utilized secondary data from the 2023 Indonesian Health Survey conducted by the Ministry of Health of the Republic of Indonesia. A total of 2,435 pulmonary tuberculosis patients who provided complete information on medication adherence behavior were included in the analysis. Therefore, the final analysis was conducted using data from these 2,435 respondents in accordance with data availability.

Descriptive statistics were used to summarize the characteristics of the study population and the distribution of independent and dependent variables. Bivariate analysis was conducted using the chi-square test to assess the association between medication non-adherence behavior and each independent variable, including predisposing, enabling, and reinforcing factors. Statistical significance was determined at a p-value of less than 0.05 with a 95% confidence interval (CI).

This study obtained ethical approval from the Research Ethics Commission of the Faculty of Medicine, Universitas Trisakti, under approval number 067/KER/FK/08/2025. All data analyzed were secondary and anonymized, ensuring participant confidentiality and compliance with ethical standards for research involving human subjects.

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RESEARCH RESULTS

Table 1. Characteristics of Respondents, Association between Predisposing, Enabling, and Reinforcing Factors and Medication-taking Behavior (N=2,435)

Variables	Results	Medication-taking behavior		p-value	PR	95%CI
		Non-adherence	Adherence			
Predisposing Factors						
Age (Mean±SD)(Range)(Year)	(40.68±22.492)					
Age (n/%)						
0 – 14	446/18.32	150/33.6	296/66.4	0.000	2.10	1.790 - 2.470
15 - 24	157/6.45	29/18.5	128/81.5			
25 – 64	1,482/60.86	288/19.4	1,194/80.6			
≥ 65	350/14.37	76/21.7	274/78.3			
Gender (n/%)						
Male	1,462/60.04	317/21.7	1,145/78.3	0.370	0.934	0.803 - 1.805
Female	973/39.96	226/23.2	747/76.8			
Education (n/%)						
< 12 years	1,492/61.27	387/25.9	1,105/74.1	0.000	1.568	1.327 - 1.853
≥ 12 years	943/38.73	156/16.5	787/83.5			
Employment Status (n/%)						
Employed	1,357/55.73	269/19.8	1,088/80.2	0.001	0.780	0.673 - 0.904
Unemployed	1,078/44.27	274/25.4	804/74.6			
Residence (n/%)						
Urban	1,253/51.46	224/17.9	1,029/82.1	0.000	0.662	0.569 - 0.771
Rural	1,182/48.54	319/27.0	863/73.0			

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Variables	Results	Medication-taking behavior		p-value	PR	95%CI
		Non-adherence	Adherence			
Patient's Perception of Having Recovered (n/%)						
Positive	147/6.04	147/100.0	0/0.0	0.000	5.778	5.283 - 6.319
Negative	2,288/93.96	396/17.3	1,892/82.7			
Use of Traditional Medicine (n/%)						
Yes	26/31.6	26/100.0	0/0.0	0.000	4.660	4.317 - 5.029
No	2,409/66.3	517/21.5	1,892/78.5			
Drug Side Effects Tolerance (n/%)						
Yes	2,402/98.64	510/21.2	1,892/78.8	0.000	0.212	0.197 - 0.229
No	33/1.36	33/100.0	0/0.0			
Feeling Bored or Reluctant to Take Medication Routinely (n/%)						
Yes	74/3.04	74/100.0	0/0.0	0.000	5.034	4.642 - 5.459
No	2,361/96.96	469/19.9	1,892/80.1			
Enabling Factors						
Limited Availability of Medication at Health Facilities (n/%)						
Available	2,215/90.97	323/14.6	1,892/85.4	0.000	0.146	0.132 - 0.161
Not available	220/9.03	220/100.0	0/0.0			
Reinforcing Factors						
Presence of a Treatment Supervisor (n/%)						
Yes	1,335/54.83	104/7.8	1,231/92.2	0.000	0.195	0.160 - 0.238
No	1,100/45.17	439/39.9	661/60.1			
Medication Adherence Behavior (n/%)						
Adhered	1,892/77.7					
Non-adhered	543/22.3					

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Table 1 outlines the respondents' characteristics. The majority were aged 25–64 years (n = 1,482; 60.86%), with males comprising most of the sample (n = 1,462; 60.04%). A substantial proportion (n = 1,492; 61.27%) had attained less than 12 years of education, and more than half were employed (n = 1,357; 55.73%). Slightly over half resided in urban areas (n = 1,253; 51.46%). Regarding treatment-related and behavioral factors, 1,335 respondents (54.83%) reported support from a treatment supervisor. In terms of perceptions, nearly all patients (n = 2,288; 93.96%) did not consider themselves cured, and 2,409 (98.93%) reported not using traditional medicine. With respect to healthcare access, 2,215 respondents (90.97%) indicated adequate availability of anti-tuberculosis drugs at health facilities. Most patients (n = 2,402; 98.64%) tolerated drug side effects, while 2,361 (96.96%) did not experience boredom or lack of motivation in treatment adherence. Furthermore, 1,892 respondents (77.7%) demonstrated consistent medication adherence behavior.

Age, education, employment, residence, and treatment-related perceptions were significantly associated with medication non-adherence. Younger patients (PR = 2.10; $p < 0.001$) and those with <12 years of education (PR = 1.568; 95% CI: 1.327–1.853; $p < 0.001$) had higher non-adherence, while employment (PR = 0.780; 95% CI: 0.673–0.904; $p = 0.001$) and urban residence (PR = 0.662; 95% CI: 0.569–0.771; $p < 0.001$) were protective. Gender showed no significant association ($p = 0.370$). Patient perceptions strongly influenced adherence: perceiving oneself as cured (PR = 5.778; 95% CI: 5.283–6.319; $p < 0.001$) and using traditional medicine (PR = 4.660; 95% CI: 4.317–5.029; $p < 0.001$) markedly increased non-adherence. Tolerance to drug side effects (PR = 0.212; 95% CI: 0.197–0.229; $p < 0.001$), absence of boredom (PR = 5.034; 95% CI: 4.642–5.459; $p < 0.001$), adequate drug availability (PR = 0.146; 95% CI: 0.132–0.161; $p < 0.001$), and treatment supervision (PR = 0.195; 95% CI: 0.160–0.238; $p < 0.001$) were strong protective factors.

DISCUSSION

Predisposing Factors and Medication Adherence Behavior among Pulmonary TB Patients

The findings of this study indicated that age was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. Adult patients tended to have a better understanding of the importance of treatment continuity, particularly because some had previous experiences with illness or a stronger awareness of the consequences of non-adherence medication, such as the risk of relapse or drug resistance (Hisran, Sugiarti, Nasution, & Ningsih, 2024). This finding is consistent with a previous study which demonstrated a significant correlation between age and medication adherence, with the highest adherence rate observed among patients aged over 50 years, reaching 90% (Nisa, Ruhyana, & Affandi, 2025). Similarly, another study reported that age was one of the factors influencing patients medication adherence (Yulita, Ekawati, Priyatno, & Gustina, 2025). These findings indicate that increasing age is associated with greater of the importance of consistent medication adherence behavior and a stronger sense of responsibility in following prescribed treatment regimens.

The results of this study showed that gender was not significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding aligns with the previous study which also reported no significant association between gender and pulmonary tuberculosis patients medication adherence behavior. The study explained that differences in medication adherence were more strongly influenced by individual factors, such as motivation to recover, understanding of the importance of consistent medication intake, and social support, rather than biological factors such as gender. In addition, the relatively equitable access to healthcare facilities, community health education, and government pulmonary tuberculosis control programs across Indonesia may contribute to similar medication adherence behavior among both men and women, resulting in comparable adherence levels (Elizah, Zaman, & Wahyudi, 2024). This finding is further supported by another study which also reported no significant relationship between gender and adherence to anti-tuberculosis drug consumption. The study indicated that both male and female pulmonary tuberculosis patients shared a similar desire to recover and to prevent disease transmission to their families, which encouraged adherence to the prescribed treatment regimen (Nasaruddin, Pramono, & Wiryansyah, 2024).

The findings of this study revealed a significant association between education level and medication non-adherence behavior among pulmonary

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tuberculosis patients. This result is consistent with former study which indicated that education level influences patients' understanding of medication regimens, treatment duration, ability to follow instructions, and awareness of complications arising from non-adherence medication. The study emphasized that higher educational attainment is associated with better health literacy, decision-making capacity, and the ability to integrate medication-taking routines into daily activities (Putri, Zaman, Priyanto, & Ekawati, 2025). Similarly, another study reported that education level affects TB patients' knowledge and comprehension related to disease prevention and treatment. Patients with lower educational attainment were more likely to be nonadherent, as they tended to perceive treatment outcomes as ineffective or meaningless (Absor, Nurida, Levani, & Nerly, 2020).

The results of this study indicated that employment status was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding is consistent with previous study which explained that employed individuals tend to have better access to healthcare services and greater ability to manage daily routines, thereby supporting consistent pulmonary tuberculosis medication intake. Additionally, the workplace environment may increase exposure to health information, strengthening motivation and understanding of the importance of treatment adherence (Samory, Yunalia, & Suharto, 2022). Similarly, another study reported that employment status influences treatment adherence by encouraging individuals to take greater responsibility for their health (Harits, Murni, & Suryani, 2025).

The findings of this study showed a significant association between place of residence and medication non-adherence behavior among pulmonary tuberculosis patients. This result is consistent with previous study which reported that place of residence was significantly associated with anti-tuberculosis drug medication adherence behavior in Indonesia. The study found that patients living in rural areas had higher levels of non-adherence compared to those living in urban areas. Contributing factors included limited access to healthcare facilities, long distances, transportation barriers, and insufficient health education. These findings support the notion that geographical conditions play an important role in determining long term medication non-adherence behavior among pulmonary tuberculosis patients, particularly in areas with uneven distribution of healthcare services (Lolong, Aryastami, Kusrini, Tobing, Tarigan, Isfandari, & Ariati, 2023). This result is also consistent with another study which stated that place of residence influences treatment seeking behavior and medication adherence behavior among pulmonary tuberculosis patients (Yulisetyaningrum, Hidayah, & Yuliarti, 2019).

The results of this study showed a significant association between patients' perception of being cured and medication non-adherence behavior among pulmonary tuberculosis patients. This finding aligns with previous study which reported that the perception of being cured was a factor associated with pulmonary tuberculosis patients medication adherence behavior. The study found that patients who experienced symptom improvement during the intensive phase of treatment tended to assume they were cured and subsequently discontinued treatment prematurely. This misconception was largely influenced by inadequate education regarding the mechanism of action of pulmonary tuberculosis drugs and the importance of completing long-term therapy to prevent drug resistance and relapse. These findings reinforce the importance of continuous education, effective communication, and clear explanations regarding the necessity of completing the six-month treatment regimen to prevent non-adherence resulting from perceived recovery (Dachi, Dachi, Sitorus, Nababan, & Tarigan, 2024).

The results of this study indicated that the use of traditional medicine as an alternative treatment was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding is consistent with previous study which revealed that sociocultural factors, including the use of traditional remedies and beliefs in non-medical healing as an alternative, play a major role in pulmonary tuberculosis treatment behavior. The study reported that many patients preferred traditional medicine because it was more accessible, less costly, and perceived as more comfortable and culturally acceptable. Additionally, beliefs linking pulmonary

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tuberculosis to supernatural causes further reinforced patients' tendency to shift from medical treatment to traditional therapy. These findings highlight that limited understanding of pulmonary tuberculosis drug mechanisms, long treatment duration, and inadequate education regarding the consequences of discontinuing anti-tuberculosis drug may lead patients to stop treatment prematurely once symptoms begin to subside (Handayani, Shaluhiyah, Widjanarko, Susanto, & Agushybana, 2024).

The results of this study demonstrated that intolerance to drug side effects was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding is consistent with previous study which reported that side effects of antituberculosis drugs significantly influence medication adherence behavior among pulmonary tuberculosis patients. The study found that patients experiencing side effects such as nausea, vomiting, dizziness, or reddish discoloration of urine were at a higher risk of discontinuing treatment prematurely. Patients who are unable to cope with or tolerate drug side effects have more than twice the risk of non-adherence. This underscores the importance of patient education regarding drug side effects, intensive monitoring during the intensive phase of therapy, and appropriate management to ensure treatment continuation until completion (Christy, Susanti, & Nurmainah, 2022).

The findings of this study indicated that feelings of boredom or laziness in taking medication regularly were significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients This result is consistent with previous study which stated that psychological factors, including boredom or laziness due to the long duration of treatment, play a major role in reducing routine medication adherence behavior among pulmonary tuberculosis patients. Daily medication intake over a prolonged period can reduce patients' internal motivation, thereby increasing the risk of treatment discontinuation during both the intensive and continuation phases. The study emphasized that psychosocial interventions, comprehensive and continuous education, and family support are essential strategies to help patients overcome boredom or laziness and maintain adherence throughout TB treatment. These findings reinforce that boredom or laziness is not merely an emotional response but a factor that significantly affects treatment success among pulmonary tuberculosis patients (Fitri, Marlindawani, & Purba, 2018).

Enabling Factor and and Medication Adherence Behavior among Pulmonary TB Patients

The results of this study indicated that limited availability of medication at healthcare facilities was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding is consistent with previous study which found that consistent availability of anti-tuberculosis drugs at healthcare facilities is a crucial factor in maintaining patient adherence. The study explained that disruptions in drug supply can increase the risk of treatment interruption, particularly during the continuation phase when patients begin to feel symptomatic improvement. Furthermore, healthcare facilities with suboptimal drug distribution systems had a two to three fold higher risk of non-adherence due to irregular medication stock, which disrupts treatment continuity. These findings emphasize the importance of proper drug logistics management, routine supply chain monitoring, and standardized distribution systems to ensure long-term treatment success and prevent drug resistance in pulmonary tuberculosis patients (Al Fitry, Mahadewi, Heryana, & Ayu, 2022).

Reinforcing Factor and Medication Adherence Behavior among Pulmonary TB Patients

The results of this study demonstrated that the presence of a treatment supervisor was significantly associated with medication non-adherence behavior among pulmonary tuberculosis patients. This finding is consistent with previous study which reported a significant association between treatment supervisor presence and medication adherence behavior among pulmonary tuberculosis patients. The study explained that patients accompanied by a treatment supervisor had more than twice the likelihood of adhering to treatment compared to those without supervision, as treatment supervisors ensure direct observation of medication intake in accordance with the Directly Observed Treatment, Short-course (DOTS) strategy. In addition, treatment supervisors play a crucial role in motivating patients, monitoring drug side effects, and

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ensuring that patients attend scheduled follow up visits. These findings highlight that the presence of a treatment supervisor is a critical component of successful pulmonary tuberculosis therapy, as the absence of supervision increases the risk of treatment interruption during the medication period (Anggraeni, Wahyudin, & Purnama, 2023). This result is further supported by another study which also reported a significant association between treatment supervisor presence and medication adherence behavior among pulmonary tuberculosis patients (Suryana & Nurhayati, 2021).

CONCLUSION

This study demonstrates that medication non-adherence among pulmonary tuberculosis patients in Indonesia is shaped by predisposing, enabling, and reinforcing factors. Predisposing determinants include perceptions of being cured, reliance on traditional medicine, intolerance to drug side effects, low motivation or boredom, and sociodemographic characteristics (age, education, employment, residence, gender). Enabling factors, notably limited drug availability, hinder consistent treatment, while reinforcing factors such as treatment supervision enhance adherence. These findings highlight the need for integrated tuberculosis control strategies that address behavioral determinants, ensure uninterrupted drug supply, and strengthen supervisory support to optimize treatment outcomes.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the Health Research and Development of the Ministry of Health, Republic of Indonesia, for providing access to the secondary data from the 2023 Indonesian Health Survey, which formed the basis of this study.

REFERENCES

Absor, S., Nurida, A., Levani, Y., & Nerly, W. S. (2020). Hubungan Tingkat Pendidikan dengan Kepatuhan Berobat Penderita TB Paru di Wilayah Kabupaten Lamongan pada Januari 2016–Desember 2018. *Medica Arteriana (Med-Art), 2 (2), 80*.

Al Fitry, Z. R., Mahadewi, E. P., Heryana, A., & Ayu, I. M. (2022). Medication Compliance Analysis in Pulmonary Tuberculosis Patients at Bekasi Jaya Health Center Indonesia. *International Journal of Health and Pharmaceutical (IJHP)*, *2*(3), 447-459.

Anggraeni, I., Wahyudin, D., & Purnama, D. (2023). Hubugan Peran Pengawas Minum Obat (PMO) dengan Kepatuhan Minum Obat pada Pasien Tuberculosis Paru di Wilayah Kerja UPTD Puskesmas Gunungguruh Kabupaten Sukabumi. *Jurnal Kesehatan Tambusai*, *4*(4), 4834-4844.

Christy, B. A., Susanti, R., & Nurmainah, N. (2022). Hubungan Tingkat Kepatuhan Minum Obat Pasien Tuberkulosis Terhadap Efek Samping Obat Anti Tuberkulosis (OAT). *Journal Syifa Sciences and Clinical Research*, *4*(2).

Dachi, S., Dachi, R. A., Sitorus, M. E. J., Nababan, D., & Tarigan, F. L. (2024). Faktor Yang Berhubungan Dengan Kepatuhan Minum Obat Anti Tuberkulosis (Oat) Pada Pasien Tb Paru di Wilayah Kerja Puskesmas Lahomi Kecamatan Lahomi Kabupatan Nias Barat. *PREPOTIF: Jurnal Kesehatan Masyarakat*, *8*(1), 816-843.

Dhewi, G. I., Armiyati, Y., & Supriyono, M. (2012). Hubungan antara pengetahuan, sikap pasien dan dukungan keluarga dengan kepatuhan minum obat pada pasien TB paru di BKPM Pati. *Karya Ilmiah*.

Elizah, E., Zaman, C., & Wahyudi, A. (2024). Analisis Kepatuhan Minum Obat Anti Tuberkulosis Paru di Wilayah Kerja Puskesmas Tahun 2024. *Cendekia Medika: Jurnal Stikes Al-Maarif Baturaja*, *9*(1), 176-187.

Fitri, L. D., Marlindawani, J., & Purba, A. (2018). Kepatuhan Minum Obat pada Pasien Tuberkulosis Paru. *Jurnal Ilmu Kesehatan Masyarakat, 7*(1), 33–42.

Green, L. W., Gielen, A. C., Kreuter, M. W., Peterson, D. V., & Ottoson, J. M. (2022). A Model for Population Health Planning, Implementation, and Evaluation In: Health Program Planning, Implementation, and Evaluation: Creating Behavioral, Environmental, and Policy Change.

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DOI: https://doi.org/10.33024/minh.v9i3.2520

Handayani, S., Shaluhiyah, Z., Widjanarko, B., Susanto, H. S., & Agushybana, F. (2024). Mapping the Sociocultural Implication on Tuberculosis Management and Control Programs.

Hanlon, A. (2021). *Digital marketing: strategic planning & integration*. London: SAGE Publications Ltd.

Harits, F., Murni, N. S., & Suryani, L. (2025). Determinants of Adherence to Taking Medication in Pulmonary Tuberculosis Patients. *Cendekia Medika: Jurnal Stikes Al-Maarif Baturaja*, *10*(2), 478-492.

Hisran, H., Sugiarti, S., Nasution, H. S., & Ningsih, V. R. (2024). The Effect of Characteristics, Patient Knowledge and Availability of Pulmonary TB Drugs with Compliance with Taking Pulmonary TB Drugs at the Jambi City Health Center in 2023. *Eduvest-Journal of Universal Studies*, *4*(11), 10948-10956.

Isbaniah, F., Burhan, E., Sinaga, B. Y M., Yanifitri, D. B., Handayani, D., Sugiri, Y. J. R. (2021). Tuberkulosis. *Pedoman Diagnosis dan Penatalaksanaan di Indonesia*. Jakarta: Perhimpunan Dokter Paru Indonesia. Retrieved from: https://www.scribd.com/document/212097756/TUBERKULOSIS-pdpi

Komariah, E. D., Hamid, O. G., & Garus, V. A. (2023). Peran Pmo Dan Kepatuhan Minum Obat Pada Pasien Tuberkolosis Paru. *Watson Journal of Nursing*, *2*(1), 14-20.

Lolong, D. B., Aryastami, N. K., Kusrini, I., Tobing, K. L., Tarigan, I., Isfandari, S., & Ariati, Y. (2023). Non-adherence to anti-tuberculosis treatment, reasons and associated factors among pulmonary tuberculosis patients in the communities in Indonesia. *PLoS One*, *18*(8), e0287628.

Ministry of Health of the Republic Indonesia. (2023). *Survei Kesehatan Indonesia (SKI) 2023*. Badan Kebijakan Pembangunan Kesehatan. Retrieved from: https://www.badankebijakan.kemkes.go.id/hasil-ski-2023/

Ministry of Health of the Republic of Indonesia. (2024). *Laporan Program Penanggulangan Tuberkulosis Tahun 2023*. Retrieved from: https://www.tbindonesia.or.id/wp-content/uploads/2024/12/Laporan-Program-Penanggulangan-TBC-2023_Final.pdf

Nasaruddin, H., Pramono, S. D., & Wiryansyah, E. P. (2024). Evaluasi Kepatuhan Pasien Tuberkulosis Paru terhadap Penggunaan OAT. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, *4*(5), 349-357.

Nisa, Q., Ruhyana, N., & Affandi, T. T. (2025). Hubungan Usia Dan Tingkat Kepatuhan Pengobatan Terhadap Kesembuhan Pasien Tb Paru Di Rs Paru Sidawangi. *Ibnu Sina: Jurnal Kedokteran Dan Kesehatan-Fakultas Kedokteran Universitas Islam Sumatera Utara*, *24*(1), 222-231.

Prayogo, A. H. E. (2013). Faktorfaktor yang mempengaruhi kepatuhan minum obat anti Tuberkulosis pada pasien Tuberkulosis Paru di Puskemas Pamulang Tangerang Selatan Provinsi Banten periode Januari 2012–Januari 2013.[Laporan Penelitian]. *Jakarta: Fakultas Kedokteran dan Ilmu Kesehatan, Universitas Islam Negeri Sjarif Hidayatullah*.

Putri, V. K., Zaman, C., Priyanto, A. D., & Ekawati, D. (2025). Analysis Factor of Compliance with Taking Anti-Pulmonary Tuberculosis Drugs in Patients With Pulmonary Tuberculosis. *Lentera Perawat*, *6*(1), 59-68.

Ryansyah, I. C., Martilova, S., Putri, K., & Sinaga, E. S. (2023). Faktor-Faktor Yang Memengaruhi Kepatuhan Pengobatan Pada Pasien TB. *CoMPHI Journal: Community Medicine and Public Health of Indonesia Journal*, *3*(3).

Samory, U. S., Yunalia, E. M., & Suharto, I. P. S. (2022). Faktor-Faktor Yang Berhubungan Dengan Kepatuhan Pasien Terhadap Pengobatan Tuberkulosis Paru Di Puskesmas Urei-Faisei (URFAS). *Indonesian Health Science Journal*, *2*(1).

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DOI: https://doi.org/10.33024/minh.v9i3.2520

Suryana, I., & Nurhayati, N. (2021). Hubungan Antara Peran Pengawas Menelan Obat (PMO) Terhadap Kepatuhan Minum Obat Penderita TB Paru. Indonesian Journal of Nursing Sciences and Practice, 4(2), 93-98.

Tarmizi, S. N. (2024). Hari Anak Nasional 2024, Masyarakat Harus Pahami Karakteristik TBC. Biro Komunikasi dan Pelayanan Publik. Kementerian Kesehatan Republik Indonesia. Retrieved from: https://kemkes.go.id/id/hari-anak-nasional-2024-masyarakat-harus-pahami-karakteristik-tbc

Ulfah, U., Windiyaningsih, C., Abidin, Z., & Murtiani, F. (2018). Faktor-Faktor yang berhubungan dengan kepatuhan berobat pada penderita tuberkulosis paru. *Indonesian Journal of Infectious Disease*, *4*(1), 413292.

World Health Organization. (2024). *Global tuberculosis report.* Geneva: WHO. Retrieved from: https://www.who.int/teams/global-programme-on-tuberculosis-and-lung-health/tb-reports/global-tuberculosis-report-2024

Yulisetyaningrum, Y., Hidayah, N., & Yuliarti, R. (2019). Hubungan Jarak Rumah Dengan Kepatuhan Minum Obat Pada Pasien Tbc Di Rsi Sunan Kudus. *Jurnal ilmu keperawatan dan kebidanan*, *10*(1), 248-255.

Yulita, P., Ekawati, D., Priyatno, A. D., & Gustina, E. (2025). Analisis kepatuhan minum obat anti tuberkulosis paru pada penderita tuberkulosis di Kabupaten Empat Lawang tahun 2024. *Jurnal Kesehatan Saelmakers PERDANA (JKSP)*, *8*(1), 105-122.

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DOI: https://doi.org/10.33024/minh.v9i3.2520