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THE RELATIONSHIP BETWEEN FAMILY SUPPORT AND ADHERENCE TO DOTS THERAPY AMONG PULMONARY TUBERCULOSIS PATIENTS IN THE WORKING AREA OF PUSKESMAS LAMPIHONG

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Abstract

Tuberculosis (TB) remains a major public health problem, particularly due to challenges in ensuring patient adherence to long-term treatment. The Directly Observed Treatment Short-course (DOTS) strategy has been widely implemented to reduce TB morbidity and mortality; however, its success largely depends on patient adherence. Family support is considered an important factor influencing patients' motivation, behavior, and consistency in undergoing therapy. This study aimed to determine the relationship between family support and adherence to DOTS therapy among pulmonary tuberculosis patients in the working area of Puskesmas Lampihong. A quantitative study with a correlational cross-sectional design was conducted. A total of 30 respondents were selected using purposive sampling from TB patients enrolled in the DOTS program. Data were collected using a structured family support questionnaire based on social support theory and the Tuberculosis Medication Adherence Scale (TBMAS). Data analysis was performed using Fisher's Exact Test with a significance level of $p < 0.05$. The results showed that the majority of respondents had high family support (93.3%) and high adherence levels (90.0%). Statistical analysis revealed a significant relationship between family support and adherence to DOTS therapy ($p = 0.002$). In conclusion, family support is significantly associated with adherence to DOTS therapy among pulmonary tuberculosis patients. Strengthening family involvement as treatment supporters is essential to improve adherence and optimize TB control programs at the primary health care level.

Keywords: Adherence, DOTS, Family Support, Pulmonary Tuberculosis

Introduction

Tuberculosis (TB) remains one of the most significant infectious diseases with a high and complex global health burden. Globally, TB continues to be a leading cause of morbidity and mortality, with millions of new cases reported each year. A major challenge in TB control lies not only in case detection but also in treatment success, which is highly dependent on patient adherence to long-term therapy. Non-adherence to TB treatment remains a serious issue that can lead to treatment failure, disease relapse, and the emergence of drug resistance, particularly multidrug-resistant TB (MDR-TB) [1].

Treatment adherence in TB, especially within the Directly Observed Treatment Short-course (DOTS) strategy, is a key determinant of therapeutic success. However, various studies have shown that patient adherence levels are still suboptimal. Research indicates that non-adherence rates in developing countries can be quite high and are influenced by social, economic, and behavioral factors

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[2]. This non-adherence has broader implications, not only for individuals but also for communities, as it increases the risk of transmission and hinders the achievement of global TB elimination targets.

One of the critical factors influencing patient adherence is family support. In the context of chronic diseases such as TB, the family plays a strategic role as the primary support system, providing emotional, informational, and instrumental assistance to patients. Studies have demonstrated that family support significantly contributes to improved health behaviors, including adherence to TB treatment [3]. Such support may include reminding patients to take medication, accompanying them during treatment, and providing motivation to ensure consistency in therapy.

Recent research findings further reinforce the importance of family support in TB treatment. A 2025 study revealed a significant relationship between family support and TB patient adherence, where patients with strong family support exhibited higher adherence levels compared to those without adequate support [4]. Additionally, another study conducted in Indonesia found that family support directly influences treatment adherence by enhancing patient motivation, with statistically significant associations [5].

Theoretically, family support contributes to increased self-efficacy and patient motivation during long-term treatment. A recent scoping review reported that family support not only improves medication adherence but also positively impacts the overall quality of life of TB patients [6]. This highlights that family-based interventions are highly relevant in TB control, particularly in developing countries where family-centered social structures are strong.

In Indonesia, challenges in TB control remain substantial due to the high disease burden and various factors affecting treatment success, including stigma, limited access to healthcare services, and low patient adherence. Although the DOTS program has been widely implemented in primary healthcare settings, its execution still faces obstacles, particularly in ensuring patient adherence and optimizing the role of family members as treatment supervisors (PMO). Therefore, strengthening the role of the family is a crucial strategy to improve TB treatment outcomes.

Based on the above discussion, it can be concluded that adherence to TB treatment is a critical factor in achieving therapeutic success, and family support plays a significant role in enhancing such adherence. However, gaps still exist in the implementation of family support at the primary healthcare level. Therefore, research examining the relationship between family support and adherence to DOTS therapy among pulmonary TB patients is essential as a basis for developing more effective and sustainable interventions.

Method

This study employed a quantitative research design using a correlational analytic approach with a cross-sectional method. The study was conducted in the working area of Puskesmas Lampihong, Balangan Regency, South Kalimantan, Indonesia, from August to November 2025.

The target population consisted of all pulmonary tuberculosis (TB) patients undergoing Directly Observed Treatment Short-course (DOTS) therapy during the study period. A total of 115 TB patients were registered in the DOTS program. The sample size was determined using a purposive sampling technique, resulting in 30 respondents who met the inclusion criteria.

The inclusion criteria were: (1) patients aged ≥18 years, (2) diagnosed with pulmonary tuberculosis and registered in the DOTS program, (3) undergoing anti-tuberculosis treatment for at least one month, and (4) willing to participate in the study by providing informed consent. The exclusion criteria included patients with multidrug-resistant tuberculosis (MDR-TB), severe complications, mental disorders, or those who were not regularly attending treatment during the study period.

The independent variable in this study was family support, while the dependent variable was adherence to DOTS therapy. Family support was measured using a structured questionnaire developed

based on House's social support theory, consisting of 16 items covering four dimensions: emotional, informational, instrumental, and appraisal support. Each item was rated using a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

Adherence to DOTS therapy was measured using the Tuberculosis Medication Adherence Scale (TBMAS), which consists of 30 items with a Likert scale ranging from 1 to 5. Both instruments had been previously tested for validity and reliability, with Cronbach's alpha values greater than 0.80, indicating good internal consistency.

Data collection was conducted through structured interviews and self-administered questionnaires. The researcher provided guidance to ensure that respondents clearly understood each question. All completed questionnaires were checked for completeness before being processed for analysis.

Data analysis was performed using both univariate and bivariate analysis. Univariate analysis was used to describe the distribution of respondent characteristics, family support, and adherence levels. Bivariate analysis was conducted using Fisher's Exact Test to examine the relationship between family support and adherence to DOTS therapy. A significance level of $p < 0.05$ was applied.

Before the study was conducted, all respondents provided informed consent after receiving a complete explanation. The confidentiality and anonymity of participants were strictly maintained throughout the entire research process.

Results

This section presents the findings of the study, including respondent characteristics, levels of adherence to DOTS therapy, family support, and the relationship between family support and adherence among pulmonary tuberculosis patients in the working area of Puskesmas Lampihong. The results are presented in the following tables.

Table 1 Respondent Characteristics (n = 30)

Variable	Category	Frequency (f)	Percentage (%)
Age (years)	17–25	4	13.3
	26–35	6	20.0
	36–45	3	10.0
	46–55	7	23.3
	56–65	9	30.0
	>65	1	3.3
Gender	Male	15	50.0
	Female	15	50.0
Education	Elementary School	8	26.7
	Junior High School	2	6.7
	Senior High School	12	40.0
	Higher Education	8	26.7
Occupation	Housewife	7	23.3
	Private Employee	6	20.0
	Civil Servant	4	13.3
	Farmer	5	16.7
	Unemployed	8	26.7

Based on Table 1, the highest proportion of respondents was found in the age group of 56–65 years (30.0%). In terms of gender, the distribution was equal, with males and females each accounting for 50.0%. Regarding education level, the majority of respondents had a senior high school education (40.0%). Meanwhile, based on occupation, most respondents were unemployed (26.7%). These findings indicate that the dominant characteristics of respondents are older adults, with moderate education levels, and predominantly not working.

Tabel 2 Distribution of Respondents' Adherence Level (n = 30)

Adherence Level	Frequency (f)	Percentage (%)
Low	2	6.7
Moderate	1	3.3
High	27	90.0
Total	**30**	**100.0**

Based on Table 2, the highest proportion of respondents was in the high adherence category, accounting for 90.0% of the total sample.

Tabel 3 Distribution of Family Support (n = 30)

Family Support	Frequency (f)	Percentage (%)
Moderate	2	6.7
High	28	93.3
Total	**30**	**100.0**

Based on Table 3, the majority of respondents had high family support, with a proportion of 93.3%.

Tabel 4 Relationship Between Family Support and Adherence Level

Family Support	Low	Moderate	High	Total	p-value
Moderate	2	0	0	2	
High	0	1	27	28	0.002
Total	2	1	27	30	

Based on Table 4, most respondents with high family support were also in the high adherence category, totaling 27 respondents. Statistical analysis showed a significant relationship between family support and adherence to DOTS therapy (p = 0.002).

Discussion

Respondent Characteristics

The characteristics of respondents in this study provide important insights into factors that may influence adherence to tuberculosis (TB) treatment. In this study, most respondents were in the late adulthood to elderly age group. Age is a significant factor in TB epidemiology and treatment outcomes. Evidence shows that TB incidence and mortality tend to increase with age due to declining immune function and the presence of comorbidities [7]. A recent study also found that older TB patients often experience more challenges in maintaining treatment adherence, including physical limitations and dependency on family support [8]. Therefore, the predominance of older respondents in this study

highlights the increasing need for external support, particularly from family members, to ensure treatment adherenc

In terms of gender distribution, this study found a relatively balanced proportion between males and females. However, global and regional evidence indicates that TB tends to disproportionately affect males. According to recent reports, men account for more than half of TB cases globally and often experience worse treatment outcomes due to delayed healthcare seeking and higher exposure to risk factors such as smoking and occupational hazards [9]. Similarly, a study conducted in 2024 reported that male patients were more likely to develop drug-resistant TB and had higher exposure to risk factors compared to females [10]. Although this study showed a balanced distribution, gender remains an important determinant that may influence health-seeking behavior and treatment adherence.

Education level is another important characteristic influencing TB treatment outcomes. In this study, most respondents had a moderate level of education (secondary education). Education is closely associated with health literacy, which plays a crucial role in understanding disease processes and the importance of treatment adherence. Previous studies have shown that patients with higher education levels are more likely to adhere to TB treatment due to better knowledge and awareness of the consequences of non-adherence [11]. Conversely, patients with lower educational backgrounds may require additional support, particularly from family members and healthcare providers, to maintain adherence.

Occupation and socioeconomic status also play a significant role in shaping treatment behavior. In this study, a considerable proportion of respondents were unemployed or engaged in informal work. Socioeconomic factors, including employment status, income level, and work conditions, have been consistently associated with TB treatment adherence. Patients with unstable jobs or financial constraints often face barriers such as limited access to healthcare services, transportation difficulties, and competing priorities between work and treatment [2]. A recent study highlighted that unemployment and poverty are significant predictors of poor adherence among TB patients, emphasizing the need for social and family support systems [12].

Overall, the findings of this study indicate that respondent characteristics particularly age, gender, education, and occupation are closely related to TB treatment adherence. These characteristics reflect both biological and socio-behavioral determinants that influence patients' ability to complete long-term therapy. Patients who are older, have lower educational levels, or face socioeconomic challenges are more likely to require stronger support systems. Therefore, understanding respondent characteristics is essential in designing targeted interventions, particularly those involving family support, to improve adherence to DOTS therapy.

Family Support of Respondents

The findings of this study indicate that the majority of respondents demonstrated a high level of family support during tuberculosis (TB) treatment. This result reflects the important role of the family as the closest social unit that directly interacts with patients throughout the long-term treatment process. Family support is widely recognized as a key determinant in influencing patient behavior, particularly in chronic diseases such as TB, where treatment duration is prolonged and requires consistent adherence.

The high level of family support observed in this study is consistent with previous research, which highlights that strong family involvement is commonly found in communities with close social and cultural ties. Family members often provide various forms of support, including emotional encouragement, practical assistance, and supervision of medication intake. A qualitative study conducted in Indonesia found that family support is manifested through empathy, accompaniment to health services, and active involvement in reminding patients to take medication, all of which significantly contribute to treatment adherence [13].

From a theoretical perspective, family support encompasses multiple dimensions, including emotional, informational, instrumental, and appraisal support. These dimensions collectively enhance patients' motivation, confidence, and ability to cope with long-term treatment. A recent scoping review emphasized that family support plays a crucial role not only in improving medication adherence but also in enhancing the quality of life and psychological well-being of TB patients (Lutfian et al., 2025).This suggests that family support functions as both a behavioral and psychosocial reinforcement mechanism in TB management.

The findings of this study are also supported by recent quantitative evidence demonstrating a significant relationship between family support and adherence to TB treatment. A study conducted in Indonesia reported that family support has a direct and statistically significant effect on treatment adherence ($p < 0.05$), with family involvement increasing patient motivation and consistency in completing therapy [5]. Similarly, another study found that patients receiving strong family support were more likely to adhere to treatment compared to those with limited support, emphasizing the role of the family as a treatment supporter or supervisor [4].

In addition, family support has been identified as a key factor in promoting self-care adherence among TB patients. A systematic review reported that increased family support is positively associated with improved self-care behaviors, including regular medication intake and attendance at follow-up visits [15]. This is particularly relevant in TB treatment, where adherence requires sustained behavioral commitment over at least six months.

However, despite the overall high level of family support, certain aspects may still be suboptimal. Previous studies have identified that instrumental support, such as financial assistance for transportation, and emotional reinforcement, such as strengthening patients' confidence in recovery, are often less consistently provided [13]. These gaps may be influenced by socioeconomic constraints, limited knowledge about TB, or competing responsibilities among family members.

Furthermore, variation in the level of family support among respondents indicates that not all families are equally prepared to function as effective treatment supporters. Factors such as limited health literacy, stigma associated with TB, and lack of structured education from healthcare providers may hinder optimal family involvement. Research suggests that targeted family education and counseling interventions can significantly improve the quality of support provided and ultimately enhance treatment outcomes [5].

Overall, the findings of this study confirm that family support plays a central role in the success of TB treatment. High levels of family support serve as a strong foundation for improving adherence to DOTS therapy. However, strengthening specific aspects of support, particularly instrumental and emotional components, remains essential to ensure more comprehensive and sustainable treatment outcomes.

Respondent Adherence Level

The findings of this study indicate that the majority of respondents demonstrated a high level of adherence to DOTS therapy. This result reflects a generally positive treatment behavior among tuberculosis (TB) patients in the study setting. Adherence to anti-tuberculosis treatment is a critical determinant of treatment success, as consistent medication intake is required over a prolonged period to achieve cure and prevent complications. High adherence rates are strongly associated with improved clinical outcomes, reduced transmission, and prevention of drug resistance [16].

The high adherence level observed in this study may be influenced by several factors, including effective implementation of the DOTS strategy, strong family support, and adequate supervision by healthcare providers. The DOTS approach emphasizes direct observation and continuous monitoring, which has been proven to improve adherence among TB patients. A recent systematic review

highlighted that adherence remains a cornerstone of TB control, and interventions such as monitoring systems and patient support mechanisms significantly contribute to improving adherence outcomes [1].

However, adherence to TB treatment is a complex and multidimensional behavior influenced by various factors. A study published in 2024 reported that adherence levels vary widely across settings, with some regions still experiencing low adherence rates due to barriers such as limited access to healthcare services, lack of knowledge, and socioeconomic constraints [17]. For example, research conducted in Timor-Leste found that only 8.1% of TB patients achieved high adherence, while the majority were categorized as having low adherence, indicating substantial variability in adherence levels across populations [17].

Furthermore, evidence suggests that adherence is influenced by a combination of individual, social, and health system factors. A literature review conducted in 2025 identified key determinants of adherence, including psychological conditions (such as depression and anxiety), socioeconomic status, treatment side effects, and social support [18]. These findings indicate that adherence is not solely determined by patient behavior but is also shaped by external conditions that may facilitate or hinder consistent treatment.

Another study conducted in 2025 demonstrated that factors such as employment status, access to healthcare facilities, and patient understanding of treatment instructions significantly affect adherence levels. Patients who closely follow medical advice and receive adequate support are more likely to achieve optimal adherence [12]. In contrast, barriers such as stigma, distance to health facilities, and financial limitations may negatively impact adherence behavior.

Although the majority of respondents in this study showed high adherence, a small proportion of patients still exhibited moderate to low adherence levels. This group requires particular attention, as non-adherence can lead to serious consequences, including treatment failure, relapse, prolonged infectiousness, and the development of multidrug-resistant TB (MDR-TB). Non-adherent patients may also contribute to ongoing transmission within the community, thereby hindering TB control efforts [16].

In addition, specific aspects of adherence behavior, such as attending scheduled follow-up visits and actively seeking support from family or healthcare providers, may still be suboptimal despite overall high adherence levels. Studies have shown that even among adherent patients, gaps in follow-up attendance and support utilization can occur due to factors such as perceived recovery, time constraints, or lack of awareness [18].

Overall, the findings of this study suggest that adherence to DOTS therapy in the study population is relatively high, indicating effective treatment management and support systems. However, adherence remains a dynamic behavior that requires continuous monitoring and reinforcement. Strengthening patient education, improving access to healthcare services, and enhancing family and community support systems are essential strategies to sustain and further improve adherence levels among TB patients.

Relationship Between Family Support and Respondent Adherence Level

The results of this study demonstrate a significant relationship between family support and adherence to DOTS therapy among tuberculosis (TB) patients. Patients who received higher levels of family support were more likely to demonstrate high adherence to treatment. This finding confirms that family support plays a crucial role as a social determinant influencing patient behavior in long-term TB therapy.

These findings are consistent with recent empirical evidence showing that family support has a direct and significant effect on treatment adherence. A study conducted in Indonesia using structural equation modeling reported that family support significantly influenced adherence to TB treatment ($\beta = 0.229$; $p = 0.006$), indicating that patients with stronger family support were more likely to follow

treatment regimens consistently [5]. This relationship is further strengthened by the role of family support in enhancing patient motivation, which indirectly contributes to improved adherence behavior.

Similarly, research conducted in 2025 confirmed that family support is a key determinant of adherence, particularly in primary health care settings. Patients who received consistent support from family members such as reminders to take medication, emotional encouragement, and assistance in accessing health servicesshowed significantly higher adherence compared to those with limited support [4]. This emphasizes that family involvement functions not only as a supportive factor but also as a practical mechanism for ensuring treatment compliance.

From a theoretical perspective, the relationship between family support and adherence can be explained through behavioral and social support frameworks. Family support contributes to increased self-efficacy, motivation, and emotional stability, which are essential for maintaining long-term adherence. A recent scoping review highlighted that family support plays an indispensable role in improving medication adherence and overall treatment outcomes, as it reinforces patients' confidence and commitment to completing therapy [14].

In addition, the role of family support extends to supervision and monitoring of medication intake, which is a core component of the DOTS strategy. Evidence indicates that patients who receive regular supervision and encouragement from family members are more likely to maintain consistent medication adherence. Conversely, lack of family support has been identified as a major barrier to treatment adherence, contributing to treatment default and poor outcomes [19].

The significant relationship observed in this study also reflects the sociocultural context in which family plays a central role in patient care. In many developing countries, including Indonesia, family members often act as treatment observers (PMO), ensuring that patients take their medication regularly and attend follow-up visits. This close involvement enhances accountability and reduces the likelihood of treatment interruption.

However, it is important to note that family support alone may not be sufficient if not accompanied by adequate knowledge and proper guidance from healthcare providers. Studies have shown that the effectiveness of family support depends on the quality of information and education provided to family members regarding TB treatment. Without proper understanding, family support may not be optimally utilized in promoting adherence.

Overall, the findings of this study confirm that family support is significantly associated with adherence to DOTS therapy. Strengthening family involvement through education, counseling, and structured engagement in TB programs is essential to improve treatment adherence and achieve optimal TB control outcomes. This highlights the need for integrated, family-centered approaches in TB management, particularly at the primary health care level.

Conclusion

This study concludes that the majority of pulmonary tuberculosis patients in the working area of Puskesmas Lampihong demonstrated high levels of both family support and adherence to DOTS therapy. Family support, encompassing emotional, informational, instrumental, and appraisal dimensions, plays a significant role in influencing patients' adherence behavior during long-term TB treatment.

The statistical analysis confirmed a significant relationship between family support and adherence to DOTS therapy ($p < 0.05$). Patients who received higher levels of family support were more likely to adhere consistently to their treatment regimen. This finding emphasizes that family involvement serves as a critical determinant in improving treatment adherence and ensuring successful TB management.

Although overall adherence levels were high, a small proportion of patients still exhibited suboptimal adherence, indicating the need for targeted interventions. Strengthening family roles through structured education, counseling, and active involvement as treatment observers (PMO) is essential to enhance adherence and prevent treatment interruption.

In conclusion, integrating family-centered approaches into TB control programs is crucial to optimize adherence to DOTS therapy. Health care providers should reinforce family engagement strategies to achieve sustainable treatment success and contribute to the broader goal of tuberculosis control at the primary health care level.

References

[1]. Agus, A. I., & Rosmiati. (2026). Association of Family Support with Treatment Adherence in Tuberculosis Patients. *Omni Health Journal*, *3*(1), 1–7. https://doi.org/10.65277/OHJ.V3I1.233

[2]. Alsehali, A., Alrajih, H., AL-Jahdali, H., Al-Safi, E., Layqah, L., & Baharoon, S. (2024). Clinical, Radiological Features and Treatment Outcomes of Tuberculosis in Patients Aged 75 Years and Older. *Journal of Epidemiology and Global Health 2024 14:4*, *14*(4), 1591–1601. https://doi.org/10.1007/S44197-024-00311-8

[3]. Appiah, M. A., Arthur, J. A., Gborgblorvor, D., Asampong, E., Kye-Duodu, G., Kamau, E. M., & Dako-Gyeke, P. (2023). Barriers to tuberculosis treatment adherence in high-burden tuberculosis settings in Ashanti region, Ghana: a qualitative study from patient's perspective. *BMC Public Health 2023 23:1*, *23*(1), 1317-. https://doi.org/10.1186/S12889-023-16259-6

[4]. Deng, L., Lu, S., Zeng, J., & Liu, H. (2025). Global, regional, and national trends and burden of diabetes mellitus type 2 among youth from 1990 to 2021: an analysis from the global burden of disease study 2021. *Frontiers in Endocrinology*, *16*, 1626225. https://doi.org/10.3389/fendo.2025.1626225

[5]. Dodd, P. J., & Horton, K. C. (2025). *A global analysis of patterns of tuberculosis exposure and transmission*. https://doi.org/10.1101/2025.10.09.25337649

[6]. Falah, M., Sansuwito, T., Dioso, R. I., Said, F. Mohd., & Lismayanti, L. (2025). Enhancing self-care adherence in tuberculosis patients through family support: a systematic review. *International Journal of Public Health Science (IJPHS)*, *14*(2), 661–671. https://doi.org/10.11591/IJPHS.V14I2.24749

[7]. Fernandes, A., Laohaprapanon, S., Nam, T. T., Sequeira, E. M. D. C., & Le, C. N. (2024). Adherence to Pulmonary Tuberculosis Medication and Associated Factors Among Adults: A Cross-Sectional Study in the Metinaro and Becora Sub-Districts, Dili, Timor-Leste. *International Journal of Environmental Research and Public Health 2024, Vol. 21, Page 1662*, *21*(12), 1662. https://doi.org/10.3390/IJERPH21121662

[8]. Gurusinga, R., Afrizal, A., Bachtiar, A., Firdawati, F., Machmud, R., Burhan, E., Jendrius, J., & Semiarty, R. (2024). Family Support Pattern for Treatment Adherence Among Tuberculosis Patients in Deli Serdang Regency : A Qualitative Study. *Jurnal Ilmu Kesehatan Masyarakat*, *15*(2), 220–233. https://doi.org/10.26553/JIKM.2024.15.2.220-233

[9]. Harahap, D. W. S., Andrajati, R., Purna Sari, S., & Handayani, D. (2025). THE FACTOR AFFECTING MEDICATION ADHERENCE IN TUBERCULOSIS PATIENTS: A LITERATURE REVIEW. *Eduvest-Journal of Universal Studies*, *5*(1). http://eduvest.greenvest.co.id

[10]. 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. https://doi.org/10.59188/EDUVEST.V4I11.49943

[11]. Ileye, U. M., Odero, V. O., Hassan, M. S., & Hossain, M. M. (2025). Determinants of tuberculosis treatment adherence among patients taking anti-TB drugs in Borama, Somaliland. *BMC Public Health 2025 25:1*, *25*(1), 3788-. https://doi.org/10.1186/S12889-025-25151-4

[12]. Jones, A. S. K., Bidad, N., Horne, R., Stagg, H. R., Wurie, F. B., Kielmann, K., Karat, A. S., Kunst, H., Campbell, C. N. J., Darvell, M., Clarke, A. L., & Lipman, M. C. I. (2021). Determinants of non-adherence to anti-TB treatment in high income, low TB incidence settings: a scoping review. *The International Journal of Tuberculosis and Lung Disease : The Official Journal of the International Union against Tuberculosis and Lung Disease*, *25*(6), 483–490. https://doi.org/10.5588/IJTLD.21.0024

[13]. Lutfian, L., Azizah, A., Wardika, I. J., Wildana, F., Maulana, S., & Wartakusumah, R. (2025a). The role of family support in medication adherence and quality of life among tuberculosis patients: A scoping review. *Japan Journal of Nursing Science : JJNS*, *22*(1). https://doi.org/10.1111/JJNS.12629

[14]. Lutfian, L., Azizah, A., Wardika, I. J., Wildana, F., Maulana, S., & Wartakusumah, R. (2025b). The role of family support in medication adherence and quality of life among tuberculosis patients: A scoping review. *Japan Journal of Nursing Science : JJNS*, *22*(1). https://doi.org/10.1111/jjns.12629

[15]. Madaki, S., Mohammed, Y., Rogo, L. D., Yusuf, M., & Bala, Y. G. (2024). Age and gender in drug resistance tuberculosis: A cross-sectional case study at a national tuberculosis reference hospital in Nigeria. *Journal of Global Antimicrobial Resistance*, *39*, 175–183. https://doi.org/10.1016/j.jgar.2024.09.002

[16]. Nindrea, R. D., Ming, L. C., & Agustian, D. R. (2025). FAMILY SUPPORT, MOTIVATION, AND PATIENT ADHERENCE TO TUBERCULOSIS TREATMENT: INSIGHTS FROM INDONESIA. *African Journal of Infectious Diseases*, *19*(2), 42–48. https://doi.org/10.21010/AJIDV19I2.5

[17]. Putri, R., Soleman, H., Sukartini, T., & Qona'ah, A. (2021). Patient Adherence to Tuberculosis Treatment: A Relation between Family Support and Patient Behavior. *Critical Medical and Surgical Nursing Journal*, *10*(2), 42–46. https://doi.org/10.20473/CMSNJ.V10I2.26491

[18]. Santosa, A., Juniarti, N., Pahria, T., & Susanti, R. D. (2025). Digital adherence technology to improve medication adherence in tuberculosis patients: a systematic review and meta-analysis randomized control trials. *Npj Primary Care Respiratory Medicine 2025 35:1*, *35*(1), 52-. https://doi.org/10.1038/s41533-025-00457-3

[19]. Shinde, A. M. (2024). Socio-demographic factors & adherence of newly diagnosed pulmonary tuberculosis patients to the newly introduced daily regimen: A hospital survey based follow up study. *Indian Journal of Tuberculosis*, *71*, S250–S257. https://doi.org/10.1016/J.IJTB.2024.03.011