



Treatment Adherence and Factors Influencing the Success of Tuberculosis Therapy: A Systematic Review

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Abstract. Tuberculosis (TB) remains a major public health challenge worldwide, with treatment adherence playing a critical role in determining therapeutic success. However, non-adherence to TB medication remains a persistent obstacle, particularly in countries with a high disease burden. This systematic review aims to synthesize scientific evidence regarding treatment adherence, emphasizing the influence of family support, healthcare worker involvement, and other contributing factors impacting TB therapy outcomes. A comprehensive literature search was conducted following PRISMA guidelines across four major databases for studies published between 2015 and 2025. Of the 871 identified records, 11 studies met the eligibility criteria and were included for review. The findings revealed that socio-economic status, effective communication between patients and healthcare providers, active family engagement, and adequate health education are significant factors enhancing adherence. Conversely, stigma, adverse drug reactions, poor patient knowledge, and limited healthcare access were commonly identified barriers. Strengthening healthcare infrastructure and implementing family-centered interventions are crucial strategies to improve adherence rates. Furthermore, continuous education and cross-sector collaboration are essential to optimizing TB treatment programs.

Keywords: Tuberculosis, Treatment adherence, Family support, Healthcare worker, Determinants.

1 Introduction

Tuberculosis (TB) remains an infectious disease that is both preventable and treatable. Despite this, by 2023, TB had once again become the world's leading cause of death from a single infectious agent, overtaking COVID-19 fatalities and accounting for nearly twice as many deaths as HIV/AIDS. The World Health Organization (WHO) reports that more than 10 million new TB cases emerge each year, with the number consistently rising since 2021, particularly in low- and middle-income countries [1].

Due in large part to inadequate adherence to TB treatment regimens, the burden of TB is still quite high in developing countries like Indonesia, Nigeria, Ethiopia, and several other countries in Africa and Asia.

In order to achieve clinical recovery, break the chain of transmission, and prevent drug resistance, including extensively drug-resistant TB (XDR-TB) and multidrug-resistant TB (MDR-TB), adherence to TB treatment is essential [2], [3]. Even in healthcare systems that have adopted Directly Observed Treatment Short-course (DOTS) at the national level, non-adherence is still a major problem, despite the World Health Organization's (WHO) recommendation that DOTS be used to increase treatment success.

Various studies have indicated that the factors influencing patient adherence to TB treatment are highly complex and multidimensional. These factors include individual characteristics (such as knowledge, perception, and attitudes toward the disease), family and social support, the quality of communication with healthcare providers, and health system-related aspects such as distance to healthcare facilities, hidden costs, and drug availability. In addition, psychosocial factors such as stigma and treatment fatigue also contribute to poor adherence [4], [5].

A study conducted in Ethiopia revealed that more than one-third of patients were non-adherent during the continuation phase of TB treatment, with the primary reasons being forgetfulness, adverse drug reactions, and long distances to healthcare facilities

[6]. In Nigeria, the prevalence of non-adherence reached 30.5%, largely influenced by socioeconomic status, distance to DOTS centers, and TB/HIV co-infection [7]. Studies in Indonesia have also emphasized the critical role of family support and health-related behaviors in improving treatment adherence, particularly among patients with drug-resistant TB [8].

A thorough grasp of the social, economic, health system, psychological, and structural elements that influence TB treatment adherence is necessary, with reference to the WHO Multidimensional Adherence Model framework. Thus, based on empirical data from several nations, this systematic review was carried out to determine and summarize the different factors impacting TB treatment adherence. It is anticipated that the results of this evaluation will be used as a basis for creating evidence-based strategies meant to enhance TB treatment outcomes on a national and international level.

2 Methods

A systematic review of the literature was undertaken using the preferred report items for systematic review and meta-analysis (prisma) statement [9]. The search was limited to articles published in the English language. Literature searches (2015–2025) were conducted on Springer nature link, Scencedirect, Scopus, and Pubmed databases. Keywords for the search included: : (TITLE-ABS-KEY (role) OR TITLE-ABS-KEY (influence) OR TITLE-ABS-KEY (family AND support) OR TITLE-ABS-KEY (health AND workers) AND TITLE-ABS-KEY (treatment) AND TITLE-ABS-KEY (adherence) OR TITLE-ABS-KEY (compliance) AND TITLE-ABS-KEY (tuberculosis AND patients) OR TITLE-ABS-KEY (community AND health AND center))

AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (EXACTKEYWORD , "Article")). The titles and abstracts produced by this search approach were manually and independently reviewed by zotero for relevance and eligibility for full text retrieval. The reference lists of the retrieved publications and prior review articles were manually examined to discover new research that fulfilled the inclusion criteria.

2.1 Data Source and Research Strategy

To gather all relevant studies, we carried out a structured search using four major databases: PubMed, Scopus, ScienceDirect, and SpringerLink. We focused on articles published between January 2015 and January 2025. The keywords were chosen to reflect the main themes of the review, including terms like treatment adherence, family support, healthcare workers, and tuberculosis. We used Boolean operators (AND, OR) to help combine and filter search results more effectively. The entire search process followed the PRISMA guidelines to ensure it was clear, organized, and methodologically sound.

2.2 Inclusion and Exclusion Criteria

Eligibility for inclusion was determined by several pre-defined criteria. Studies were required to be original research articles, published in peer-reviewed journals, written in English, and specifically focused on treatment adherence in tuberculosis patients. Articles were excluded if they were reviews, editorials, conference abstracts, non-English publications, animal studies, or lacked full-text availability.

2.3 Data Extraction

Two data extraction forms were developed. The first form was used to extract the general characteristics of the included studies, while the second form was used to extract the study findings. Key data extracted for general characteristics included: Author, Location, Study Design/Type, Population, Age (years), Gender (%), and Sample. Key data extracted from the study findings included: Purpose of Study, Instruments, Adherence, Knowledge, Attitude, Family Support, and Health Worker.

2.4 Quality Assessment Methods

The quality of the selected studies was carefully reviewed by two independent evaluators using the Joanna Briggs Institute (JBI) checklist, tailored to both cross-sectional and qualitative research designs. The methodological quality and possible bias of the studies that were part of this systematic review were assessed by the authors. Eight questions with four possible answers Yes (Y), No (N), Unclear (U), and Not Applicable (NA) made up the appraisal checklist [10]. If the reviewers had differing assessments, they discussed the issues together, and when necessary, sought input from a third reviewer to reach a final decision.

2.5 Data Synthesis

This review used a thematic synthesis to better understand the factors that influence whether patients stick to their tuberculosis (TB) treatment. The findings were grouped into three broad themes: patient-related, provider-related, and system-related factors. On the patient side, things like how well someone understands TB, their personal drive to recover, emotional stability, and whether they have support from family or friends all played a role in how consistently they followed their treatment. When it came to healthcare providers, the quality of communication, trust in the medical team, and the support patients received over time were found to make a big difference. At the system level, challenges like limited access to clinics, transportation costs, financial burdens, and gaps in health policies often got in the way of patients completing their treatment. By organizing the evidence this way, the review gives a clearer picture of how these different layers interact and shape the experience of TB patients, especially in areas with limited resources.

3 Results

3.1 Search Outcomes

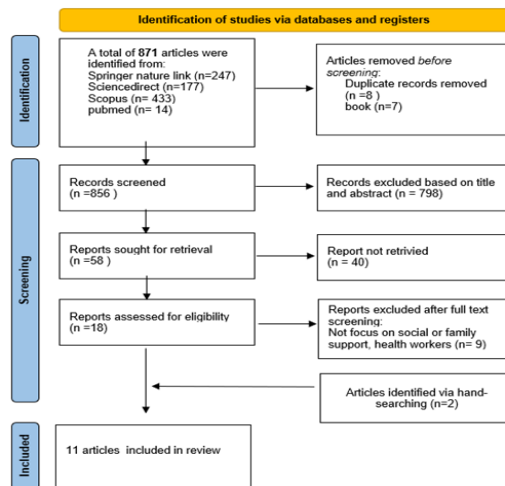


Fig. 1. PRISMA diagram of retrieved studies

A total of 871 articles were identified from four databases. Fifteen articles were removed prior to screening due to duplication or being marked as ineligible by automation tools. During the screening stage, 798 articles were excluded, and an additional 40 articles were excluded during the eligibility assessment, leaving 9 articles for inclusion. Subsequently, a manual search for relevant studies was conducted to identify additional

articles that met the eligibility criteria, resulting in the inclusion of 2 additional studies. In total, 11 articles were included in this review, as illustrated in Fig. 1.

3.2 Critical Appraisal

The quality of the 11 included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, adapted for both cross-sectional and qualitative research designs. Eight criteria were applied to evaluate the methodological validity of each study. Most studies demonstrated strengths in clearly defining inclusion criteria, describing the study setting, using valid and reliable exposure and outcome measures, and applying appropriate statistical analyses. However, a major limitation was identified in the area of confounding factors. Only three studies identified confounding factors, and none of the studies reported explicit strategies to address them.

Overall, this appraisal suggests that while reporting quality was generally adequate, methodological aspects related to bias control and confounding management need to be improved in future studies.

3.3 Characteristic of fundings

Table 1 summarizes the characteristics of 11 studies analyzed in this systematic review, focusing on treatment adherence among tuberculosis (TB) patients. Most studies were conducted in developing countries with a high TB burden, such as Indonesia, Ethiopia, China, Nigeria, and Peru.

The majority of studies (9 out of 11) employed a cross-sectional design, while two studies adopted a mixed-method approach that combined quantitative and qualitative analyses. The studied populations were generally adult TB patients (≥ 18 years), with one study specifically focusing on patients with multidrug-resistant TB (MDR-TB) and two studies including healthcare workers as participants.

Across the reviewed studies, male participants generally outnumbered females. The sample sizes varied widely, with some studies involving as few as 9 participants, while others included more than 500. This wide range illustrates the different methodological choices researchers have made to explore treatment adherence. Variations in study design, location, and population background emphasize how crucial it is to consider local context when analyzing what influences TB treatment adherence. These differences point to the importance of flexible, community-based strategies that can adapt to specific settings and populations.

3.4 Summary of Findings

Table 2 presents a summary of the main findings from the eleven studies analyzed in this systematic review, focusing on treatment adherence among tuberculosis (TB) patients and the role of key determinants such as patient knowledge, family support, and healthcare provider support. The analysis of this table is essential to understand the methodological variations and findings across diverse social and geographical contexts.

Table 1. Characteristic of findings.

Author, year	Location	Design /type of study	Population	Age (year)	Gender (%)	Sample
Fagundes et al, 2016	Equatorial Guinea	cross-sectional	Suffering TB	≥ 18	M: 48 (48.98), F: 50 (51.02)	98
Woimo et al, 2017	Ethiopia	Mix-method	Suffering TB	≥15	M: 140 (53.6), F: 121(46.4)	261 (quantitative)
Chen et al, 2020	China	cross-sectional	Health workers newly diagnosed TB	≥ 18	M: 298 (62.0), F: 183 (38.0)	14 (qualitative) 481
Dilas et al, 2023	Peru	cross-sectional	Suffering TB	≥ 18	M: 101 (62.3), F: 61 (37.7)	162
Du et al, 2020	China	cross-sectional	Suffering TB	≥15	M: 374 (66.31), F: 190 (33.69)	267 (47.34%) urban and 297 (52.66%) rural
Iweama et al, 2021	Nigeria	cross-sectional	Suffering TB	≥ 18	M: 124 (31.8), F: 266 (68.2)	390
Marin et al, 2024	South Sudan	cross-sectional	Suffering TB	≥ 18	M: 173 (73.9), F: 61 (26.1)	234
Yani et al, 2022	Indonesia	cross-sectional	MDR-TB	≥ 18	M: 40 (50.6), F: 39 (49.4)	79
Gashu et al, 2021	Ethiopia	Mix-method	Suffering TB	≥ 18	M: 178 (58.0), F: 129 (42.0)	307 (quantitative)
Sofiana et al, 2022	Indonesia	cross-sectional	Health workers Suffering TB	26-40	NA	9 (qualitative) 75
Lestari et al, 2020	Indonesia	cross-sectional	Suffering TB	≥ 17	M: 25 (50), F: 25 (50)	50

Table 2. Summary of Findings.

No	Author, Year, Country	Purpose of study	Instruments	Adherence	Knowledge	Attitude	Family support	Health Worker
1	Fagundez et al, Equatorial Guinea, 2016	Explored treatment adherence among TB patients and assessed public understanding of TB	Batalla Knowledge Test and Morisky-Green-Levine Adherence Scale	Approximately 78.6% of participants demonstrated adherence based on the Morisky scale.	Around 63% showed adequate TB knowledge according to the Batalla assessment.	NA	NA	NA
2	Woimo et al, Ethiopia, 2017	Investigated prevalence and contributing factors of non-adherence to TB treatment in public healthcare	Structured interviews; non-adherence defined as missing $\geq 10\%$ of prescribed doses	24.5% of patients were classified as non-adherent	Poor TB knowledge increased likelihood of non-adherence	NA	NA	NA

3	Chen et al, China, 2020	The research examined the impact of family involvement, community support, and policy initiatives on adherence to TB treatment among newly diagnosed patients	MMAS-8 Adherence Scale; evaluation of family and doctor-patient relationships.	45.7% adhered to treatment; others had moderate or low adherence.	Higher TB knowledge correlated with better adherence (OR 0.49; 95% CI: 0.33–0.72).	NA	Family supervision and spiritual support improved adherence	good doctor-patient relationships were beneficial.
4	Dilas et al, Peru, 2023	Explored how treatment education mediates between social support, healthcare quality, and adherence	Validated questionnaire covering education, social support, and adherence	Education positively influenced treatment adherence.	Health education contributed to higher adherence levels	NA	Social support promotes adherence to TB treatment, improves psychological health, reduces stress, and boosts self-efficacy in the face of sickness.	nurse-led education improved adherence and self-efficacy
5	Du et al, China, 2020	Explored relationships between adherence, trust, communication, and treatment	CAHPS communication scale; validated adherence questionnaire.	Urban patients reported better outcomes than rural patients	NA	NA	NA	Good communication between doctors and patients was proven to improve treatment adher-

		outcomes in urban and rural patients						ence, which in turn helped en- hance treat- ment out- comes)
6	Iweama et al, Nigeria, 2021	Assessed non-adherence and contributing factors among TB patients in northwest Nigeria	PROM adherence questionnaire; DOTS service quality assessment	69.5% adherent; 30.5% non-adherent	NA	NA	NA	NA
7	Marin et al, South Sudan, 2024	Identified prevalence, reasons, and factors for non-adherence among TB patients.	WHO MAM-based interviews; self-reported non-adherence reasons	24.8% were non-adherent	NA	NA	NA	Most patients satisfied with provider support; shorter wait times improved adherence.
8	Yani et al, Indonesia, 2022	Analyzed factors influencing adherence among MDR-TB patients	Modified health behavior and family support questionnaire	Median adherence score: 20 (IQR 18–20).	Mean knowledge score: 7.14 (SD 1.93	NA	High family support noted, but not significantly linked to adherence	NA

9	Gashu et al, Ethiopia, 2021	Evaluated TB treatment adherence during continuation phase among adults.	Shortened 11-item ARMS questionnaire	64.2% adherence rate	Good knowledge increased adherence likelihood (AOR 1.85).	NA	Family wealth, transport issues, and poor community support affected adherence.	Non-adherence to TB treatment in the continuation phase was primarily linked to poor patient-provider communication
10	Sofiana et al, Indonesia, 2022	Identified factors influencing treatment adherence among TB patients.	Self-developed, validated questionnaire on adherence and health behavior	Adherence level measured, but specific percentage not provided	Knowledge was the most significant factor for adherence (OR 3.78; 95% CI: 1.25–11.47).	Positive attitudes were associated with higher adherence (PR 2.45; 95% CI: 1.28–4.69).	Family support not significantly linked;	healthcare worker support showed no strong association
11	Lestari et al, Indonesia, 2020	Examined how family and healthcare worker support relate to adherence among TB patients in a public health center.	Validated, self-developed questionnaire assessing support and adherence	46% of respondents demonstrated high adherence.	NA	NA	Majority reported receiving family support (76%)	healthcare worker support (80%).

3.5 Adherence to Tuberculosis Treatment

Treatment adherence levels for TB varied across studies. Some studies reported high adherence rates, such as 78.6 % in Equatorial Guinea and 64.2 % in Ethiopia [6], [11]. Contrast, in China reported that only 45.7 % of patients demonstrated high adherence [5]. In Nigeria found that 30.5 % of patients were non-adherent to treatment [7]. This variation may be influenced by the type of TB (regular or MDR), the treatment phase (intensive or continuation), and the adherence measurement tools used (MMAS-8, ARMS, Morisky Test, TBMAQ).

3.6 Patient Knowledge

Most studies indicated a significant relationship between knowledge about TB and its treatment and patient adherence. The studies in Indonesia and Ethiopia demonstrated that patients with good knowledge were more likely to adhere to treatment [4], [12]. They found that higher knowledge scores were positively correlated with adherence (OR = 0.49, 95 % CI: 0.33–0.72) [5]. Inadequate knowledge may lead patients to discontinue therapy when symptoms subside, thereby increasing the risk of drug resistance and relapse.

3.7 Family Support

Family support encompasses emotional, spiritual, financial, and direct supervision dimensions in treatment adherence. The study by Chen et al. (2020) found that supervision by family members (OR = 0.34) and spiritual support (OR = 0.13) contributed significantly to improved adherence. Yani et al. (2022) also reported a high family support score (mean = 88.05). However, they did not find a significant association, suggesting that the impact of family support may be influenced by cultural context and perceptions of the family's role in care [4].

3.8 Healthcare Worker Support

The role of healthcare worker is crucial in delivering information, monitoring therapy, and reinforcing patient motivation. The study in China emphasized the importance of doctor–patient communication in enhancing trust and adherence [3]. Study in Peru highlighted that education provided by nurses mediates the effect of service quality on adherence [13]. Study in South Sudan reported that 99.6 % of patients expressed satisfaction with the healthcare providers who supported them [14]. However, study in Indonesia found no statistical association between healthcare provider support and adherence, indicating the need to evaluate the quality of interaction and communication delivered [4].

3.9 Attitude

The findings showed that attitude had a significant relationship with treatment adherence, alongside knowledge. This study explicitly measured patients' attitudes toward

TB treatment as a variable statistically tested for its association with medication adherence. Patients with a positive attitude—those who believe that treatment must be completed even when symptoms improve—were more likely to exhibit adherent behavior [4].

4 Discussion

Adherence to tuberculosis (TB) treatment continues to play a crucial role in ensuring patients achieve the best possible treatment outcomes and in controlling the spread of the disease. Around the world, failing to follow TB treatment properly has repeatedly been linked to serious consequences, including increased drug resistance, relapse of the illness, higher rates of complications and death, as well as ongoing transmission within communities [1]. Improving adherence to treatment is, therefore, a critical foundation for achieving the goals outlined in the WHO's End TB Strategy.

This systematic review synthesizes evidence from a diverse set of studies conducted in countries such as Equatorial Guinea, Ethiopia, China, Nigeria, Peru, South Sudan, and Indonesia. The findings consistently suggest that adherence to tuberculosis treatment is shaped by a multifaceted combination of factors. These include individual beliefs and behaviors, social and family support, the responsiveness of the healthcare system, structural barriers such as access and affordability, and deeply rooted cultural norms. Understanding these interacting determinants is essential for designing interventions that are both context-sensitive and sustainable.

One of the most consistent findings is the significant role of family support, which encompasses emotional encouragement, spiritual motivation, financial assistance, and supervision throughout the treatment process. Studies have shown that active family involvement is positively associated with higher patient adherence rates [5], [11], [13]. These findings are consistent with global literature highlighting the effectiveness of family-based interventions, particularly in resource-limited settings [15].

However, contrasting evidence was observed in Indonesia, where studies reported no significant association between family support and treatment adherence [2], [8]. This indicates the importance of contextual factors such as cultural perceptions of family roles in healthcare, prevailing social stigma, and differences in family structures.

The role of healthcare workers has also proven to be crucial in promoting adherence. Effective interpersonal communication, trust-building, and appropriate health education significantly contribute to improving patient adherence. These findings emphasize the importance of adopting a patient-centered care approach to enhance treatment adherence [3], [13]. Additional evidence also underscores the contribution of healthcare providers such as pharmacists, where the implementation of pharmaceutical care programs has been shown to enhance tuberculosis (TB) case detection and improve treatment outcomes. This practice involves collaborative care, direct observation, and the management of drug-related problems (DRPs), all of which play a key role in supporting medication adherence [16].

Patient knowledge regarding TB and its management is another critical factor. Studies conducted in Ethiopia, South Sudan, and China reported that misconceptions about

disease transmission, treatment duration, and premature discontinuation of therapy remain significant barriers to adherence [5], [6], [14]. These findings are reinforced by global reviews that emphasize the essential role of health literacy improvement to foster adherence [17]. Moreover, relatively simple interventions, when appropriately designed and easily understood, have the potential to significantly enhance TB care outcomes [18].

Beyond individual factors, structural and socioeconomic barriers such as transportation costs, geographic distance to healthcare facilities, and financial constraints are frequently reported, particularly in Ethiopia, Nigeria, and South Sudan [7], [12], [14]. These challenges are also highlighted in global reviews, which emphasize the need for decentralized TB services and adequate economic support for patients [15].

Additionally, psychosocial factors such as social stigma, alcohol consumption, and limited community-level support remain significant obstacles to adherence. Studies in Peru, South Sudan, and findings from global reviews revealed that stigma within communities reduces patient engagement, increases psychological distress, and contributes to premature treatment discontinuation [13], [14].

Geographical accessibility is another important factor to consider. Evidence from Indonesia indicated that patients residing more than five kilometers from DOTS facilities are at higher risk of non-adherence [8]. Similarly, studies in southern Ethiopia revealed that transportation barriers, lack of consistent health information, and limitations in decentralized DOTS services contribute to treatment interruption [6], [12].

Other behavioral and psychosocial dimensions, such as alcohol consumption and social stigma, particularly in resource-limited settings, further exacerbate the psychological burden experienced by TB patients, thereby increasing non-adherence risks and undermining TB control efforts [14]. Therefore, creative interventions targeting both healthcare workers and the broader community are essential. Interventions for healthcare workers can enhance their capacity to provide adequate support to TB patients, while community-level interventions have the potential to reduce stigma and promote supportive environments for individuals with TB [19].

Taken together, these findings highlight that adherence to tuberculosis treatment is a complex and multidimensional challenge, influenced by the interplay of individual knowledge, family and social support, healthcare system responsiveness, structural limitations, and broader community-level factors. Addressing this issue effectively requires integrated and context-sensitive strategies. These include enhancing health literacy among patients and their families, equipping healthcare providers with empathetic and communicative skills, reducing stigma through community-driven efforts, improving the availability and affordability of healthcare services, and reinforcing policy support for the sustainability of community-based DOTS programs [19], [20].

5 Conclusions

Adherence to tuberculosis treatment is influenced by a dynamic and interconnected set of factors, including patients' knowledge and attitudes, the level of family involvement, the role of healthcare providers, and broader socio-economic conditions. To improve

treatment outcomes, it is essential to strengthen health literacy among both patients and their families, equip healthcare workers with effective communication skills, address systemic and structural barriers, and actively combat stigma associated with the disease. For these efforts to be effective, policymakers and healthcare leaders should prioritize interventions that are patient-centered, easily accessible, and embedded within community-based support networks. Such approaches are key to enhancing adherence and ultimately reducing the burden of TB-related illness, death, and transmission.

Conflict of Interest. The authors confirm that there are no conflicts of interest associated with this study.

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References

1. World Health Organization, "Global tuberculosis report 2024," (2024), [Online]. Available: <https://www.who.int/publications/i/item/9789240101531>
2. D. I. Yani, N. Juniarti, M. Lukman, "Factors related to complying with anti-TB medications among drug-resistant tuberculosis patients in Indonesia," *Patient Prefer. Adherence*, 16, 3319–3327 (2022), <https://doi.org/10.2147/PPA.S388989>
3. L. Du, R. Wu, X. Chen, J. Xu, H. Ji, L. Zhou, "Role of treatment adherence, doctor–patient trust, and communication in predicting treatment effects among tuberculosis patients: Difference between urban and rural areas," *Patient Prefer. Adherence*, 14, 2327–2336 (2020), <https://doi.org/10.2147/PPA.S277650>
4. L. Sofiana, S. M. Ayu, D. Amelia, P. Adiningsih, U. Sa'diyah, N. Putri, A. R. Azizah, A. A. Safitri, "Medication adherence of tuberculosis patients in Yogyakarta: A cross-sectional study," *J. Health Educ.*, 7, 2 (2022), <https://doi.org/10.15294/jhe.v7i2.60607>
5. X. Chen, L. Du, R. Wu, J. Xu, H. Ji, Y. Zhang, X. Zhu, L. Zhou, "The effects of family, society and national policy support on treatment adherence among newly diagnosed tuberculosis patients: A cross-sectional study," *BMC Infect. Dis.*, 20, 623 (2020), <https://doi.org/10.1186/s12879-020-05354-3>
6. K.D. Gashu, K.A. Gelaye, B. Tilahun, "Adherence to TB treatment remains low during continuation phase among adult patients in Northwest Ethiopia," *BMC Infect. Dis.*, 21, 725 (2021), <https://doi.org/10.1186/s12879-021-06428-6>
7. C.N. Iweama, O.S. Agbaje, P.C.I. Umoke, C.C. Igbokwe, E.L. Ozoemena, N.L. Omaka-Amari, B.M. Idache, "Nonadherence to tuberculosis treatment and associated factors among patients using directly observed treatment short-course in north-west Nigeria: A cross-sectional study," *SAGE Open Med.*, 9, 1–15 (2021), <https://doi.org/10.1177/2050312121989497>
8. Y. P. Lestari, T. Sukartini, M. Makhfudli, "The correlation of family support and health worker support with medication adherence of TB patients at Puskesmas Taman," *Crit. Med. Surg. Nurs. J.*, 9, 2 (2020), <https://doi.org/10.20473/cmsnj.v9i2.21533>
9. A. Liberati, D.G. Altman, J. Tetzlaff, C. Mulrow, P.C. Gøtzsche, J.P.A. Ioannidis, M. Clarke, P.J. Devereaux, J. Kleijnen, D. Moher, "The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Expla-

- nation and elaboration,” *Ann. Intern. Med.*, 151, W-65–W-94 (2009), <https://doi.org/10.7326/0003-4819-151-4-200908180-00136>
10. Joanna Briggs Institute, “JBI critical appraisal tools,” (2025), [Online]. Available: <https://jbi.global/critical-appraisal-tools>
 11. G. Fagundez, H. P. Freixo, J. Eyene, J. C. Momo, L. Biyé, T. Esono, M. O. M. Ayecab, A. Benito, P. Aparicio, Z. Herrador, “Treatment adherence of tuberculosis patients attending two reference units in Equatorial Guinea,” *PLoS ONE*, 11, 9 (2016), <https://doi.org/10.1371/journal.pone.0161995>
 12. T. T. Woimo, W. K. Yimer, T. Bati, H. A. Gesesew, “The prevalence and factors associated for anti-tuberculosis treatment non-adherence among pulmonary tuberculosis patients in public health care facilities in South Ethiopia: A cross-sectional study,” *BMC Public Health*, 17, 269 (2017), <https://doi.org/10.1186/s12889-017-4188-9>
 13. D. Dilas, R. Flores, W.C. Morales-García, Y.E. Calizaya-Milla, M. Morales-García, L. Sair-itupa-Sanchez, J. Saintila, “Social support, quality of care, and patient adherence to tuberculosis treatment in Peru: The mediating role of nurse health education,” *Patient Prefer. Adherence*, 17, 175–186 (2023), <https://doi.org/10.2147/PPA.S391930>
 14. P.M. Marin, M. Munyeme, C. Kankya, A.S. Jubara, E. Matovu, P. Waiswa, J. Sanchez Romano, F. Mutebi, D. Onafroo, E. Kitale, O. Benard, K.J. Buhler, M. Tryland, “Medication nonadherence and associated factors in patients with tuberculosis in Wau, South Sudan: A cross-sectional study using the World Health Organization multidimensional adherence model,” *Arch. Public Health*, 82, 107 (2024), <https://doi.org/10.1186/s13690-024-01339-9>
 15. A. Toczek, H. Cox, P. du Cros, G. Cooke, N. Ford, “Strategies for reducing treatment default in drug-resistant tuberculosis: Systematic review and meta-analysis,” *Int. J. Tuberc. Lung Dis.*, 17, 299–307 (2013), <https://doi.org/10.5588/ijtld.12.0537>
 16. I.S. Pradipta, E.O. Yanuar, C.Y. Nurhijriah, N.P. Maharani, L. Subra, D.P. Destiani, A. Di-antini, “Practical models of pharmaceutical care for improving tuberculosis patient detection and treatment outcomes: A systematic scoping review,” *Trop. Med. Infect. Dis.*, 8, 287 (2023), <https://doi.org/10.3390/tropicalmed8050287>
 17. N. Sommerland, E. Wouters, E.M.H. Mitchell, M. Ngicho, L. Redwood, C. Masquillier, R. van Hoorn, S. van den Hof, A. Van Rie, “Evidence-based interventions to reduce tuberculosis stigma: A systematic review,” *Int. J. Tuberc. Lung Dis.*, 21, S81–S86 (2017), <https://doi.org/10.5588/ijtld.16.0788>
 18. G. Marley, X. Zou, J. Nie, W. Cheng, Y. Xie, H. Liao, Y. Wang, Y. Tao, J.D. Tucker, S. Sylvia, R. Chou, D. Wu, J. Ong, W. Tang, “Improving cascade outcomes for active TB: A global systematic review and meta-analysis of TB interventions,” *PLoS Med.*, 20, e1004091 (2023), <https://doi.org/10.1371/journal.pmed.1004091>
 19. C. Nuttall, A. Fuady, H. Nuttall, K. Dixit, M. Mansyur, T. Wingfield, “Interventions pathways to reduce tuberculosis-related stigma: A literature review and conceptual framework,” *Infect. Dis. Poverty*, 11, 101 (2022), <https://doi.org/10.1186/s40249-022-01021-8>
 20. F.H. Gebreweld, M.M. Kifle, F.E. Gebremicheal, L.L. Simel, M.M. Gezae, S.S. Ghebreyesus, Y.T. Mengsteab, N.G. Wahd, “Factors influencing adherence to tuberculosis treatment in Asmara, Eritrea: A qualitative study,” *J. Health Popul. Nutr.*, 37, 1 (2018), <https://doi.org/10.1186/s41043-017-0132-y>

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