Journal of Health Promotion and Behavior (2025), 10(02): 316-327
Masters Program in Public Health, Universitas Sebelas Maret

Meta-Analysis
Open Access

The Role of Social Support in Improving Treatment Compliance in Tuberculosis Patients: A Meta-Analysis

Hendra Dwi Kurniawan[1)], Rizki Aqsyari[1)], Fara Khansa Azizah[2)]

[1)]School of Health Sciences Panti Kosala, Sukoharjo, Central Java, Indonesia
[2)]School of Health Sciences Mamba'ul 'Ulum, Surakarta, Indonesia

Received: 30 May 2025; Accepted: 10 June 2025; Available online: 16 July 2025

ABSTRACT

Background: Tuberculosis is a disease that requires attention in global health issues. Tuberculosis is a disease with a high mortality rate. Although a cure for tuberculosis has been discovered, the treatment process remains challenging, particularly the length of treatment. Tuberculosis patients often fail to complete their treatment due to the lengthy duration. Support from loved ones and a supportive environment is crucial for tuberculosis patients during their treatment. With this support, tuberculosis patients will have a support system that can assist them in their treatment. This study aims to estimate the effect of social support on treatment compliance in tuberculosis patients.

Subjects and Method: This study used a systematic review and meta-analysis using PICO. Population: tuberculosis patients. Intervention: social support. Comparison: no social support. Outcome: treatment adherence. The articles used in this study came from 2 databases, namely Google Scholar and Science Direct. The keywords of the article are "tuberculosis" AND ("social support" OR "support system") AND ("adherence" OR "compliance") AND "cross sectional" AND "multivariate". This study uses articles published in 2019 to 2025 with full paper articles, cross-sectional study designs, and the magnitude of the Adjusted Odds Ratio relationship. Articles were analyzed using the Review Manager 5.3 application.

Results: Eleven cross-sectional studies showed that social support can increase tuberculosis treatment adherence by 1.44 times compared to tuberculosis patients who do not receive social support, and this result is statistically significant (aOR = 1.44; 95% CI = 1.03 to 2.01; p = 0.03). The forest plot also shows high heterogeneity of effect estimates between primary studies I2 = 84%. The calculation of the average effect estimate was carried out using the random effect model approach.

Conclusion: Good social support can help improve treatment adherence in patients with tuberculosis.

Keywords: social support, medication adherence, tuberculosis.

Correspondence:
Hendara Dwi Kurniawan. School of Health Sciences Panti Kosala. Jl. Raya Solo - Baki No. 4, Sukoharjo, Central Java, Indonesia. Email: hendradeeka@gmail.com.Mobile: +6281234101501.

Cite this as:
Kurniawan HD, Aqsyari R, Azizah FK (2025). The Role of Social Support in Improving Treatment Compliance in Tuberculosis Patients: A Meta-Analysis. J Health Promot Behav. 10(03): 316-327. https://doi.org/10.26911/thejhpb.2025.10.03.06.

BACKGROUND

Tuberculosis is one of the diseases that needs to be considered in health problems. Tuberculosis is a disease that contributes to high mortality rates in sufferers (Zamaa et al., 2023). Based on da-ta from the World Health Organization (WHO), tuberculosis sufferers globally has increased from year

to year. In 2021, the prevalence of tuberculosis sufferers was 10.4 million cases, then in 2022 it became 10.7 million cases, and at the end of 2023, there was a significant increase to 10.8 million cases. India, Indonesia, China, the Philippines, and Pakistan are the 5 countries with the most tuberculosis cases in the world.

Tuberculosis in 2023 was recorded as the second cause of death in the world due to a single infectious agent after the coronavirus disease. Many factors underlie this, including poverty, inadequate access to health services, public stigma related to tuberculosis, social factors, and the presence of tuberculosis drug resistance, which make tuberculosis a global ongoing problem (Ahuja et al., 2024). The success rate of tuberculosis treatment is still the center of attention in handling these cases. This is because of the fairly long treatment period. In India, less than 30% of tuberculosis patients have successfully completed treatment within the specified period (Bagchi et al., 2010). Interrupted or incomplete treatment within the specified time period means that tuberculosis sufferers have a high risk of developing resistance to tuberculosis drugs (Tesfahuneygn et al., 2015).

Based on studies, patients with tuberculosis lung disease may not take their medications as prescribed due to a variety of reasons, including forgetting to take them, purposefully skipping them, reducing or stopping treatment in unhealthy conditions, not taking their medications on time, and arriving late to check their return sputum (Mardhiyyah et al., 2024). Due to problems in the treatment of tuberculosis patients who do not complete their treatment or whose treatment period is interrupted, this can lead to a high risk of these patients becoming resistant to tuberculosis drugs. This can worsen the condition of tuberculosis patients, thereby increasing the mortality rate due to tuberculosis.

Resistance to tuberculosis drugs is a major problem for the success rate of tuberculosis treatment. Drug resistance during tuberculosis treatment is influenced by one of the mechanisms of treatment that requires a long time (Nirmal et al., 2021). Therefore, compliance in treatment for tuberculosis patients is very important to note. Although current tuberculosis treatment has implemented WHO recommendations, namely using the Directly Observed Treatment Shortcourse (DOTS) method, a low level of treatment success is still found. The decline was obtained from data from 2015 which had reached a success rate of 85% and in 2022 it decreased to 55%. This decline is a challenge for current tuberculosis treatment (Nursalim et al., 2021).

Non-compliance in tuberculosis treatment is a major obstacle to the success of the DOTS program. Tuberculosis patients who are not compliant in completing treatment can cause new problems, namely resistance to tuberculosis drugs (MDR-TB) (Anley et al., 2023). Several existing studies have stated that the death rate of tuberculosis sufferers due to MDR-TB is increasing; therefore, a comprehensive approach is needed in dealing with this problem (Aibana et al., 2020).

The problem of non-compliance with tuberculosis treatment remains a major factor in treatment failure in tuberculosis patients. Given this issue, many factors need to be considered to improve patient adherence to treatment. One of the main factors that causes tuberculosis sufferers to be unable to complete their treatment is the lack of social support. Having good social support is considered to be able to help tuberculosis sufferers in undergoing treatment (Asriwati et al., 2021). Social support

that can be given to tuberculosis sufferers can include motivation, appreciation, and special attention (Gurusinga et al., 2024). However, there are still gaps in the specific roles and impacts of various forms of social support provided to tuberculosis patients undergoing treatment Social support from family members, peers, and community health workers plays a crucial role in facilitating consistent medication adherence. Social support provides emotional support and practical assistance, impacting adherence outcomes (Asriwati & Tristiyana, 2020). Therefore, further research is needed on the role of social support in treatment compliance in tuberculosis patients.

SUBJECTS AND METHOD

1. Study Design

This study uses articles published from 2019 to 2025. The selection of articles uses a flow diagram, namely the PRISMA Flow Diagram. The keywords used in the article search are "tuberculosis" AND ("social support" OR "support system") AND ("adherence" OR "compliance") AND "cross sectional" AND "multivariate".

2. Steps of Meta- Analysis

This study uses meta-analysis steps, including:

1) Formulating PICO includes P= Tuberculosis sufferers, I= Social support, C= No social support, O= Treatment compliance.

2) Searching for primary study articles from a variety of electronic and non-electronic journals.

3) Conducting screening and critical appraisal of primary research study articles

4) Performing extraction and synthesis of forecast output data into RevMan 5.3.

5)Present the results and draw conclusions.

3. Inclusion Criteria

This study used inclusion criteria, namely full-text articles with a cross-sectional research design. This article was published in English from 2019 to 2025. Analyzing and estimating social support for tuberculosis treatment adherence until the end of the study was reported using adjusted odds ratios (aOR).

4. Exclution Criteria

This study used exclusion criteria, namely articles that had been meta-analyzed, did not use a cross-sectional design, the final results of the study were not reported using the adjusted odds ratio (aOR) and the sample was <50 participants

5. Operational Definition of Variables

The article search was conducted by considering the eligibility criteria determined using the PICO model.

Social support: Tuberculosis patients' perceptions of the assistance received from family, health workers, and social environment, including emotional, informational, and instrumental support during tuberculosis treatment.

Tuberculosis treatment compliance: The level of regularity of tuberculosis patients in taking medication according to the recommended schedule, dose and duration during the treatment period.

6. Study Instruments

The instrument in this study was the PRISMA Flow Diagram using the primary study quality assessment for the cross-sectional design of the Meta-analysis research.

7. Population and Sample

The research participants in this primary article are tuberculosis patients from various countries. This study includes all published cross-sectional studies of the effect of social support on treatment compliance in tuberculosis patients. Article search was conducted from 2019 to 2025.

8. Data analysis

From the articles that have been collected, data processing is carried out using the Review Manager application (RevMan 5.3)

to determine the magnitude of the influence between social support and tuberculosis treatment compliance. Data processing is presentedin the form of forest plots and funnel plots.

RESULTS

The process of searching for articles to be synthesized, then the process of reviewing and selecting articles using the PRISMA Flow Diagram shown in Figure 1 from the initial search process produced 1,920 articles, after removing duplicate articles, 850 articles were produced, then after the process of removing duplicate articles, the next step was to check the relevance of the title and study design used to produce 1,070 articles.

After that, checking the articles according to the inclusion criteria and obtaining the exclusion criteria of 50 articles. From the filtered articles, a research quality assessment was carried out, 11 articles were found. Based on Figure 2, 11 research articles came from the African continent, namely from the countries (Ethiopia, Kenya, Uganda, South Africa), the Asian continent, namely the countries (Vietnam, Indonesia), the American continent, namely the country (United States).

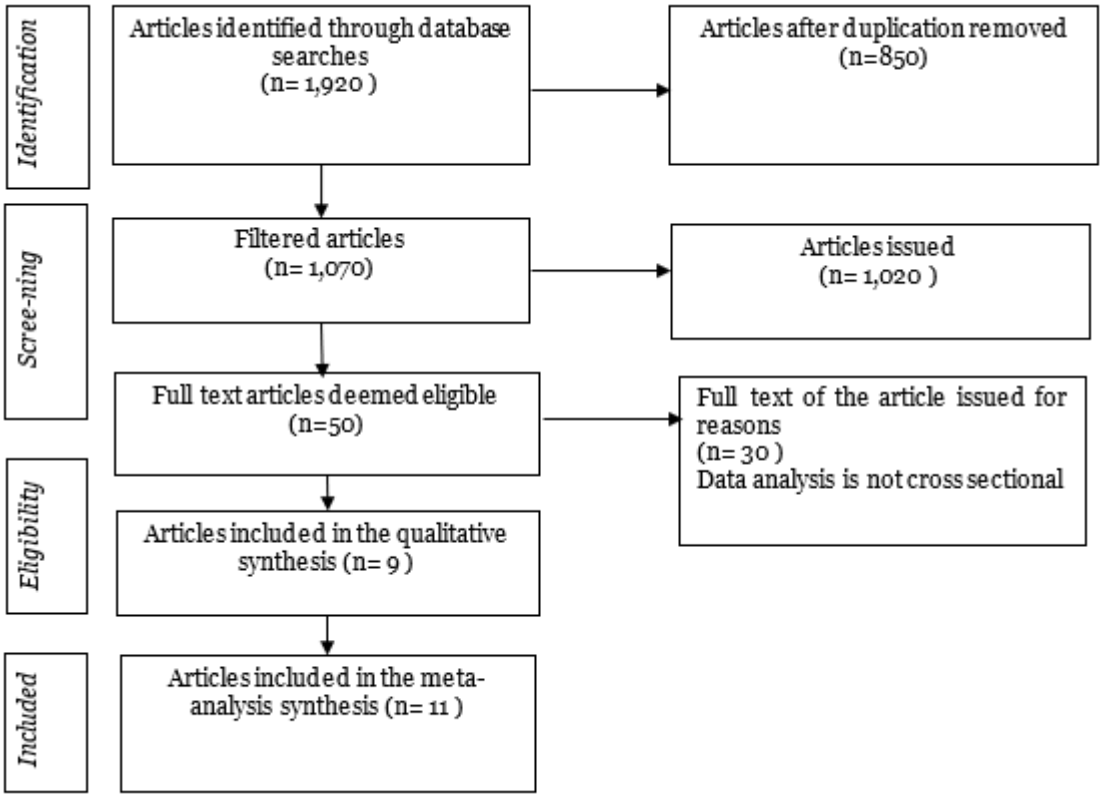

Figure 1. PRISMA Flow of the Role of Social Support in Improving Treatment Compliance in Tuberculosis Patients

Figure 2. Research area of cross-sectional study of the influence of social support on tuberculosis treatment compliance

Table 1. Critical Appraisal Skills Programme of the Article on The Role of Social Support in Improving Treatment Compliance in Tuberculosis Patients

Author (Year)	Appraisal Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Ahuja et al 2024	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Alinaitwe et al 2025	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Solikhah et al 2019	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Mohammedhussein et al 2020	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Abdurahman et al 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Chebet et al 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Bresenham et al 2020	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Vo et al 2020	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Nguyen and Dinh 2024	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Sofiana et al 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Duko et al 2019	2	2	2	2	2	2	2	2	2	2	2	2	2	26

Description of question criteria:

1. Formulation of research questions in the acronym PICO

a. Is the population in the primary study the same as the population in the PICO meta-analysis?

b. Is the operational definition of intervention, namely exposed status in the primary study the same as the definition intended in the meta-analysis?

c. Is the comparison, i.e. unexposed status, used in the primary study the same as the definition intended in the meta-analysis?

d. Are the outcome variables studied in the primary studies the same as those defined in the meta-analysis?

2. Methods for selecting research subjects

a. In an analytical cross-sectional study, whether researchers select samples from the population randomly (random sampling)?

b. Alternatively, if in an analytic cross-sectional study the sample is not

selected randomly, does the researcher select the sample based on outcome status or intervention status?

3. Methods for measuring exposure (intervention) and outcome variables

a. Were both exposure and outcome variables measured with the same instruments in all primary studies?
b. If variables are measured on a categorical scale, are the cutoffs or categories used the same across primary studies?

4.Design related bias

If the sample is not selected randomly, has the researcher made efforts to prevent bias in selecting research subjects. For example, in selecting subjects based on outcome status not affected by exposure status (intervention), or in selecting subjects based on exposure status (intervention) not affected by outcome status.

5. Methods to control confounding

Have the primary study investigators made efforts to control for confounding influences (e.g., performing multivariate analyses to control for the influence of a number of confounding factors).

6.Statistical analysis methods

a. Did the researcher analyze the data in this primary study using a multivariate analysis model (e.g., multiple linear regression analysis, multiple logistic regression analysis).
b. Did the primary study report the effect size or association of the multivariate analysis results (adjusted OR).

7. Conflict of interest

Is there a possibility of a conflict of interest with the research sponsor, which could cause bias in concluding the research results?

Assessment Instructions:

1. Total number of questions = 13 questions. Answer "Yes" for each question gives a score of "2". Answer "Uncertain" gives a score of "1". Answer "No" gives a score of "0".
2. Total maximum score = 13 questions x 2 = 26.
3. The total minimum score = 13 questions x 0 = 0. So the range of total score for a Primary study is between 0 and 26.

If the total score of a primary study is >= 22, then the study can be included in the meta-analysis. If the total score of a primary study.

Table 2. Description of primary studies of the influence of social support on tuberculosis treatment adherence with a cross-sectional design (n=8,189)

Writer (Year)	Country	Sample	P (Population)	I (Intervention)	C (Comparison)	O (Results)
Ahuja et al 2024	United States of America	477	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Alinaitwe et al 2025	Uganda	140	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Solikhah et al 2019	Indonesia	99	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Mohammedhussein et al 2020	Ethiopia	410	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Abdurahman et al 2022	Ethiopia	213	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Chebet et al 2022	Kenya	235	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance

Writer (Year)	Country	Sample	P (Population)	I (Intervention)	C (Comparison)	O (Results)
Bresenham et al 2020	South Africa	397	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Vo et al 2020	Vietnamese	5,490	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Nguyen and Dinh 2024	Vietnamese	236	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Sofiana et al 2022	Indonesia	75	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance
Duko et al 2019	Ethiopia	417	Tuberculosis sufferer	Social support	Lack of social support	Treatment compliance

Table 3. Adjusted Odd Ratio data on the influence of social support on tuberculosis treatment compliance with a cross-sectional design (n=8,189)

Author (Year)	aOR	95% CI	
		Lower limit	Upper limit
Ahuja et al 2024	2.50	1.31	4.77
Alinaitwe et al 2025	2.48	1.44	4.27
Solikhah et al 2019	4.04	1.72	9.49
Mohammedhussein et al 2020	2.41	1.06	5.48
Abdurahman et al 2022	4.13	1.29	13.22
Chebet et al 2022	0.35	0.13	0.94
Bresenham et al 2020	0.35	0.12	1.02
Vo et al 2020	1.07	1.00	1.14
Nguyen and Dinh 2024	0.72	0.59	0.88
Sofiana et al 2022	1.24	0.63	2.44
Duko et al 2019	2.45	1.18	5.09

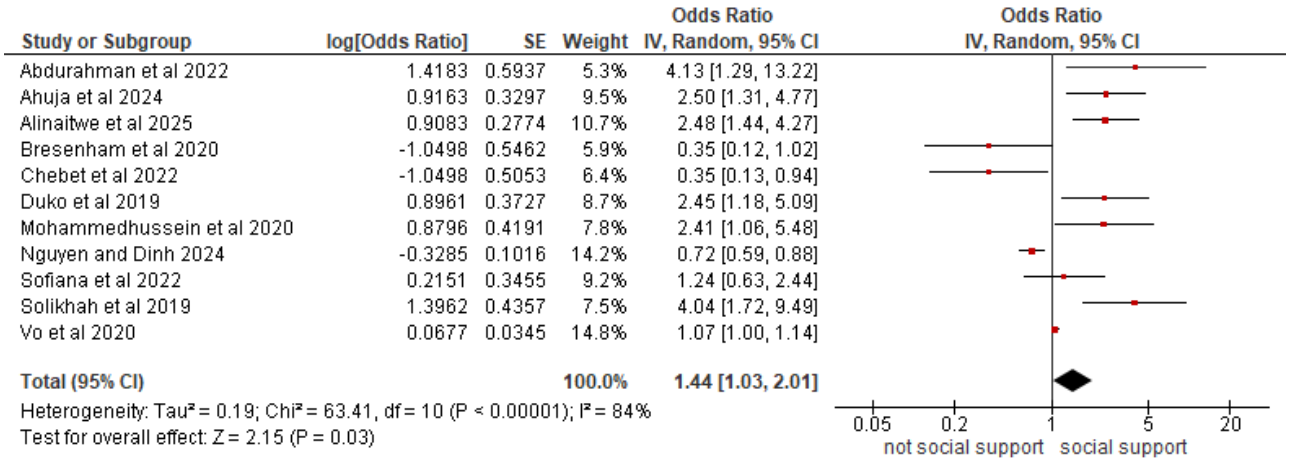

Figure 3. Forest plot Ratio of the influence of social support on tuberculosis treatment compliance

Forest plot Figure 3 shows that social support can increase tuberculosis treatment compliance by 1.44 times compared to tuberculosis patients who do not receive social support, and this result is statistically significant (aOR=1.44; 95% CI= 1.03 to 2.01; p= 0.03). The forest plot also showed high heterogeneity of effect estimates between primary studies I^2= 84%. The calculation of the average estimated effect

is carried out using the random effect model approach.

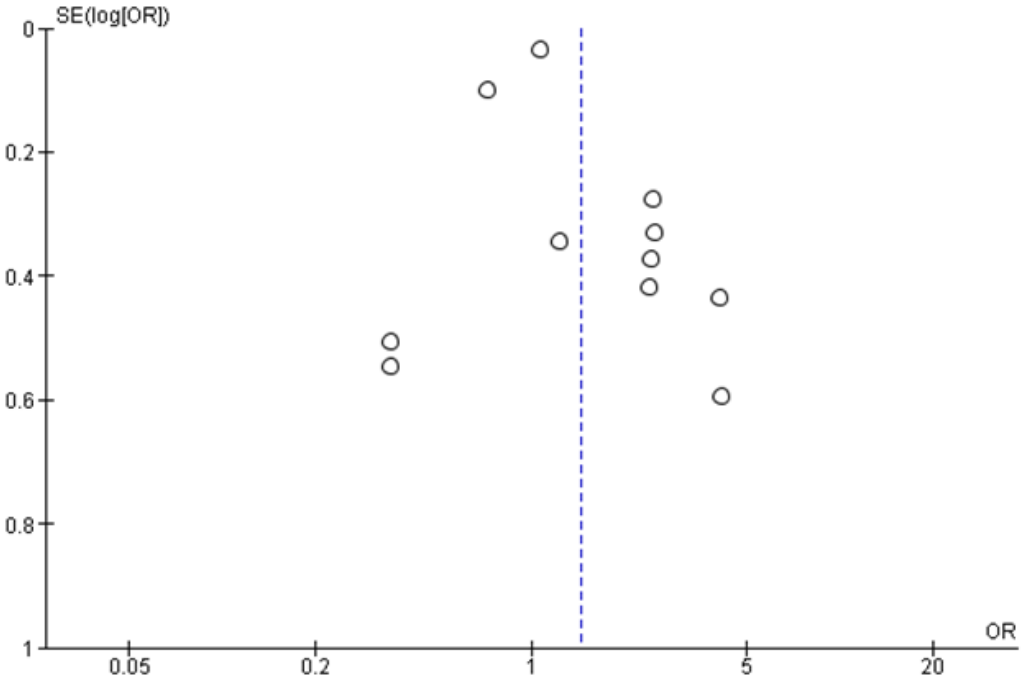

Figure 4. Funnel plot of the ratio of the influence of social support on tuberculosis treatment compliance

Funnel plot Figure 4 shows that the distribution of effect estimates is uneven. The distribution of effect estimates shows that the distribution of effect estimates tends to be more located to the right of the average vertical line of effect estimates than to the left. Thus, this funnel plot image shows the presence of publication bias. Because the distribution of effect estimates is located to the right of the average vertical line in the same direction as the diamond in the forest plot, publication bias tends to overestimate the true effect.

DISCUSSION

This meta-analysis study analyzes the effect of social support on tuberculosis treatment adherence. This study uses aOR statistics from multivariate analysis which aims to obtain the same final results for the studies to be analyzed.

The influence of social support on tuberculosis treatment compliance

Social support has a positive impact on increasing treatment compliance in tuberculosis patients. The results of the meta-analysis show that social support can increase tuberculosis treatment adherence compared to those with low social support.

Social support provided by healthcare professionals can influence the treatment of tuberculosis patients. This is because such support can provide a positive support system for tuberculosis patients, making them feel like someone is paying attention and supporting their recovery during treatment (Adima & Arini, 2025). This finding aligns with research conducted by Suprijandani et al., (2025) which found that social support can create positive perceptions in patients undergoing treatment, thereby increasing their adherence to treatment.

Research by Yan et al (2023)in China showed that social support was significantly associated with increased medication adherence, mainly through emotional and motivational support from family members (aOR = 1.68; 95% CI: 1.12–2.53). Similar findings were found by Ayalew et al (2022) in Ethiopia, which revealed that patients with strong social support were almost twice as likely to adhere to treatment than those without support. Family support and motivation play a crucial role in improving patient satisfaction with tuberculosis treatment. Strategies to strengthen family involvement and patient motivation need to be integrated into tuberculosis control programs to improve optimal treatment outcomes (Nindrea et al., 2025).

Providing attention and support to tuberculosis sufferers needs to be considered, because this attention can increase treatment compliance in tuberculosis sufferers who are undergoing treatment (Ariyanti et al., 2025). According to Ruru et al (2020)that support from health workers, in the form of regular communication and medication reminder systems, has a significant impact on treatment retention. Community-based interventions such as mentoring by health cadres or family support have also proven effective in increasing patient motivation to complete tuberculosis treatment.(Yuniarti et al., 2022). Social support from family and health cadres not only helps reduce stigma, but also increases patient motivation to complete treatment. This is very important considering the long duration of TB therapy often causes boredom and non-compliance.(Tola et al., 2016). And with the existence of social media can reduce mental health due to excessive focus on oneself and potential addiction, which triggers anxiety. This can interfere with tuberculosis patients' compliance with treatment, especially if the social support they receive is low (Aqsyari et al., 2024).

The motivation of tuberculosis patients undergoing treatment also needs to be considered, as it is a key factor in successful treatment. Good social support can increase an individual's motivation to complete their treatment (Simanjuntak et al., 2025). This is consistent with research conducted by Setiawan et al., (2025) which found that adequate social support can improve tuberculosis patient adherence to treatment. Providing social support to tuberculosis patients undergoing treatment has numerous positive impacts and is therefore crucial for successful treatment.

Research by Zhou et al. (2016) in China showed that patients who received support from their spouses and children had greater confidence in adhering to treatment. This social support not only provided emotional comfort but also helped remind them of medication schedules and accompany them to healthcare facilities. Furthermore, research by Adejumo et al. (2021) in Nigeria found that TB patients with strong social support, particularly from family and healthcare professionals, had higher adherence rates. Patients who felt emotionally supported tended to be better able to cope with long-term treatment challenges, such as drug side effects or social stigma.

Research by Ekwueme & Essien (2022) confirmed that social support can alleviate the psychosocial and economic burdens faced by TB patients, such as transportation costs to clinics or lost income due to unemployment. This material support significantly impacts the continuation of therapy. Furthermore, research by Munro et al. (2007) also underscored the importance of understanding the social and cultural context in efforts to improve TB treatment adherence. In various cultures, social support serves as a stigma reducer

and increases patients' perception that they are not alone in their fight against the disease.

Social support has been shown to be effective when provided within a community setting. Patients who received support from community health workers showed significantly higher treatment completion rates compared to patients without similar intervention (Datiko et al., 2020). This is in line with research by Mishra et al. (2021) in India, which found that community involvement in TB programs reduced drug discontinuation rates.

AUTHORS CONTRIBUTION

Hendra Dwi Kurniawan as the principal researcher who designed the research, conducted article searches and analyzed the data. Rizki Aqsyari collected articles and analyzed the data. Fara Khansa Azizah reviewed the article documents.

FUNDING AND SPONSORSHIP

The study was self-funded.

ACKNOWLEDGEMENT

The authors would like to thank the database providers Google Scholar and Science Direct.

CONFLICT OF INTEREST

There was no conflict of interest in this study.

REFERENCES

Adejumo OA, Daniel OJ, Jinabhai C (2021). Treatment adherence among people with drug-resistant tuberculosis in Lagos Nigeria: The effects of stigma, resilience, social support, and temporal discounting. Int J Mycobacteriol. Available from: https://journals.lww.com/ijmy/fulltext/2021/01000/-treatment_adherence_among_people_with.7.aspx

Adima F, Arini M (2025). The influence of healthcare workers' social support on compliance to medication in multi drug resistant tuberculosis patients at the Regional General Hospital of Dr. Saiful Anwar. Clin Epidemiol Glob Health. 31(6):101-890. doi: 10.1016/-j.cegh.2024.101890.

Ahuja N, Kuzmik A, Sznajder K, Lengerich E, Fredrick NB, Chen M, Hwang W, et al. (2024). Perceived social support and medication dose interruption among pulmonary tuberculosis patients in Western India: A cross-sectional study. Cureus. 16(11):1–11. doi: 10.7759/cureus.74507.

Aibana O, Dauria E, Kiriazova T, Makarenko O, Bachmaha M, Rybak N, Flanigan TP, et al. (2020). Patients' perspectives of tuberculosis treatment challenges and barriers to treatment adherence in Ukraine: A qualitative study. BMJ Open. 10(1):1–12. doi: 10.1136/bmjopen-2019-032027.

Anley DT, Akalu TY, Dessie AM, Anteneh RM, Zemene MA, Bayih WA, Solomon Y, et al. (2023). Prognostication of treatment non-compliance among patients with multidrug-resistant tuberculosis in the course of their follow-up: A logistic regression–based machine learning algorithm. Front Digit Health. 5(5):1–10. doi: 10.3389-/fdgth.2023.1165222.

Aqsyari R, Kurniawan HD, Prisusanti RD, Irfandi J (2024). Meta-analysis: Effect of social media on anxiety disorders in adolescents. Icistech. 1(2): 143–152. doi: 10.61397/jkpp.v1i2.88.

Ariyanti F, Nurmansyah MI, Wardani RK, Zilhadia, Kilic B (2025). The impact of health system responsiveness on tuberculosis treatment adherence in public primary healthcare facilities in

Indonesia. Clin Epidemiol Glob Health. 34(2): 102–107. doi: 10.1016-/j.cegh.2025.102107.

Asriwati, Tristiyana PI (2020). The determinants of family support of lung TB patients in consuming anti tuberculosis medicine in Polonia Health Center Medan. Health Notions. 4(1):1–6. doi: 10.33846/hn40101.

Asriwati YE, Niakurniawati, Usman AN (2021). Risk factors analysis of non-compliance of tuberculosis (TB) patients taking medicine in Puskesmas Polonia, Medan, 2021. Gac Sanit. 35: S227–S230. doi: 10.1016/j.gaceta.20-21.10.027.

Ayalew Y, Tegegne D, Abera W, Dagnaw F (2022). Social support and its association with adherence to tuberculosis treatment in Ethiopia: A cross-sectional study. PLoS One. 17(4): e0266-450. doi: 10.1371/journal.pone.026-6450.

Bagchi S, Ambe G, Sathiakumar N (2010). Determinants of poor adherence to anti-tuberculosis treatment in Mumbai, India. Int J Prev Med. 1(4):223–232.

Datiko DG, Habte D, Jerene D (2020). Community-based tuberculosis care improves treatment outcome in Ethiopia: A retrospective study. BMC Infect Dis. Available from: https://-bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-020-05162-z.

Ekwueme DU, Essien EJ (2022). Determinants of adherence to tuberculosis treatment among patients in Ghana: the role of social support. Pan Afr Med J. Available from: https://-www.panafrican-med-journal.com/-content/article/41/100/full/.

Gurusinga R, Afrizal A, Bachtiar A, Firdawati F, Machmud R, Burhan E, Jendrius J, et al. (2024). The relationship between family support and treatment adherence in patients with tuberculosis in Deli Serdang Regency 2022: A cross-sectional study. Nurs Midwifery Stud. 13(3):1–10.

Mardhiyyah CA, Pandanwangi S, Joharudin A, Sundari RT, Sumari S, Puteri RS (2024). Analysis of effectiveness and adherence of tuberculosis patients' medication in health care facilities in Indonesia. Saudi J Med Pharm Sci. 10(12):984–989. doi: 10.36348/sjm-ps.2024.v10i12.016

Mishra A, Verma R, Joshi H (2021). Community support and TB treatment adherence: Evidence from India. Indian J Tuberc. Available from: https://www.ijtb.org/article.asp?issn-=0019-5707;year=2021;volume=68;-issue=1;spage=93;epage=98

Munro SA, Lewin SA, Smith HJ, Engel ME, Fretheim A, Volmink J (2007). Patient adherence to tuberculosis treatment: A systematic review of qualitative research. PLoS Med. 4(7):e238. doi: 10.1371/journal.pmed.0040238

Nindrea RD, Ming LC, Agustian DR (2025). Family support, motivation, and treatment: Insights from Indonesia patient adherence to tuberculosis. Asian J Infect Dis. 19(2):43–49. doi: 10.21010/Ajidv19i2.5.

Nirmal A, Sznajder K, Patil R, Shaikh B (2021). Preference of inhalants over pills/injections among pulmonary tuberculosis patients in Western India: A cross-sectional study. J Clin Tuberc Other Mycobact Dis. 23: 100234. doi: 10.1016/j.jctube.2021.1-00234.

Nursalim, Nyorong M, Amirah A (2021). Implementation of management of pulmonary tuberculosis with the directly observed treatment short course strategy. J Adv Multidiscip Res

Med Health Sci Stud. 2(4):130–142. doi: 10.47616/jamrmhss.v2i4.227

Ruru Y, Andries A, Ahmad RA (2020). Supportive supervision and treatment adherence among tuberculosis patients in Indonesia. Trop Med Infect Dis. 5(2):61. doi: 10.3390/tropicalmed5020061

Setiawan H, Fadilah R, Rahmawati S, Pratama B, Kartika R (2025). Self-esteem and its determinants among pulmonary tuberculosis patients in Subang, Indonesia. Indones J Epidemiol Community Health. 2(2):51–58. doi: 10.31962/inj.v2i2.298

Simanjuntak VB, Novriani E, Razoki (2025). Studi kualitatif: Analisis faktor-faktor yang mempengaruhi pengobatan pasien TB di Puskesmas Sentosa Baru. Jurnal Riset Kesehatan. 4(1):454–464. doi: 10.55606/jurrikes-.v4i1.4751.

Suprijandani S, Setiawan S, Pathurrahman P, Wardoyo S, Rahayyu AM (2025). The behaviour of TB patients in East Lombok through a health belief model approach. J Health Popul Nutr. 44(1): 23. doi: 10.1186/s41043-025-00746-0

Tesfahuneygn G, Medhin G, Legesse M. (2015). Adherence to anti-tuberculosis treatment and treatment outcomes among tuberculosis patients in Alamata District, northeast Ethiopia. BMC Res Notes. 8(1):1–11. doi: 10.1186/s13104-015-1452-x

Tola HH, Shojaeizadeh D, Tol A, Garmaroudi G, Yilma H, Kebede A (2016). Psychological and educational intervention to improve tuberculosis treatment adherence in Ethiopia based on health belief model: A cluster randomized control trial. PLoS One. 11(5): e0155147. doi: 10.1371/journal.pone.-0155147.

Yan H, Zhang Y, Chen X, Li M (2023). Impact of social support on treatment adherence among tuberculosis patients in China: A cross-sectional study. BMC Public Health. 23(1):1221. doi: 10.1186/s12889-023-15790-1.

Yuniarti T, Sarwoko S, Asna AV, Kurniawan H, Anasulfalah H. (2022). Hubungan dukungan keluarga dengan keikutsertaan vaksin Covid-19. Avicenna. 5-(1):126–131. doi: 10.36419/avicenna.-v5i1.599

Zamaa MS, Windasari DP, Pawerusi EP, Aminullah, Iskandar Z (2023). Hubungan dukungan keluarga dengan kepatuhan minum obat pada pasien tuberkulosis. Jambura Nurs J. 5(2): 164–172. doi: 10.37311/jnj.v5i2.19547

Zhou C, Chu J, Liu J (2016). Adherence to tuberculosis treatment among migrant pulmonary tuberculosis patients in Shandong, China: A quantitative survey study. PLoS ONE 7(12): e52334. https://doi.org/10.1371/journal.pone.0052334.