



ORIGINALS

Impact of the “Peer Support” Programme on the treatment of patients with Tuberculosis: quasi-experimental study

Impacto del Programa “Apoyo entre Pares” en el tratamiento de pacientes con Tuberculosis: estudio cuasi-experimental

Syamikar Baridwan Syamsir^{1*}
Henny Permatasari²
Utami Rachmawati²
Agus Setiawan²
Dhea Natashia³
Heru Supriyatno⁴

¹ Department of Nursing, Faculty of Health Sciences, Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia. *Correspondence Email: syamikarbaridwan@upnvj.ac.id

² Department of Community Nursing, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia

³ Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Muhammadiyah Jakarta, Jakarta, Indonesia

⁴ Department of Nursing, Politeknik Kesehatan Kemenkes Semarang, Semarang, Indonesia

<https://doi.org/10.6018/eglobal.632141>

eolocation-id: e632141

Received: 4/10/2024

Accepted: 3/04/2025

ABSTRACT

Objective: Tuberculosis (TB) is a public health problem in many countries, including Indonesia. To enhance the treatment of TB patients, improving patients' perceptions of the disease and treatment is essential. This study aims to assess the effects of a peer support group program on the Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy of TB patients undergoing treatment.

Methods: Employing a quasi-experimental one-group pre-test-post-test design, the study was conducted at the Cimanggis Community Health Centre in Depok City. A total of 32 TB patients were selected via a total sampling technique. Over two months, the intervention included seven sessions encompassing participant selection, psychoeducation, cognitive restructuring, breathing exercises, activity scheduling, problem-solving, and health behavior maintenance. Instruments utilized included validated Health Belief Model and Sociodemographic Profile Questionnaires. Data analysis was performed using paired sample t-tests.

Results: This study showed a significant difference between pre-test and post-test scores in each domain of Perceived Severity ($p=0.000$), Perceived Benefits ($p=0.000$), Perceived Barriers ($p=0.000$), and Self-Efficacy ($p=0.000$). The average score of each part increased significantly.

Conclusions: The peer support group program effectively enhanced TB patients' perceptions and

confidence in their treatment approach. The pivotal roles of community nurses in facilitating peer support groups, delivering TB education, and overseeing program participation underscore the value of community-based interventions in TB management.

Keywords: Tuberculosis, Support Groups, Health Belief Model, Perception, Community Health Nursing.

RESUMEN

Objetivo: La tuberculosis (TB) es un problema de salud pública en muchos países, incluida Indonesia. Mejorar las percepciones de los pacientes sobre la enfermedad y el tratamiento es esencial para mejorar su tratamiento. Este estudio evalúa los efectos de un programa de apoyo entre pares en la Gravedad Percibida, Beneficios Percibidos, Barreras Percibidas y Autoeficacia de los pacientes con TB en tratamiento.

Métodos: Con un diseño cuasiexperimental de un solo grupo con pruebas antes y después, el estudio se realizó en el Centro de Salud Comunitario de Cimanggis en Depok. Se seleccionaron 32 pacientes con TB mediante muestreo total. Durante dos meses, la intervención incluyó siete sesiones sobre selección de participantes, psicoeducación, reestructuración cognitiva, ejercicios de respiración, planificación de actividades, resolución de problemas y mantenimiento de comportamientos saludables. Se utilizaron cuestionarios validados del Modelo de Creencias de Salud y Perfiles Sociodemográficos. Los datos se analizaron con pruebas t de muestras apareadas.

Resultados: Se encontró una diferencia significativa entre las puntuaciones pre y post en cada dominio: Gravedad Percibida ($p=0.000$), Beneficios Percibidos ($p=0.000$), Barreras Percibidas ($p=0.000$) y Autoeficacia ($p=0.000$), con un aumento significativo en las puntuaciones medias.

Conclusiones: El programa de apoyo entre pares mejoró las percepciones y la confianza de los pacientes con TB en su tratamiento. Los roles clave de las enfermeras comunitarias en facilitar grupos de apoyo, impartir educación sobre TB y supervisar la participación en el programa resaltan el valor de las intervenciones comunitarias en el manejo de la TB.

Palabras clave: Tuberculosis; Grupos de Apoyo; Modelo de Creencias de Salud; Percepción; Enfermería en Salud Comunitaria.

INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease caused by the bacterium *Mycobacterium tuberculosis*, primarily affecting the lungs but capable of infecting other organs through the respiratory tract⁽¹⁾. TB remains a significant global health issue, contributing significantly to the disease burden worldwide and posing a substantial threat to public health⁽²⁾. Despite being treatable, high mortality and morbidity rates from TB remain a pressing challenge. According to the Global TB Report 2022, Indonesia currently ranks second, after India, in the number of tuberculosis cases globally, an increase of one rank compared to 2020. The report estimates that in 2021, there were approximately 969,000 individuals infected with TB in Indonesia, with 443,235 cases detected⁽³⁾, indicating that about 525,765 TB cases in Indonesia were not detected and reported. This situation enables the transmission of the infection to others, particularly when individuals with active TB do not receive appropriate treatment. TB bacteria can spread into the air and infect others through inhaled air⁽¹⁾.

TB treatment adherence and transmission prevention behaviors significantly impact patient recovery rates and the ability to control disease spread and prevent drug resistance⁽⁴⁾. Behavioral factors, such as knowledge, attitudes, and skills, are crucial in improving TB patients' adherence to treatment and transmission prevention behaviors⁽⁵⁾. Furthermore, patients with a positive perception of TB treatment are more likely to adhere and have a better prognosis⁽⁶⁾.

Despite the recognized importance of adherence, many TB patients fail to follow their treatment regimens due to various complex reasons, including financial constraints related to treatment costs, side effects of therapy, difficulty following complex treatment regimens, perceptions of treatment effort, low levels of health literacy, and lack of social support⁽⁷⁾. Non-adherence can lead to prolonged disease duration, increased risk of TB transmission in the community, and even death⁽⁸⁾. It also causes significant pain and suffering for the infected individual while having far-reaching economic and social implications, exacerbating inequalities in public health⁽⁹⁾. Additionally, the emergence of drug-resistant TB poses increasingly complex challenges in treating and controlling the disease^(7,10). To prevent treatment failure and the development of drug resistance, supporting TB patients during their treatment is necessary.

Social support forms of help or support provided by others, such as family members, friends, neighbors, co-workers, or individuals experiencing similar problems is essential⁽¹¹⁾. The World Health Organization (WHO) has recommended interventions to improve TB patient support systems as part of TB program management and the new End TB strategy⁽¹²⁾. Various interventions, including health education, psychotherapy, and family and community support, have been implemented to strengthen social support for TB patients and enhance treatment adherence rates⁽¹³⁾. Past research on social support in the context of pulmonary TB has demonstrated a positive influence on improving medication adherence and preventing transmission⁽¹⁴⁾.

Community Nursing plays a critical role in the success of TB treatment through community-based approaches. Community nurses not only provide health education to TB patients but also facilitate and monitor the effectiveness of peer support programs⁽¹⁵⁾. With the involvement of community nurses, patients receive better guidance and companionship, enhancing their motivation to complete treatment. Previous studies have shown that support provided by community-based healthcare workers improves patient adherence to TB treatment and reduces the rate of treatment discontinuation⁽¹⁶⁾. Therefore, integrating peer support programs into community nursing can be an effective strategy in TB control.

Utilizing the Peer Group Support program to deliver social support has proven effective in preventing TB transmission. Researchers have recognized this approach as a suitable model for intervention when addressing the issue of TB. Peer Group Support is a main component of a social support program that aims to provide support and benefits to participants who engage in the group⁽¹⁷⁾. Group support programs, such as Peer Group Support, are widely used in the health domain to help individuals overcome specific health challenges. These interventions enable participants to feel more connected, accepted, and supported by peers experiencing similar situations.

Although previous studies have explored factors influencing TB treatment adherence, most have focused on individual factors, such as knowledge and attitudes toward treatment⁽¹⁸⁾. To date, research on the effectiveness of peer support programs in TB treatment remains limited, particularly at the local level in Depok City. The scarcity of studies exploring community-based interventions in this area forms an important basis for this research. This study is expected to fill gaps in the literature by evaluating how peer support programs can improve TB patients' perceptions of their

treatment, as well as provide a basis for the development of community-based policies in TB control in Indonesia.

However, there remains a research gap in understanding how peer support interventions impact patient perceptions of TB treatment using the Health Belief Model (HBM). Therefore, the objective of this study is to examine the impact of the Peer Group Support program on the perceptions of patients suffering from Tuberculosis (TB) towards their treatment in terms of the Health Belief Model theory consisting of Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy in undergoing treatment.

METHODS

This study employed a quasi-experimental one-group pre-test-post-test design to evaluate the effectiveness of a peer group support program in improving TB patients' perceptions of treatment based on the Health Belief Model (HBM) theory. The methodology and results were reported according to the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement guidelines to ensure clarity and reproducibility of the findings⁽¹⁹⁾.

The HBM, a conceptual framework used to understand health-related behaviors, underpins this study. It posits that health behaviors are influenced by personal beliefs about disease risks and treatment benefits⁽²⁰⁾. Within TB management, the HBM addresses six key components: Perceived Susceptibility, Perceived Severity, Perceived Benefits, Perceived Barriers, Cues to Action, and Self-Efficacy⁽²¹⁾. By understanding individuals' perceptions and beliefs, nurses and health professionals can design more effective approaches to increasing public awareness of TB, motivating patients to follow timely treatment, and reducing disease transmission. In TB care, HBM provides a structured view to improve the quality of care and prevention.

The study was conducted at Cimanggis Community Health Centre, Depok City, West Java, involving TB patients actively undergoing treatment. A total sampling technique was used, considering the relatively small population, resulting in 32 participants meeting the inclusion criteria. The sample size was determined using the G*Power 3.1 application (effect size = 0.5, power = 80%), with a required minimum of 27 participants. No dropouts were recorded during the study. Inclusion criteria included adult patients actively undergoing TB treatment, while patients with medical conditions that prevented participation in the peer group support program were excluded from the study.

The research instruments used were based on the HBM framework, which consists of the Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy. This questionnaire was adopted from a study conducted by Kueh et al., (2022)⁽²²⁾ and then modified by the researcher. This questionnaire consists of 27 statements rated using a Likert scale of 1-4. There are five questions in the Perceived Severity Questionnaire, seven in the Perceived Benefits Questionnaire, six in the Perceived Barriers Questionnaire, and nine in the Self-Efficacy Questionnaire. Details of the distribution of questions per indicator are presented in Table 1.

Table 1. Scale Indicator Details Based on the Health Belief Model

Indicator	Number of Questions	Rating Scale	Description
Perceived Severity	5	Likert 1-4	Measures the perceived severity of TB
Perceived Benefits	7	Likert 1-4	Measures the perceived benefits from TB treatment
Perceived Barriers	6	Likert 1-4	Measures obstacles faced in undergoing TB treatment
Self-Efficacy	9	Likert 1-4	Measures self-confidence in managing TB treatment

The validity and reliability of the instruments have been tested to ensure or improve the quality of the research results. This test was conducted at Pasir Gunung Selatan Community Health Centre, Depok City, on 20 pulmonary tuberculosis patients who were not included in the study sample. The validity test results using the Pearson Correlation Test showed that the questionnaire is valid with significance values for all question items ($p < 0.05$), and the reliability test produced a Cronbach's alpha value of 0.8, indicating high reliability.

A Sociodemographic Profile Questionnaire was also used to complete the data, including gender, age, religion, ethnicity, education, and comorbidities. In addition, the clinical data collected involved measuring participants' vital signs to provide important information regarding their health status.

The intervention used in this study was peer group support. Peer support is a practice where individuals use their personal experiences to help each other, bring together people with similar experiences to support each other, and provide an environment where they feel accepted and understood⁽¹⁷⁾. In the context of TB patients, peer group support is a form of social intervention that incorporates TB patients in a support group of individuals also experiencing similar conditions⁽²³⁾. The primary purpose of this intervention is to provide emotional support, information, and positive practices to TB patients, which aims to improve treatment adherence and motivate patients to follow measures to prevent disease transmission. This peer support group intervention was implemented in seven sessions, and each session was designed to provide holistic support to participants in dealing with TB, emphasizing the understanding, motivation, and skills needed to manage the disease. Each session had a specific focus, and sessions were conducted weekly by trained facilitators, including nurses and peer educators. The intervention included:

The first session involved the selection of participants and marked the formation of a TB support group. This group aimed to unite individuals who shared similar experiences with TB, fostering a sense of community. Participants were educated on the Support Group Intervention's purpose, which encompassed providing emotional support, sharing valuable information, and improving adherence to TB treatment. This, in turn, strengthened their perception of the benefits derived from the group. Additionally, a group leader was chosen to facilitate interaction and coordination within the group.

Subsequently, in the second session, a psychoeducational intervention took place, allowing participants to express their challenges and experiences during TB treatment openly. A story-sharing session enabled participants to share their

narratives and experiences with fellow group members, potentially influencing their perception of the severity of the disease. Moreover, educational content on TB and its treatment was delivered to enhance participants' comprehension of the ailment and the importance of treatment adherence. This educational component also contributed to their understanding of the benefits of adhering to the treatment.

In the third session, cognitive restructuring was the focus, offering participants guidance on modifying potentially negative mindsets that could impact their motivation to adhere to TB treatment. The objective was to empower participants to overcome any fears or concerns that might obstruct their adherence, thus emphasizing increased self-efficacy in managing the disease.

The subsequent session, Session 4, centered on breathing exercises and physiotherapy treatment for the chest. Participants were instructed in Active Cycle Breathing techniques to enhance their breathing quality. This could be particularly beneficial for individuals managing TB, which often involves respiratory problems, influencing their perception of the disease's severity.

Session 5 underscored the importance of activity scheduling during the TB treatment journey. Participants were equipped with strategies for organizing their time to engage in enjoyable activities. This, in alignment with the Health Belief Model, aimed to enhance their perception of the benefits associated with treatment adherence.

In Session 6, participants delved into problem-solving techniques, learning to identify and effectively address challenges that might arise during TB treatment. The overarching goal was to guide participants away from maladaptive behaviors and toward constructive solutions, ultimately reducing perceived barriers.

Finally, Session 7 focused on maintaining healthy behaviors that participants incorporated throughout the TB treatment journey. They were encouraged to adhere to the treatment plan and implement TB prevention practices, thereby contributing to increased self-efficacy.

During the intervention, nurses and peer facilitators actively engaged with participants, monitoring their progress and providing tailored guidance. Attendance and participation were documented, ensuring consistency in program implementation.

The research team was responsible for collecting data in this study. Participants who had consented to take part in the research provided informed consent before participating in the peer group support program. The study was structured into three phases: pre-intervention, intervention, and post-intervention phases. During the pre-intervention phase, participants were required to fill out the HBM questionnaire and the Sociodemographic Profile Questionnaire. This initial step aimed to gain insights into their perceptions and sociodemographic characteristics. The intervention phase spanned two months, from June 2023 to August 2023. During this period, participants actively engaged in peer support groups, offering emotional support, exchanging information, and developing positive practices related to managing TB. Finally, the post-intervention phase involved participants completing the HBM questionnaire once more after completing the peer group support program. This was done to assess any

changes in participants' perceptions of TB following their participation in the peer group support intervention.

Quantitative data were analyzed using descriptive statistics (frequency and percentage), Shapiro-Wilk normality tests, and paired samples t-test for statistical comparison of pre- and post-intervention scores. The normality test results showed that all data were normally distributed with a significance level ($p>0.05$) for all variables.

This study was approved by the Ethics Committee of the Faculty of Nursing, University of Indonesia (Number: KET-128/UN2.F12.D1.2.1/PPM.00.02/2022). The researcher also obtained informed consent from each participant after explaining the purpose of the study and maintaining the privacy and confidentiality of responses during data collection. Finally, participants had the right to withdraw from the study at any time without any negative impact.

RESULTS

The Peer Group Support program involving 32 participants displayed a diverse range of sociodemographic characteristics, providing substantial insights into the group's composition (Table 2). The analysis of sociodemographic data revealed that the majority of participants were male (66%) and classified as early adults (18-40 years old) (50%). The predominant religion among the participants was Islam (91%), with a smaller proportion identifying as Christian (9%). Ethnically, the majority were Javanese (62%), followed by Sundanese and Betawi (each 19%). In terms of educational background, most participants had completed high school (78%), with a smaller proportion having tertiary education (19%), and a minority having only junior high school education (3%). Approximately 16% of participants reported comorbidities, whereas a vast majority (84%) did not. This demographic variability emphasizes the inclusivity of the Peer Group Support program, effectively accommodating a broad range of social and demographic backgrounds, fostering an inclusive environment essential for addressing diverse TB-related challenges.

Table 2. Frequency Distribution of Participant Demographics (n=32)

Variable	Frequency (n)	Presentation (%)
Gender		
Male	21	66%
Female	11	34%
Age		
Early Adult (18 - 40)	16	50%
Middle Adult (41 -59)	16	50%
Religion		
Islam	29	91%
Christianity	3	9%
Tribe		
Javanese	20	62%
Sundanese	6	19%
Betawi	6	19%

Variable	Frequency (n)	Presentation (%)
Pendidikan		
Junior High School	1	3%
Senior High School	25	78%
University	6	19%
Comorbidities		
Yes	5	16%
No	27	84%

The paired sample t-test analysis indicated significant changes in participants' perceptions regarding TB treatment, including Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy (Table 3).

Table 3. Results of Pre- and Post-Implementation Data Analysis of the Peer Group Support Program

Variable	Δ Mean	Δ Std. Deviation	t	df	p-value
Perceived Severity (pre-and post-test data)	9.031	2.559	19.966	31	0.000*
Perceived Benefits (pre-and post-test data)	5.406	3.004	10.181	31	0.000*
Perceived Barriers (pre-and post-test data)	6.688	2.132	17.746	31	0.000*
Self-efficacy (pre-and post-test data)	10.344	3.189	18.350	31	0.000*

*) significant if $\alpha < 0.05$ with paired t-test

The "p-value" column shows that these changes are statistically significant, with values less than 0.05, indicating a marked improvement in each domain from pre-test to post-test. Each variable displayed a p-value of 0.000, confirming that the Peer Group Support program significantly impacted patients' Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy in managing their TB treatment. Notably, Self-Efficacy showed the most considerable improvement (Δ Mean = 10.344, $t = 18.350$, $p = 0.000$).

DISCUSSION

This study aimed to assess the effect of the Peer Group Support program in improving patients' perceptions of TB treatment, as measured by the variables Perceived Severity, Perceived Benefits, Perceived Barriers, and Self-Efficacy. The results of this study consistently show that the Peer Group Support program has a positive and significant impact on all four variables. With this increase in positive perceptions, TB patients tend to understand the consequences of their disease better, identify more significant benefits in treatment, feel more confident in facing barriers, and have greater confidence in their ability to undergo TB treatment. This is in line with previous studies that underscore the vital role of Peer Group Support in improving patients' understanding of their disease and motivation to follow treatment diligently⁽²³⁾. In addition, these findings also align with the concept of the HBM, which states that an individual's beliefs about healthy behavior are influenced by factors such as perceptions of susceptibility to illness, Severity of illness, benefits of

preventive action, barriers to taking preventive action, self-efficacy, and cues to action⁽²¹⁾.

Peer group support interventions that help enhance the perception of disease severity (Perceived Severity) through storytelling sessions and health education. By hearing firsthand experiences from fellow group members who have faced complications or challenges due to TB, participants gain a realistic perspective on the serious impacts of TB if not properly treated. This helps them realize the importance of adhering to treatment and motivates them to take their health management more seriously. In the context of Perceived Benefits, this intervention educates participants about the concrete benefits of consistent and effective TB treatment through educational sessions and shared learning. These sessions emphasize improvements in quality of life and reduction of the risk of transmitting the disease to others. Participants also learn about the improvements in their physical and psychological conditions as a result of following the treatment properly, enhancing their perception of the benefits of TB treatment. Patients must understand their susceptibility to TB and the benefits of appropriate treatment. Social support through Peer Group Support programs is essential in improving patients' understanding of their disease, providing motivation to adhere to treatment, and facilitating better decision-making processes⁽²⁴⁾. This heightened perception may catalyze patients to adhere diligently to their treatment regimens, driven by their heightened understanding of the potential repercussions of TB⁽²⁵⁾.

The findings also indicate that social support interventions can enhance Perceived Barriers by equipping participants with strategies to address potential obstacles encountered during TB treatment. Through problem-solving sessions and cognitive restructuring, participants are taught to identify and manage mental and practical barriers, such as stigma, fear of medication side effects, or difficulties in adhering to strict treatment schedules. By strengthening these capabilities, patients become more confident in overcoming challenges that arise during the treatment process. Studies show that psychosocial support interventions significantly improve TB treatment outcomes and reduce perceived barriers⁽²⁶⁾. Furthermore, social support interventions also increase the self-efficacy of TB patients to remain adherent to their treatment. Patient self-efficacy shows significant improvement, indicating an increased confidence in their ability to effectively follow TB treatment protocols. Studies indicate that community-based social support interventions, including health education and psychosocial support, help reduce stigma and enhance mental health, which is crucial for boosting the self-efficacy of TB patients⁽²⁷⁾.

This study provides concrete evidence that the Peer Group Support program is an effective tool in enhancing TB patients' perceptions and confidence regarding their treatment. As a health promotion program, peer support groups empower individuals by fostering motivation, knowledge, and adherence throughout their treatment journey. Studies show that peer groups help patients expand their social networks, exchange experiences, and receive emotional support, all of which facilitate better treatment adherence and recovery^(17,28). Additionally, the involvement of nurses and healthcare workers in facilitating these groups is crucial in ensuring structured discussions, delivering accurate health information, and maintaining patient engagement. These findings align with previous studies emphasizing that community-based interventions play a vital role in improving TB treatment adherence and reducing stigma^(29,30). By incorporating structured peer support into community

nursing strategies, healthcare providers can enhance patient empowerment, fostering active participation in treatment and recovery.

The findings from this study suggest that peer support groups should be integrated into public health policies to enhance TB management and treatment outcomes. Health ministries and policymakers should consider incorporating peer support interventions into TB control programs, as they have been shown to improve patient compliance, reduce psychological distress, and strengthen trust in treatment processes. Additionally, peer groups provide a platform for patient education, facilitating knowledge exchange on self-care strategies and medication adherence. By fostering a supportive community around TB patients, these interventions can offer continuous emotional and practical assistance, which is essential for ensuring long-term treatment success.

This study's limitation is that it only involved an intervention group without a control group, which may introduce selection bias and limit the ability to attribute changes solely to the intervention. To minimize this, uniform inclusion criteria and standardized intervention protocols were applied. Additionally, the pre-post design without follow-up evaluation presents a risk of temporal bias, as the sustainability of the intervention's effects remains unclear. A small sample size (n=32) also increases the risk of statistical bias, potentially limiting the generalizability of findings. However, rigorous recruitment ensured participant diversity, and future research should expand the sample size and incorporate long-term follow-up. Lastly, the absence of confirmatory factor analysis to validate the psychometric properties of the instrument may introduce measurement bias, though reliability and validity testing were conducted beforehand. Future studies should address these limitations to strengthen the robustness of findings.

CONCLUSIONS

Based on this study, the Peer Group Support program significantly improved TB patients' perceptions of various aspects, including perceptions of disease severity, treatment benefits, possible barriers, and confidence in their ability to undergo treatment. It illustrates the great potential of peer support group interventions in improving the quality of care for TB patients. The role of community nurses in this regard is critical, as they can facilitate the formation of peer support groups, provide TB-related education, and monitor participation and the program's impact. In addition, nursing education institutions can also play a role by integrating education on peer support group interventions into the curriculum so prospective nurses can understand and implement their role in a holistic and effective TB response. With strong collaboration between community nurses, nursing education institutions, and other relevant parties, TB prevention can be optimized and positively impact patients and society.

ACKNOWLEDGEMENT

The authors thank all the respondents who participated in this study. We also wish to thank the healthcare staff at the community health centers (puskesmas) for their support and permission to conduct this research.

REFERENCES

1. WHO. Tuberculosis [Internet]. World Health Organization. 2021 [cited 2021 Sep 4]. Available from: <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
2. Chen Z, Wang T, Du J, Sun L, Wang G, Ni R, et al. Decoding the WHO Global Tuberculosis Report 2024: A Critical Analysis of Global and Chinese Key Data. *Zoonoses (Ireland)* [Internet]. 2025;5(1):1–16. Available from: <https://doi.org/10.15212/ZOONOSES-2024-0061>
3. WHO. Global TB Report [Internet]. 2022. Available from: <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022>
4. Vernon A, Fielding K, Savic R, Dodd L, Nahid P. The importance of adherence in tuberculosis treatment clinical trials and its relevance in explanatory and pragmatic trials. *PLoS Med* [Internet]. 2019 Dec;16(12):e1002884. Available from: <https://doi.org/10.1371/journal.pmed.1002884>
5. Xie H, Wang W, Chen X, Huang D, Yu Q, Luo L. An analysis of knowledge, attitudes, practice and influencing factors for tuberculosis prevention and control among Hainan University students. *Front Public Heal* [Internet]. 2025;13(January). Available from: <https://doi.org/10.3389/fpubh.2025.1478251>
6. Parwati NM, Bakta IM, Januraga PP, Wirawan IMA. A health belief model-based motivational interviewing for medication adherence and treatment success in pulmonary tuberculosis patients. *Int J Environ Res Public Health* [Internet]. 2021;18(24). Available from: <https://doi.org/10.3390/ijerph182413238>
7. Agus Z, Junadi P, Rusadi RA. Factors Associated for Anti Tuberculosis Treatment Non-Adherence Among Tuberculosis Patients: Scoping Review. *Media Publ Promosi Kesehat Indones* [Internet]. 2024;7(9):2273–9. Available from: <https://doi.org/10.56338/mppki.v7i9.5874>
8. Gb P, Adithiyan RP, Charumathi B, Jain T. Qualitative Assessment of Adherence to Anti-Tuberculosis Medication Among Active Tuberculosis Patients. *Natl J Community Med* [Internet]. 2022;13(5):308–12. Available from: <https://doi.org/10.55489/njcm.1305202214>
9. Imam F, Sharma M, Obaid Al-Harbi N, Rashid Khan M, Qamar W, Iqbal M, et al. The possible impact of socioeconomic, income, and educational status on adverse effects of drug and their therapeutic episodes in patients targeted with a combination of tuberculosis interventions. *Saudi J Biol Sci* [Internet]. 2021;28(4):2041–8. Available from: <https://doi.org/10.1016/j.sjbs.2021.02.004>
10. Alene KA, Viney K, Gray DJ, McBryde ES, Wagnew M, Clements ACA. Mapping tuberculosis treatment outcomes in Ethiopia. *BMC Infect Dis* [Internet]. 2019;19(1):1–11. Available from: <https://doi.org/10.1186/s12879-019-4099-8>
11. Miller TA, DiMatteo MR. Importance of family/social support and impact on adherence to diabetic therapy. *Diabetes, Metab Syndr Obes Targets Ther*. 2013;6:421–6.
12. WHO. Companion handbook. World Health Organization. 2014. 464 p.
13. Martono M, Akhyar M, Pamungkasari EP, Lestari A. Results of professional interventions to improve medication adherence based on health beliefs and important determinants of tuberculosis medication: a systematic review. *Eur Rev Med Pharmacol Sci* [Internet]. 2023;27(24):11794–805. Available from: https://doi.org/10.26355/eurrev_202312_34778
14. Nirmal A, Kuzmik A, Sznajder K, Lengerich E, Fredrick NB, Chen M, et al. ‘If not for this support, I would have left the treatment!’: Qualitative study exploring the role

- of social support on medication adherence among pulmonary tuberculosis patients in Western India.' *Glob Public Health* [Internet]. 2021;0(0):1–13. Available from: <https://doi.org/10.1080/17441692.2021.1965182>
15. Febriani E, Wibowo A, Kak N, Al-Mossawi HJ. Empowering health cadres to support drug-resistant tuberculosis (DR-TB) patient to enroll in treatment. *Kesmas* [Internet]. 2021;16(2):84–90. Available from: <https://doi.org/10.21109/KESMAS.V16I2.3307>
 16. Baniqued MG, Ballecer BAP, Ballesteros BDC, Balmonte JRR, Bancud EMF, Rebuena MCDR, et al. Social support from nurses and non-adherence with directly observed therapy (DOTS) maintenance phase among patients with tuberculosis in Metro Manila, Philippines. *Public Health Nurs* [Internet]. 2020;37(3):339–46. Available from: <https://doi.org/10.1111/phn.12714>
 17. Mind. Peer support. 2019;1–10.
 18. Gebremariam RB, Wolde M, Beyene A. Determinants of adherence to anti-TB treatment and associated factors among adult TB patients in Gondar city administration, Northwest, Ethiopia: based on health belief model perspective. *J Heal Popul Nutr* [Internet]. 2021;40(1):1–10. Available from: <https://doi.org/10.1186/s41043-021-00275-6>
 19. Jarlais DCD. TREND (Transparent Reporting of Evaluations with Nonrandomized Designs). In: *Guidelines for Reporting Health Research: A User's Manual* [Internet]. 2014. p. 156–68. Available from: <https://doi.org/10.1002/9781118715598.ch16>
 20. Allender JA, Rector C, Warner KD. *Community and Public Health Nursing*. 8th ed. Philadelphia: Lippincott Williams & Wilkins; 2014.
 21. Stanhope M, Lancaster J. *PUBLIC HEALTH NURSING Population-Centered Health Care in the Community*. 9th ed. United State: Elsevier Health Sciences; 2016.
 22. Kueh MTW, Rahim FF, Rashid A. Development and validation of the health belief model questionnaire to promote smoking cessation for nasopharyngeal cancer prevention: A cross-sectional study. *BMJ Open* [Internet]. 2022;12(9):1–10. Available from: <https://doi.org/10.1136/bmjopen-2021-057552>
 23. Hasanah U, Makhfudli M, Ni'Mah L, Efendi F, Aurizki GE. Peer Group Support on the Treatment Adherence of Pulmonary Tuberculosis Patients. *IOP Conf Ser Earth Environ Sci* [Internet]. 2019;246(1):1–6. Available from: <https://doi.org/10.1088/1755-1315/246/1/012033>
 24. Petersson C, Nygårdh A, Hedberg B. To support self-management for people with long-term conditions - The effect on shared decision-making, empowerment and coping after participating in group-learning sessions. *Nurs open* [Internet]. 2022 Sep;9(5):2444–53. Available from: <https://doi.org/10.1002/nop2.1261>
 25. Van Den Boogaard J, Msoka E, Homfray M, Kibiki GS, Heldens JJHM, Felling AJA, et al. An exploration of patient perceptions of adherence to tuberculosis treatment in Tanzania. *Qual Health Res* [Internet]. 2012;22(6):835–45. Available from: <https://doi.org/10.1177/1049732312438968>
 26. Charyeva Z, Curtis S, Mullen S, Senik T, Zaliznyak O. What works best for ensuring treatment adherence. Lessons from a social support program for people treated for tuberculosis in Ukraine. *PLoS One* [Internet]. 2019;14(8). Available from: <https://doi.org/10.1371/journal.pone.0221688>
 27. Li X, Wang B, Tan D, Li M, Zhang D, Tang C, et al. Effectiveness of comprehensive social support interventions among elderly patients with tuberculosis in communities in China: A community-based trial. *J Epidemiol*

- Community Health [Internet]. 2018;72(5):369–75. Available from: <https://doi.org/10.1136/jech-2017-209458>
28. Pender NJ, Murdaugh CL, Parsons MA. Health Promotion in Nursing Practice. 7th ed. USA: Pearson Education; 2015.
 29. Syamsir SB, Permatasari H, Setiawan A. Experiences of Patients with Tuberculosis Who Underwent Completed TB Treatment during the COVID-19 Pandemic in Indonesia: A Qualitative Study. *Int J Community Based Nurs Midwifery* [Internet]. 2023;11(4):226–36. Available from: <https://doi.org/10.30476/ijcbnm.2023.98768.2257>
 30. Rachmat M, Marwang S. Collaborative Model of Family and Health Workers Support to Improve the Success of Tuberculosis Treatment: A Qualitative Study. *Rev Int Geogr Educ Online* [Internet]. 2021;11(5):2657–62. Available from: <https://doi.org/10.48047/rigeo.11.05.162>