

Health Challenges Associated with Post-Tuberculosis Sequelae Among Tuberculosis Survivors in Oyo Metropolis, Oyo State, Nigeria

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Abstract: Tuberculosis (TB) is a public health problem, claiming more lives in developing countries including Nigeria. The study was purposeful to assess health challenges associated with post-TB sequelae (PTBS) among TB survivors (TBS) in Oyo metropolis, Oyo State, Nigeria. A descriptive cross-sectional survey design was adopted. The population of the study comprised all TBS in Oyo metropolis, Oyo State. A convenience sampling technique was used to select 120 respondents. Data were collected using a structured questionnaire validated by three experts. The reliability of the instrument was established using Cronbach's alpha, yielded a coefficient of 0.82. Data were presented using mean ranking, while hypothesis was tested using Pearson correlation at the 0.05 level of significance. The findings revealed that occasional coughing ($M = 3.47$), anxiety due to sleeplessness caused by occasional night coughing ($M = 3.47$), and workplace rejection ($M = 3.29$) were the most physical, psychological and social health challenges affecting TBS with PTBS respectively. The result further showed that PTBS had a significant association with overall health challenges ($r = .71, p < .05$) of

TBS. The study concluded that physical, psychological and social health statuses of TBS with PTBS were negatively affected. It was recommended that, health educators and other healthcare providers should provide appropriate health education to TBS experiencing recurrent respiratory symptoms to seek prompt care, provide community- and clinic-based mental health counselling to TBS experiencing psychological health-related problems, and educate family and community members on the importance of providing adequate care and social supports to TBS.

Keywords: health challenges, metropolis, post-tuberculosis sequelae, tuberculosis, tuberculosis survivors

INTRODUCTION

Tuberculosis (TB) is a public health problem claiming more lives in developing countries including Nigeria. TB is deadly in nature and affect multiple organ systems, including cardiovascular, neurological, musculoskeletal, metabolic, and psychosocial domains (Seo et al., 2024). It ravaging lives irrespective of age, gender and backgrounds (Oguntunji et al., 2020). In sub-Saharan Africa, about a quarter of global new TB cases were reported in Africa, and Nigeria tops the list in the 6th position among high burden countries (World Health Organization (WHO), 2020). Pulmonary TB has traditionally been considered successfully treated when a patient declared cured or has completed their treatment (WHO, 2014). After this, many TB survivors (TBS) often have some respiratory symptoms and lung abnormalities due to the post effects of TB exposure. The lasting effects or complications that remain after TB treatment are known as post-TB sequelae (PTBS). It has been estimated that 155 million individuals worldwide are TBSs, but microbiological cure does not mark the end of their illness (Dodd et al., 2021).

PTBS refers to irreversible structural damage or static residual lesions, primarily confined to the lungs (Min et al., 2026). Alene et al. (2021) defined PTBS as persistent respiratory symptoms, radiological abnormalities, lung function impairment and vascular disease after completion of adequate therapy with its adverse impacts. PTBS include persistent respiratory symptoms (Khosa et al., 2020), abnormal lung functions (Ivanova et al., 2023) and reduced health-related quality of life (Nkereuwem et al., 2023). TBS face a threefold to six fold higher mortality rate, and most deaths occur within the first year following treatment completion, with cardiovascular disease and cancer being the most common cause (Meghji et al., 2025). PTBS rise from the disease process or the side effects related to TB treatment and increase the risk of permanent disability, physical impairment, psychosocial problems, premature mortality, and poor quality of life (Alene, et al., 2021). Quality of life for TB impair survivors' quality of life, interfere with daily functioning, and increase risks to poorer health outcomes (Mave et al., 2025). Available data indicates that around 50% of TBS experience long term health problems after TB disease (Maleche-Obimbo et al., 2022).

Globally, it was estimated that PTBS account for nearly half of the total TB-related disability-adjusted life years (Menzies et al., 2021). The physical health challenges faced by TBS include fatigue, shortness of breath, and difficulty engaging in daily activities limiting the survivors' ability to maintain their previous lifestyles (Allwood et al., 2020). After completing treatment, evidence shows that many adult TBS continue to experience chronic physical health problems which often leads to repeated hospitalization (Romanowski et al., 2023), functional limitations, and long term complications (Min et al., (2026). In the study of Nkereuwem et al. (2023), participants reported reduction in their ability to engage in physical activities such as sports and exercise, and easily got tired when ran short distance, had chronic pain and fatigue, and diminished ability to carry out household tasks.

Post-TB morbidity can include lung disability, neurological impairment, and cardiac disorders (Ivanova et al., 2023). In adults, imaging studies often revealed structural abnormalities such as fibrosis, bronchiectasis, lung cavitation, and pleural thickening even after microbiological cure (Seo et al., 2024), and many are often irreversible and can lead to persistent cough, dyspnea, chest pain and haemoptysis (Min et al., 2026). Studies showed that post-TB lung disease can cause obstructive, restrictive or mixed patterns of functional abnormalities on spirometry, and abnormal spirometry is seen in almost 60% of TBS with 10%-15% of survivors demonstrating severe impairment in pulmonary function (Meghji et al., 2025; Seo et al., 2024).

The psychological trauma of experiencing a life-threatening illness, together with the stigma surrounding TB can lead to significant mental health concerns including anxiety and depression (Stenberg et al., 2024). Fukunaga and Moonan (2024) reported that post-TB lung damage leaves TBS at higher risk for anxiety and depression. According to Kim et al. (2025), depression and anxiety often compromise the psychological well-being of TBS most especially among those who have experienced hospitalization, isolation or complications due to PTBS. The mental health effects may be worsened by internalized stigma and a lack of social support (Min et al., 2026). Also, mental health impacts of TB impairs' quality of life, interfere with daily functioning and increase risks to poorer health outcomes (Kim et al., 2025). Participants most especially males in the study of Nkereuwem et al. (2023) reported psychological distress which manifests in depression, and existential thoughts.

In some places, TBS face social challenges which include withdrawal from work, school, and community life, stigma, rejection in marriage, loss of job and social status, discrimination during hiring, and sometimes poverty (Min et al., 2026). The stigma associated with TB can lead to social exclusion, discrimination, difficulties reintegrating into society, and prevent participation in community activities (Stenberg et al., 2024). According to Egge et al. (2023); Jones et al. (2018), due to TB sequelae, many TBS refrained from social interactions to avoid being stigmatized. Stigma was experienced in various settings which include family, workplaces, communities, and healthcare facilities (Wademan et al., 2021).

This study is based on the Biopsychosocial Model developed by Engel (1977). It explains health and illness as the result of the interaction between biological, psychological, and social factors rather than biological factors alone. The model posits that an individual's health status is influenced not only by physical or medical conditions, but also by emotional well-being, cognitive processes, and the social environment (Engel, 1977; Borrell-Carno et al., 2004). In relation to this study, the model provides a framework for understanding the three key variables of the study. The biological dimension explains the physical health challenges experienced by TBS, the psychological dimension accounts for mental health challenges such as anxiety and depression, while the social dimension explains challenges such as stigma, discrimination and social exclusion. Thus, the Biopsychosocial Model provides a comprehensive framework for understanding how PTBS affects TBS across physical, psychological, and social domains.

TB control programmes in Nigeria and Oyo State inclusive have largely focused on case detection, case notification, treatment, contact tracing, community outreaches, prevention strategies, data management and reporting, drug supply and management, supervision, data validation, private-public mix, training, and collaboration with local and international organizations. However, less attention is given to the long-term health consequences experienced by individuals after successful biomedical treatment. Programmatic clinical and field experience of the researchers showed that TBS often experience and affected by physical, psychological, and social health challenges due to PTBS. As reported by Meghji et al. (2016), computerized tomography scans of post-TB patients analyzed in a systematic review revealed a high prevalence of residual bronchiectasis (86%), nodules (55%), and emphysema (45%). Post-TB symptoms among TBS prevent them from performing their social roles, which impair their mental health (Jones et al. (2018). Also, studies affirmed that TBS often face some psychological challenges from public and community members such as stigmatization and discrimination (Nkereuwem et al., 2023), which can lead to post-traumatic stress disorders (Schrader & Poss, 2021).

As observed by the researchers, health education provided by health personnel in TB clinics for TB patients before, during and after treatment is often limited to medication adherence, follow-up test, need for contact tracing, infection control practices, with minimal emphasis on post-treatment health outcomes. This short-coming identified as gap sometimes contributes to TBS' lack of adequate knowledge on PTBS, poor health seeking behaviour, and poor reporting and inability to decide where to manage persistent post-TB-related health challenges occurring after being declared cured or treatment completed. This knowledge gap prompted an assessment of health challenges associated with PTBS among TBS in Oyo metropolis, Oyo State, Nigeria with the view of making viable recommendations.

Research Questions

The following questions were answered in this study:

1. To what extent are TBS with PTBS affected by physical health challenges in Oyo metropolis, Oyo State, Nigeria?
2. To what extent are TBS with PTBS affected by psychological health challenges in Oyo metropolis, Oyo State, Nigeria?
3. To what extent are TBS with PTBS affected by social health challenges in Oyo metropolis, Oyo State, Nigeria?

Hypothesis

1. There is no significant association between PTBS and overall health challenges among TBS in Oyo metropolis, Oyo State, Nigeria.

Material and Method

A descriptive cross-sectional survey design was employed in this study. It was a community-based study. The study was conducted between May and September 2024 among people treated for TB (TB survivors) with biomedicine in the time past and declared cured or treatment completed. Different communities were identified based on the previous information about past episodes of TB cases in the study location. A convenience sampling technique was used to select 120 respondents from the identified communities who were willing to participate in the study. The study excluded TB survivors who are less than 18 years, and adults who completed their treatment or declared cured less than 6 months as the time of the study. Data were collected using a structured questionnaire titled "Health Challenges Associated with PTBS among TBS (HCAPTBSTBS)". The instrument was validated by three experts that is, one from Health Education, and two from Public Health. Reliability of the instrument was established using Cronbach's alpha, yielded a coefficient of 0.82. Informed verbal consent was obtained from all the participants, purpose of the study clearly explained, confidentiality of information shared pledged, and participation in the study was made voluntary. Three trained research assistants assisted in data collection. Data were analyzed using SPSS version 25. The research questions were answered and presented using mean score and ranking, while the hypothesis was tested using Pearson Product Moment Correlation at 0.05 level of significance.

RESULTS

Research Question One: To what extent are TBS with PTBS affected by physical health challenges in Oyo metropolis, Oyo State, Nigeria?

Table 1: Extent of Physical Health Challenges among TBS with PTBS in Oyo Metropolis, Oyo State, Nigeria

N = 120

S/N	Item	$\bar{x}$	SD	Rank	Remarks
1	Occasional coughing	3.47	0.63	1 st	High Extent
2	Chest pain	2.83	1.08	7 th	High Extent
3	Cough with thick mucus	3.26	0.84	3 rd	High Extent
4	Difficulty in performing daily tasks	3.08	0.89	6 th	High Extent
5	Poor appetite	2.28	0.98	10 th	Low Extent
6	Shortness of breath	3.10	0.96	5 th	High Extent
7	Poor weight gain	2.59	1.09	8 th	High Extent
8	Inability to carry/lift heavy loads	3.31	0.71	2 nd	High Extent
9	Reduced physical strength	3.12	0.92	4 th	High Extent
10	Occasional coughing out of blood	2.56	1.04	9 th	High Extent
11	Difficulty breathing	1.97	0.95	11 th	Low Extent

Criterion Mean = 2.50; Grand mean = 2.87

Decision Rule: Mean $\geq$ 2.50 = High Extent; Mean < 2.50 = Low Extent

In the Table 1, items 1, 2, 3, 4, 6, 7, 8 & 9 had the mean scores above the criterion mean of 2.50 indicating a high extent with item 1 “occasional coughing” ranked first, while items 5 & 11 had the mean scores below 2.50 indicating a low extent with item 11 “difficulty breathing” ranked last as the physical health challenge among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria.

Research Question Two: To what extent are TBS with PTBS affected by psychological health challenges in Oyo metropolis, Oyo State, Nigeria?

Table 2: Extent of Psychological Health Challenges among TBS with PTBS in Oyo Metropolis, Oyo State, Nigeria

N= 120

S/N	Item	$\bar{x}$	SD	Rank	Remarks
1	Being anxious about the current health status	3.29	0.82	5 th	High Extent
2	Feeling sad due to the present health condition	3.30	0.81	4 th	High Extent
3	Constant worry about the possibility of TB relapse	3.08	0.97	7 th	High Extent
4	Feeling depressed because of long term health condition.	3.35	0.66	2 nd	High Extent
5	Fear due to chest discomfort	3.17	0.88	6 th	High Extent
6	Reduced confidence due to past TB history.	3.33	0.85	3 rd	High Extent
7	Anxiety due to sleeplessness caused by occasional night cough	3.47	0.53	1 st	High Extent

Criterion Mean = 2.50; Grand mean = 3.28

Decision Rule: Mean $\geq$ 2.50 = High Extent; Mean < 2.50 = Low Extent

In the Table 2, all the 7 items recorded the mean scores above the criterion mean of 2.50, with item 1 “worry due to sleeplessness caused by occasional night cough” ranked first as the most high psychological health challenge among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. Research Question Three: To what extent are TBS with PTBS affected by social health challenges in Oyo metropolis, Oyo State, Nigeria?

Table 3: Extent of Social Health Challenges among TBS with PTBS in Oyo Metropolis, Oyo State, Nigeria
N =120

S/N	Item	$\bar{x}$	SD	Rank	Remarks
1	Rejection from neighbours	3.24	0.89	3 rd	High Extent
2	Being treated differently in the community	3.22	0.86	4 th	High Extent
3	Avoidance of social gathering	3.13	0.90	6 th	High Extent
4	Strained relationship with family members	2.36	0.92	11 th	Low Extent
5	Isolation from friends	2.42	1.03	10 th	Low Extent
6	Workplace rejection	3.29	0.91	1 st	High Extent
7	Exclusion from community events	3.27	0.84	2 nd	High Extent
8	Hissing upon	2.61	1.06	9 th	High Extent
9	Labelling	3.14	0.84	5 th	High Extent
10	Nicknaming	3.01	1.01	7 th	High Extent
11	Denial of right/opportunities	2.98	1.09	8 th	Low Extent

Criterion Mean = 2.50; Grand mean = 2.97

Decision Rule: Mean $\geq$ 2.50 = High Extent; Mean < 2.50 = Low Extent

In the Table 3, items 1, 2, 3, 6, 7, 8, 9, 10 & 11 recorded mean scores above the criterion mean of 2.50, indicating a high extent with item 6 “workplace rejection” ranked first, while items 4 & 5 had the mean scores below 2.50, indicating a low extent with item 4 “strained relationship with family members” ranked last as the social health challenge among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria.

Hypothesis One: There is no significant association between PTBS and overall health challenges among TBS in Oyo metropolis, Oyo State, Nigeria.

Table 4: Pearson (r) Correlation between PTBS and Overall Health Challenges among TBS in Oyo Metropolis, Oyo State, Nigeria

Variables	N	Df	SD	r-cal. Value	r-crit. value	p-value	Decision
PTBS & Overall Health Challenges	120	118	5.21 6.01	0.71	0.133	< 0.001	Ho Rejected

In the table 4, the analysis showed a significant high positive association between PTBS and overall health challenges ($r = .71$, $N = 120$, $df = 118$, $p < .001$). Since the p -value (< 0.001) $< .05$ level of significance, the null hypothesis is rejected. The finding revealed that there is a significant association between PTBS and overall health challenges among TBS in Oyo metropolis, Oyo State, Nigeria.

DISCUSSION

Table 1 shows the extent of physical health challenges among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. The findings indicated that occasional coughing ($M = 3.47$), inability to carry/lift heavy loads ($M = 3.31$), cough with thick mucus ($M = 3.26$), reduced physical strength ($M = 3.12$), shortness of breath ($M = 3.10$), difficulty in performing daily tasks ($M = 3.08$), chest pain ($M = 2.83$), poor weight gain ($M = 2.59$), and occasional coughing out of blood ($M = 2.56$) ranked first to ninth respectively as the highly physical health challenges among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. The least reported physical health challenges were poor appetite ($M = 2.28$) and difficulty breathing ($M = 1.97$). The grand mean of 2.87 which is higher than the criterion mean of 2.50 implies that TBS with PTBS were affected by physical health challenges to a high extent in Oyo metropolis, Oyo State, Nigeria. This finding is consistent with Nkereuwem et al. (2023), who reported reduction in the ability to engage in physical activities such as sports and exercise, and easily got tired when ran short distance, had chronic pain and fatigue, and diminished ability to carry out household tasks among TBS with PTBS. The study further align with the report of Allwood (2020) that TBS often experience fatigue, shortness of breath, and difficulty engaging in daily activities.

Table 2 showed the extent of psychological health challenges among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. The findings indicated that anxiety due to sleeplessness caused by occasional night cough ($M = 3.47$), feeling depressed because of long term health condition ($M = 3.35$), reduced confidence due to past TB history ($M = 3.33$), feeling sad due to the present health condition ($M = 3.30$), being anxious about the current health status ($M = 3.29$), fear due to chest discomfort ($M = 3.17$), and constant worry about the possibility of TB relapse ($M = 3.08$) ranked first to seventh respectively as the highly psychological health challenges among TBS with PTBS

in Oyo metropolis, Oyo State, Nigeria. Also, the grand mean of 3.28 which is higher than the criterion mean of 2.50 implies that TBS with PTBS were affected by psychological health challenges to a high extent in Oyo metropolis, Oyo State, Nigeria. This finding corroborates the previous reports of Min et al. (2026); Kim et al. (2025); Fukunaga and Moonan (2024); Nkereuwem et al. (2023); Stenberg et al. (2024), that due to PTBS, TBS's psychological health status was negatively affected which manifest mostly in anxiety, depression and existential thoughts.

Table 3 revealed the extent of social health challenges among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. The findings showed that workplace rejection ($M = 3.29$), exclusion from community events ($M = 3.27$), rejection from neighbours ($M = 3.24$), being treated differently in the community ($M = 3.22$), labelling ($M = 3.14$), avoidance of social gathering ($M = 3.13$), nicknaming ($M = 3.01$), denial of right/opportunities ($M = 2.98$), and hissing upon ($M = 2.61$) ranked first to ninth respectively as the highly social health challenges among TBS with PTBS in Oyo metropolis, Oyo State, Nigeria. The least reported social health challenges were isolation from friends ($M = 2.42$) and strained relationship with family members ($M = 2.36$). The grand mean of 2.97 which is higher than the criterion mean of 2.50 implies that TBS with PTBS were affected by social health challenges to a high extent in Oyo metropolis, Oyo State, Nigeria. This finding is line with the report of Min et al. (2026) that TBS do experience withdrawal from work, school, and community life, stigmatization, marital problem, loss of job, diminished social status, and discrimination when seeking for job. (Stenberg et al. (2024) added social exclusion, societal discrimination, and rejection from participating in community activities as among the social health challenges experienced by TBS with PTBS. Overall, the findings in the table 4 showed that there was a significant association between PTBS and overall health challenges (physical, psychological and social) combined together among TBS in Oyo metropolis, Oyo State, Nigeria. This buttress the findings discovered and discussed in the Tables 1-3.

CONCLUSION

TB survivors with post-tuberculosis sequelae were negatively affected by physical, psychological and social health challenges in Oyo metropolis, Oyo State, Nigeria.

Recommendations

1. Healthcare personnel should provide appropriate health education to TB survivors on recognition of recurrent respiratory symptoms, and encourage to seek prompt medical assessment and appropriate care from hospitals/clinics whenever such symptoms occur.
2. Health educators and other healthcare providers should provide community- and clinic-based mental health counselling and psychosocial health education for TB survivors experiencing psychological health-related problems following TB treatment.

3. Health educators should educate family and community members on the importance of providing adequate care, acceptance, and social supports to TB survivors while avoiding stigmatization and discrimination.

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REFERENCES

- Alene, K. A., Wangdi, I. K., Colquhoun, S., Chani, K., Islam, T., Rahevar, K., Morishita, F., Byrne, A., Clark, J. and Viney, K. (2021). Tuberculosis related disability: a systematic review and meta-analysis. *BMC Medicine*, 9(1), 203. <https://doi.org/10.1186/s12916-021-02063-9>
- Allwood, B. W., vanderZalam, M. M., Amaral, A. F. S., Byrne, A., Datta, S., Egere, U., Evans, C. A., Gray, D. M., Hoddinott, G., Ivanova, O., Jones, R., Makanda, G., Marx, F. M., Meghji, J., Mpagama, S., Pasipanodya, J. G., Rachow, A., Schoeman, I, Shaw, J. and Mortimer, K. (2020). Post-tuberculosis health: perspectives from the first international symposium. *International Journal of Tuberculosis and Lung Disease*, 24(8), 820-828. <https://doi.org/10.5588/ijtld.20.0067>.
- Borrell-Carno, F., Suchman, A. L. and Epstein, R. M. (2004). The biopsychosocial model 25 years later: principles, practice, and scientific inquiry. *Annals of Family Medicine*, 2(6),576-582. <https://doi.org/10.1370/afm.245>.
- Dodd, P. J., Yuen, C. M., Jayasooriya, S. M., Zalm, M. M. and Seddon, J. A. (2021). Quantifying the global number of tuberculosis survivors: a modeling study. *Lancet Infectious Diseases*, 21(7), 984-992. [https://doi.org/10.1016/S1473-0999\(20\)30919-1](https://doi.org/10.1016/S1473-0999(20)30919-1).
- Egere, U., Shayo, E. H., Chinouya, M., Taegtmeier, M., Ardey, J., Mpagama, S., Ntinganya, N. E., Ahmed, R., Hussein, E. H., Sony, A. E., Winfield, T., Obasi, A., Tolhurst, R. and IMPALA Consortium (2023). Honestly, this problem has affected me a lot: a qualitative exploration of the lived experiences of people with chronic respiratory disease in Sudan and Tanzania. *BMC Public Health*, 23(1), 485. <https://doi.org/10.1186/s12889-023-15368-6>.
- Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine science (New York, N. Y.), 196(4286), 129-136. <https://doi.org/10.1126/science.847460>.
- Fukunaga, R. & Moonan, P. K. (2024). Mental health and tuberculosis-holding our breath in isolation. *Emerging Infectious Diseases*, 30(3), 627-628. <https://doi.org/10.3201/eid3003>. AC3003.
- Ivanova, O., Hoffman, V. S., Lange, C. and Andrea, M. H. (2023). Post-tuberculosis lung impairment: systematic review and meta-analysis of spirometry data from 14621 people. *European Respiratory Review*, 32(168), 220221. <https://doi.org/10.1183/16000617.0221-2022>.

- Jones, R., Muyinda, H., Nyakoojo, G., Kirenga, B., Katagara, W. and Pooler, J. (2018). Does pulmonary rehabilitation alter patients' experiences of living with chronic respiratory diseases? A qualitative study. *International Journal of Chronic Obstructive Pulmonary Disease*, 13, 2375-2385. <https://doi.org/10.2147/COPD.S165623>.
- Kim, H. S., Jung, J. H., Han, K., Kim, H. and Jeon, H. J. (2025). The risk of developing depression in tuberculosis survivors: a nationwide cohort study in South Korea. *Front Psychiatry*, 16, 1425637. <https://doi.org/10.3389/fpsy.2025.1425637>.
- Maleche-Obimbo E., Odhiambo, M. A., Njeri, L., Mburu, M., Jaoko, W., Were, F. and Graham, S. M. (2022). Magnitude and factors associated with post-tuberculosis lung disease in low- and middle-income countries: a systematic review and meta-analysis. *PLoS Global Public Health*, 2(12), e0000805. <https://doi.org/10.1371/journal.pgph.0000805>.
- Mave, V., Cox, S. R., Gupte, A. N. and Golub, J. E. (2025). Addressing post-tuberculosis sequelae among people living with HIV: an unmet need. *Journal of the International AIDS Society*, 28(3), e26439. <https://doi.org/10.1002/jia2.26439>.
- Meghji, J., Auld, S. C., Bisson, G. P., Khosa, X., Masekela, R., Navuluri, N. and Rachow, A. (2025). Post-tuberculosis lung disease: towards prevention, diagnosis, and care. *Lancet Respiratory Medicine*, 13(5), 460-472. [https://doi.org/10.1016/S2213-2600\(24\)00429-6](https://doi.org/10.1016/S2213-2600(24)00429-6).
- Meghji, J., Simpson, H., Squire, S. B. and Mortimer, K. A. (2016). Systematic review of the prevalence and pattern of imaging defined post-tuberculosis lung disease. *PLoS One*, 11(8), e0161176. <https://doi.org/10.1371/journal.pone0161176>.
- Menzies, N. A., Quaife, M. Allwood, B. W., Byrne, A. L., Coussens, A. K., Harries, A. D., Marx, F. M., Meghji, J., Pedrazzoli, D., Salomon, J. A., Sweeney, S., van Kampen, S. C., Wallis, R. S., Houben, R. M. G. and Cohen, T. (2021). Lifetime burden of disease due to incident tuberculosis: a global reappraisal including post-tuberculosis sequelae. *Lancet Global Health*, 9(12), e1679-1687. [https://doi.org/10.1016/S2214-109X\(21\)00367-3](https://doi.org/10.1016/S2214-109X(21)00367-3).
- Min, J., Jeong, Y., Kim, H. W., Choi, H., Sohn, H., Lipman, M. and Kim, J., S. (2026). Post-tuberculosis health: a holistic perspective on multisystem sequelae and long term wellbeing. *Tuberculosis and Respiratory Diseases*, 89(2), 202-214. <https://doi.org/10.4046/trd.2025.0120>.
- Nkereuwem, O., Nkereuwem, E., Owolabi, O., John, P., Ehere, U., Mortimer, K., Kampmann, B. and Togun, T. (2023). Perspectives of tuberculosis survivors and policymakers on post-tuberculosis disability. *Public Health Action*, 13(1), 17-22. <https://doi.org/10.5588/pha.22.0050>.
- Oguntunji, I. O., Awojobi, H. A., Ogunmola, P. O., Sosanya, J. O. and Ojo, A. A. (2020). Assessment of tuberculosis-based health education among patients attending tuberculosis clinics in Oyo metropolis, Oyo State. *Journal of Research and Contemporary Issues in Human Kinetics and Health Education*, 6(1), 22-31.

- Romanowski, K., Karim, M. E., Gulbert, M., Cook, V. J. and Johnston, J. C. (2023). District healthcare utilization profiles of high healthcare use tuberculosis survivors: a latent class analysis. *PLoS One*, 18(9), e0291997. <https://doi.org/10.1371/journal.pone.0291997>.
- Seo, W., Kim, H. W., Kim, J. S. and Min J. (2024). Long term management of people with post-tuberculosis disease. *Korean Journal of Internal Medicine*, 39(1), 7-24. <https://doi.org/10.3904/kjim.2023.395>.
- Stenberg, B., Drage, M., Msukwa-Panje, W. and Alvarez-Manon, V. (2024). Sustained effects of the pulmonary rehabilitation programme (Unpublished manuscript). LHL International Tuberculosis Foundation, Norway.
- Schrader, C. and Poss, A. (2021). A review of PTSD and current treatment strategies. *Missouri Medicine*, 118(6), 546-551.
- Wademan, D. T., Mainga, T., Gondwe, M., Ayles, H., Shanaube, K., Mureith, L., Bond, V. and Hoddinott, G. (2022). *Global Public Health*, 17(8). <https://doi.org/10.1080/17441692.2021.1940235>.
- World Health Organization (2020). *Global tuberculosis report*. Retrieved June 18, 2026 from <https://apps.who.int/iris/bitstream/handle/10665/337538/9789240016095-eng.pdf>.
- World Health Organization (2014). *Guideline for national tuberculosis programmes on the management of tuberculosis in children*. 2nd ed. Geneva: World Health Organization.