

# Factors Affecting the Quality of Life Among Pulmonary Tuberculosis Patients at the TB-DOTS Outpatient Clinic of Public Hospital

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## Abstract

**Background:** Indonesia is the second country in the world with the highest burden of tuberculosis. Pulmonary tuberculosis is one of the global health issues that can substantially affect quality of life.

**Objective:** To analyze the quality of life and associated factors among pulmonary tuberculosis patients.

**Method:** A cross-sectional study was conducted at the TB-DOTS outpatient clinic of Prof. Dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital, Medan, Indonesia. The study subject was 100 pulmonary tuberculosis patients aged  $\geq 18$  years, newly diagnosed, and undergoing treatment from August to October 2023, selected using consecutive sampling. Primary data were obtained through in-person interviews using the WHOQOL-BREF questionnaire. Descriptive statistics, the chi-square test, and the logistic regression test were used for data analyses.

**Results:** The chi-square test showed there was a significant association between age ( $p = 0.022$ ), family income ( $p = 0.005$ ), treatment phase ( $p < 0.001$ ), and adverse drug reactions ( $p = 0.040$ ) with overall quality of life. The logistic regression test showed there was a significant association between family income ( $p = 0.007$ , OR = 3.685, 95% CI = 1.432–9.479) and treatment phase ( $p < 0.001$ , OR = 5.643, 95% CI = 2.139–14.888) with the deterioration of overall quality of life.

**Conclusion:** The intensive phase was the factor that most influenced the deterioration of the overall quality of life. Hence, families, healthcare workers, and the government should consider the treatment phase as a focus of interventions to improve the quality of life of pulmonary tuberculosis patients.

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## Background

Tuberculosis (TB) is the leading factor of death from infection worldwide and causes more deaths in patients with Human Immunodeficiency Virus (HIV). A quarter of the world's population is estimated to be infected with *M. tuberculosis* and about 5-10% of those exposed will develop TB symptoms and disease (World Health Organization, 2023a). Globally, there were 7.5 million newly diagnosed cases of TB in 2022—the highest number since the WHO began to track the disease in 1995. An estimated 10.6 million people will be affected by TB in 2022, up from the highest estimates of 10.3 million in 2021 and 10 million in 2020. A return to pre-pandemic levels is expected in 2023 or 2024 (World Health Organization, 2023b).

In 2022, 87% of global TB cases were reported in the 30 countries with the highest TB burden. Eight countries accounted for two-thirds of this total: India (27%), Indonesia (10%), China (7.1%), Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%), and Democratic Republic of Congo (3.0%) (World Health Organization, 2023b). The issue of TB is not simply about the magnitude of the incidence but also the quality of life of patients. In general, the quality of life of patients with TB is poorer than that of healthy people in most domains, with the domain of physical functioning being the most affected. However, the relative contribution of TB to impaired quality of life can occasionally be biased because some patients have socio-economic problems or comorbid diseases. Several studies report that older men, poor socio-economic status, and a low level of education will correlate with a decrease in the quality of life of patients with TB (Aggarwal, 2019).

According to Aggarwal (2019), important determinants of the quality of life with TB are gender, age baseline social and economic status, comorbid disease, including HIV co-infection, residual impairment after treatment completion, adverse drug reactions, success or failure with anti-tubercular treatment (ATT), financial issues during diagnosis and treatment, emotional and/or psychologic dysfunction, stigmatization, isolation, and functional limitation due to disease.

Quality of life is a patient's perception of position in their culture and value system, performing consideration of their objectives, aspirations, social standards, and interests (World Health Organization, 2023c). The study conducted in Ciamis, Indonesia using WHOQOL-BREF instruments revealed that pulmonary TB has an enormous negative effect on the quality of life of pulmonary TB patients (Sartika et al., 2019). The statement is consistent with other studies that also investigate the quality of life of pulmonary TB patients: a study conducted in Cameroon, Central Africa using the SF-36 questionnaire (Pokam et al., 2020); a study in Medan, Indonesia conducted at Adam Malik General Hospital using the measurement instrument SF-36 (Wahyuni et al., 2018); and a study carried out in Surabaya, Indonesia using the RAND-36 Item Health Survey (Juliasih et al., 2020). In addition, a study conducted in Hamadan, Western Iran using the SF-36 instrument stated that improving the quality of life can improve adherence to ATT as well as the function and well-being of TB patients (Mamani et al., 2014).

The decrease in the quality of life of pulmonary TB patients, especially in the physical domain, has a domino effect, such as limitations in work that cause pulmonary TB patients to not be able to work at their maximum, resulting in a decline in income or even loss of income that ultimately affects economic conditions. Low incomes encourage patients to save on medical treatment and transportation to health facilities, which are also related to non-adherence to medication (Kastien-Hilka et al., 2016).

Studies on the quality of life among pulmonary TB patients have not been extensively conducted in Medan, Indonesia. Therefore, researchers are interested in conducting such a study with the aim of analyzing the quality of life among pulmonary TB patients and related factors. This study is expected to be useful for the future in terms of preventing and addressing the deterioration in the quality of life among pulmonary TB patients.

## Method

### Study Design

A cross-sectional study was used to analyze the relationship between age, gender, education level, family income, comorbidities, treatment phase, and adverse drug reactions with the quality of life among pulmonary TB patients. Quality of life was considered a variable dependent on this study and the quality of life was assessed using the Indonesian version of WHOQOL-BREF questionnaire. Some possible factors associated with the quality of life of pulmonary TB patients are age, gender, education level, family income, comorbidities, treatment phase, and adverse drug reactions. Age is classified as >40 years and 18–40 years. Gender is classified into male and female. Education levels are classified as lower education and higher education. Comorbidities are classified as having comorbid or no comorbid. The treatment phase is classified as an intensive phase if it lasts less than 2 months and a continuation phase if it lasts

more than 2 months. Adverse drug reactions are classified as having adverse drug reactions if there are more than 4 symptoms and no adverse drug reactions if there are less than 3 symptoms.

### **Setting**

This study was conducted from August to October 2023 at the TB-DOTS outpatient clinic of Prof. Dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital, Medan, Indonesia.

### **Sample/Participants**

The study subject was 100 pulmonary TB patients selected using consecutive sampling according to the inclusion criteria and exclusion criteria. The inclusion criteria are aged  $\geq 18$  years, newly diagnosed, undergoing treatment and wilfully sign an informed consent. The exclusion criteria are TB patients who are uncooperative and uncommunicative and have a history of TB and ATT previously. To determine the necessary sample size, the Slovin formula was used since the population was already identified based on the pulmonary TB data from August to October 2023. With a margin of error of 5% and a population of 133 pulmonary TB patients, the minimum sample size estimated was 100 patients (Nurhidayati, 2016).

### **Data Collection**

Primary data were obtained through in-person interviews using the WHOQOL-BREF questionnaire.

### **Data Analysis**

The statistics were analyzed using SPSS software version 27.0. Descriptive statistics, the chi-square test, and the logistic regression test were used for data analyses.

### **Trustworthiness**

WHOQOL-BREF is a quality-of-life measurement tool developed by the World Health Organization. It is valid ( $r = 0.89-0.95$ ) and reliable ( $R = 0.66-0.87$ ) (World Health Organization, 2012). This tool was translated into Indonesian directly from the WHO website and has been validated for tuberculosis patients at Duren Sawit Public Health Center, East Jakarta, DKI Jakarta, Indonesia (Anisah & Djuwita, 2019). The WHOQOL-BREF questionnaire is made of 26 questions. One question is about the person's overall perception of quality of life, one question is about the person's overall perception of health, and 24 questions are about four dimensions of health: physical, psychological, social, and environmental (Harper et al., 1998). According to the WHOQOL-BREF guidelines, a higher score indicates a better quality of life. The calculation is carried out by calculating the mean score in each domain and multiplying by 4 to be comparable to WHOQOL-100. The score obtained will be transformed into a scale of 0–100 using the formula  $(\text{score}-4) \times (100/16)$  (World Health Organization, 2012). Quality of life is assessed by cut-off points according to the mean result of the transformation of each domain (Sofiana et al., 2022).

### **Ethical Consideration**

This study was approved by the Health Research Ethics Committee, Medical Faculty, Universitas Sumatera Utara (Number 570/KEPK/USU/2023). Each participant was required to sign an appropriate informed consent prior to data collection.

### **Results**

**Table 1** describes the general information about the study's subjects. Among 100 respondents, the majority of them were aged 18 to 30 (26%) with a mean age of  $45.2 \pm 15.9$ . Most of the respondents were male (54%), had a high education level (70%), had no family income reduction (51%), and had no comorbid disease (69%). Regarding comorbidities, most of them had diabetes (25%). The majority of respondents in this study were in the continuation phase of treatment (59%), and only a few respondents have experienced more than 4 symptoms of adverse drug reactions (40%). The most common adverse drug reactions are numbness on the hand or feet (52%), gastrointestinal disorders (42%), hypersensitive skin (42%), and sleep disorders (38%).

**Table 1** Characteristic of respondents

Respondents' Characteristics	Frequency (n=100)	Percentage (%)
Age, years		
Mean $\pm$ SD	45.2	15.9
18–30	26	26
31–40	13	13
41–50	17	17
51–60	25	25
61–70	16	16
> 70	3	3
Sex		
Male	54	54
Female	46	46
Education Level		
Low (primary, junior high school)	30	30
High (senior high school, college)	70	70
Family income		
Reduce	49	49
Not reduce	51	51
Comorbidities		
Yes	31	31
Diabetes	25	25
Hypertension	9	9
HIV	2	2
Diabetes and hypertension	5	5
No	69	69
Treatment phase		
Intensive ( $\leq$ 2 months)	41	41
Continuation ( $>$ 2 months)	59	59
Adverse drug reactions		
Yes ( $\geq$ 4 symptoms)	40	40
Gastrointestinal disorders	42	42
Headache	31	31
Fever	14	14
Visual impairment	25	25
Sleep disorders	38	38
Hepatitis	1	1
Hypersensitive skin	42	42
Joint pain	33	33
Numbness on hand/foot	52	52
No ( $\leq$ 3 symptoms)	60	60

SD: standard deviation

**Table 2** shows the detailed data for each domain and overall quality of life for those who had a bad or good quality of life. Quality of life is classified by a cut-off point. The cut off points are equal to the mean value of each domain; if the value is greater than the cut-off point is categorized as having a good quality of life and vice versa. About half of the respondents had a bad physical domain (55%), specifically the physical domain, which had the lowest mean quality of life ( $49.6 \pm 23.8$ ) compared to other domains.

**Table 2** Description of quality of life

Quality of Life	Frequency (n=100)	Percentage (%)
Physical domain		
Mean ± SD	49.6 ± 23.8	
Bad	55	55
Good	45	45
Psychological domain		
Mean ± SD	71.9 ± 18.1	
Bad	50	50
Good	50	50
Social domain		
Mean ± SD	67.9 ± 21.2	
Bad	50	50
Good	50	50
Environmental domain		
Mean ± SD	65.1 ± 15.7	
Bad	51	51
Good	49	49
Overall		
Mean ± SD	63.6 ± 15.6	
Bad	45	45
Good	55	55

SD: standard deviation

**Table 3** shows a statistically significant association between independent variables and the overall quality of life of pulmonary TB patients. The deterioration in overall quality of life was dominated by respondents aged >40 (33%), male (28%), low-level educated (17%), family income reduction (29%), no comorbid disease (17%), intensive phase of treatment (28%), and adverse drug reactions (23%). Bivariate analysis showed that age ( $p = 0.022$ ), family income ( $p = 0.005$ ), treatment phase ( $p < 0.001$ ), and adverse drug reactions ( $p < 0.040$ ) had a significant association with overall quality of life.

**Table 3** Bivariate analysis of overall quality of life among respondents

Variables	Overall Quality of Life			p-value
	Bad (n)	Good (n)	Total (n)	
Age, years				
> 40	33	28	61	0.022**
18–40	12	27	39	
Sex				
Male	28	26	54	0.136*
Female	17	29	46	
Education Level				
Low	17	13	30	0.125*
High	28	42	70	
Family income				
Reduce	29	20	49	0.005**
Not reduce	16	35	51	
Comorbidities				
Yes	17	14	31	0.185*
No	28	41	69	
Treatment phase				
Intensive	28	13	41	< 0.001**
Continuation	17	42	59	
Adverse drug reactions				
Yes	23	17	40	0.040**
No	22	38	60	

\*denotes  $p$ -value < 0.25; \*\*denotes  $p$ -value < 0.05

**Table 4** shows a statistically significant association between independent variables and the deterioration in the overall quality of life of pulmonary TB patients. Multivariate analysis can be performed if the variable in bivariate analysis has a p value < 0.25. Based on this, all the independent variables in this study can be analyzed using multivariate analysis. There is a significant association between family income (p = 0.047) and treatment phase (p < 0.001) with the deterioration of overall quality of life. The intensive phase was the factor that most influenced the deterioration of overall quality of life (OR = 5.643, 95% CI = 2.139–14.888).

**Table 4** Binary logistic regression analysis of deterioration in overall quality of life among respondents

Variables	Reference	Coefficient	p-value	OR (95% CI)
Sex				
Male	Female	0.968	0.057	2.634 (0.971–7.139)
Family income				
Reduce	Not reduce	1.304	0.007*	3.685 (1.432–9.479)
Treatment phase				
Intensive	Continuation	1.730	< 0.001*	5.643 (2.139–14.888)
Adverse drug reactions				
Yes	No	0.857	0.094	2.355 (0.863–6.423)
Constant		-2.462	< 0.001	0.085

OR: odds ratio; CI: confidence interval; \*denotes p-value < 0.05

## Discussion

Specifically, pulmonary TB patients are predominantly aged 18–30 (26%) with a mean age of  $45.2 \pm 15.9$ . This differs from the study conducted in Manila, Philippines, in which 561 respondents were included, among whom more patients were aged 31–50 (36.5%) with a mean age of  $41.87 \pm 15.6$  (Masumoto et al., 2014). In a Canadian study of 84 respondents, the mean age for pulmonary TB was higher than this study ( $49.0 \pm 19.0$ ) (Guo et al., 2008). Pulmonary TB patients in this study were predominantly male (54%). This result is consistent with the study conducted in Taiwan with 140 respondents, mostly male (70.7%) (Chung et al., 2014). According to a study conducted in Yogyakarta, Indonesia, it is said that the high percentage of cases of pulmonary TB in men is associated with the work environment and smoking habits that are more prevalent among men than women. Smoking habits or even exposure to cigarette smoke can weaken the immune system and make individuals more susceptible to pulmonary TB (Sofiana et al., 2022). On the variable of education level, the characteristics of pulmonary TB patients are dominated by the level of higher education (70%), including senior high school and college. It's possible because the data collection is done in a hospital located in a metropolitan area. Besides that, pulmonary TB can occur at all levels of education, both elementary and higher. This is consistent with a study conducted in Ghana, where the incidence of pulmonary TB is higher among patients with a higher educational level (54.8%) (Quarcoopome & Tornu, 2022). Family income was dominated by pulmonary TB patients who did not have a decreased family income (49%). This is in contrast to a previous study conducted in Taiwan on 140 respondents, with the majority of pulmonary TB patients experiencing reduced family income (84.8%) (Chung et al., 2014). In this study, more pulmonary TB patients were found to have no comorbidity (69%), whereas in pulmonary TB with comorbid patients, it was found that diabetes is the most common comorbid disease (25%). This is consistent with a study conducted on 84 respondents in Canada, with pulmonary TB patients being predominantly non-comorbid (55%), but the study did not mention the type of comorbidity (Guo et al., 2008). According to a study carried out in Pakistan with 269 respondents, the majority of pulmonary TB patients did not have comorbid (60.61%), whereas in pulmonary TB with comorbid, diabetes (20.82%), heart disease (12.64%), and hepatitis (5.95%) were predominating. Pulmonary TB patients with comorbid have a low immune system, therefore treatment of pulmonary TB is less effective and leads to dissatisfaction as well as anxiety in patients (Rafiq et al., 2021). The treatment phase in this study was dominated by pulmonary TB patients who were in the continuation phase of treatment (59%). This is consistent with a study conducted in Manila, Philippines, with 561 respondents (Masumoto et al., 2014). Furthermore, pulmonary TB patients were dominated by a group with less than three symptoms of adverse drug reactions (60%). In this study, the most frequently occurring symptoms were numbness on the hand/foot (52%), gastrointestinal disorders (42%), skin hypersensitivity (42%), and sleep disorders (38%). This is consistent with a study conducted in Manila, Philippines, in which pulmonary TB patients were dominated



by a group of less than 3 symptoms of adverse drug reactions (76.3%), but in this study there was no data on the type of symptoms (Masumoto et al., 2014). In a study conducted in Taiwan, the majority of patients experienced adverse drug reactions (53.2%), and the most commonly adverse drug reactions were skin rash (24.3%), hyperuricemia (22.5%), gastrointestinal disorders (16.2%), and visual impairment (11.7%) (Chung et al., 2014).

WHOQOL-BREF assesses the quality of life by domain and overall. The deterioration of the quality of life of pulmonary TB patients occurred more frequently in the physical domain ( $49.6 \pm 23.8$ ) by 55% and in the environmental domain ( $65.1 \pm 15.7$ ) by 51%. Whereas in the psychological domain ( $71.9 \pm 18.1$ ) and the social domain ( $67.9 \pm 21.2$ ), it was found that the quality of life of pulmonary TB patients was balanced between good and bad. However, in the overall quality of life ( $63.6 \pm 15.6$ ), more pulmonary TB had a good quality of life by 55%. According to a previous study conducted in Ghana, West Africa, the quality of life in the physical domain ( $46.19 \pm 21.27$ ), psychological domain ( $50.67 \pm 23.95$ ), social domain ( $40.9 \pm 21.74$ ), and environmental domain ( $51.91 \pm 20.13$ ) were classified as lower than the mean of this study (Quarcoopome & Tornu, 2022). In a study at Ciamis, Indonesia, almost all domains of quality of life have deteriorated with a mean less than 50, namely, physical domain ( $20.8 \pm 8.8$ ), social domain ( $36.9 \pm 9.2$ ), overall quality of life ( $45.25 \pm 23.3$ ), environmental domain ( $46.9 \pm 10.4$ ), and psychological domain ( $76.4 \pm 11.9$ ) (Sartika et al., 2019). According to the results, there are still many pulmonary TB patients who have a bad quality of life, especially in the physical domain. The deterioration in the quality of life of the physical domain in pulmonary TB patients is strongly influenced by the severity of the disease, the duration of symptoms, and comorbidities (Aggarwal et al., 2013). According to a previous study, health conditions, socio-economic factors, demographic factors, and quality of health services are associated with the quality of life and treatment adherence of pulmonary TB patients (Kastien-Hilka et al., 2016).

According to the bivariate analysis, it was found that age ( $p = 0.022$ ), family income ( $p = 0.005$ ), treatment phase ( $p < 0.001$ ), and adverse drug reactions ( $p = 0.040$ ) had significant association with overall quality of life. In this study, the deterioration in overall quality of life was dominated by pulmonary TB patients aged  $>40$  years (33%), family income reduced (29%), undergoing treatment in intensive phase (28%), and experiencing adverse drug reactions (23%). In a study in Mumbai, India, the age and treatment phase had no significant association with overall quality of life, but the mean overall quality of life in old age and intensive phase was lower than young age who were undergoing treatment in continuation phase. Occupation changes in the study had a significant association with the overall quality of life, the mean overall quality of life is lower in pulmonary TB patients who were undergoing occupation change compared to no occupation change (Laxmeshwar et al., 2019). In a study conducted in the United States, pulmonary TB had a variable impact on the financial condition of patients. Some patients said pulmonary TB makes their financial condition unstable due to the cost of vitamins and supplements aimed at increasing stamina, while in some patients, pulmonary TB did not affect their financial condition. One patient said pulmonary TB gave him the motivation to work harder in anticipation of the untreatable pulmonary TB, and he could no longer fund his family (Hansel et al., 2004). Subsequently, a multivariate analysis of binary logistic regression was conducted to identify the factors that most influenced the deterioration of the overall quality of life of pulmonary TB patients. According to a previous study, pulmonary TB can affect the quality of life due to complex and prolonged treatment processes. The effectiveness of treatment is determined by adherence to taking the anti-tuberculosis drug with the right combination of medication and dosage. Such adherence can accelerate bacterial death and increase the chances of recovery (Dires et al., 2020).

The final result of multivariate analysis showed there was a significant association between family income ( $p = 0.047$ ) and treatment phase ( $p < 0.001$ ) with the deterioration of overall quality of life, and the intensive phase of treatment was the factor that most influenced the deterioration quality of life (OR = 5.643, 95% CI = 2.139–14.888). Pulmonary TB patients in the intensive phase are five times more likely to have deterioration in overall quality of life compared to pulmonary TB patients in the continuation phase. According to the results of the multivariate equation, the probability of male pulmonary TB patients, whose family income was reduced, being in the intensive phase of treatment and having adverse drug reactions experiencing a deterioration in their overall quality of life by 91.5%. Even though pulmonary TB has a significant negative effect on the quality of life, a study carried out in the United States found pulmonary TB also has a positive impact that can dramatically affect the quality of life. Some patients consider recovering from pulmonary TB as a second chance to do things that they could not do before, such as a healthy diet, exercise, quitting smoking and alcohol, as well as encouraging them to become wiser, more cautious, and more concerned about health and infectious disease (Hansel et al., 2004).

This study has a limitation as a cross-sectional study; it could not establish a causal relationship. Further study with a longitudinal prospective might be needed for better results.

## Conclusion

There was a significant association between family income reduction and the intensive phase of treatment with the deterioration of overall quality of life. The intensive phase was the factor that most influenced the deterioration of the overall quality of life. Hence, families, healthcare workers, and the government should consider the treatment phase as a focus of interventions to enhance the quality of life of pulmonary TB patients.

## Declaration Conflicting Interest

All authors stated no conflict of interest in this research.

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## Author Contribution

All authors were actively engaged from the beginning of the research activities to the publication process.

## Author Biography

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## References

- Aggarwal, A. N. (2019). Quality of life with tuberculosis. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, 17. <https://doi.org/10.1016/J.JCTUBE.2019.100121>
- Aggarwal, A. N., Gupta, D., Janmeja, A. K., & Jindal, S. K. (2013). Assessment of health-related quality of life in patients with pulmonary tuberculosis under programme conditions. 17(April 2012), 947–953. <https://doi.org/https://doi.org/10.5588/ijtld.12.0299>
- Anisah, S. N., & Djuwita, R. (2019). Reliability and Validity of WHOQOL-BREF into Indonesian Version as a Measure of Quality of Life of Tuberculosis Patients. *Indian Journal of Public Health Research & Development*, 10(12), 1972–1977. <https://doi.org/10.37506/V10/I12/2019/IJPHRD/192160>
- Chung, W.-S., Li, C.-R., Liao, L.-Y., & Yang, W.-T. (2014). Quality of life among pulmonary tuberculosis patients under treatment in Eastern Taiwan. 33(1), 23–35. <https://doi.org/10.6288/TJPH201433102089>
- Dires, A., Hagos, T., Yitayal, M., Amare, G., & Yalew, A. (2020). Quality of life and associated factors among patients with tuberculosis at the University of Gondar comprehensive specialized hospital. *Quality of Life Research*, 0123456789. <https://doi.org/10.1007/s11136-020-02717-w>
- Guo, N., Marra, C. A., Marra, F., Moadebi, S., Elwood, R. K., & FitzGerald, J. M. (2008). Health state utilities in latent and active tuberculosis. *Value in Health*, 11(7), 1154–1161. <https://doi.org/10.1111/j.1524-4733.2008.00355.x>
- Hansel, N. N., Wu, A. W., Chang, B., & Diette, G. B. (2004). Quality of life in tuberculosis: Patient and provider perspectives. *Quality of Life Research*, 13(3), 639–652. <https://doi.org/10.1023/B:QURE.0000021317.12945.f0>
- Harper, A., Power, M., Orley, J., Herrman, H., Schofield, H., Murphy, B., Metelko, Z., Szabo, S., Pibernik-Okanovic, M., Quemada, N., Caria, A., Rajkumar, S., Kumar, S., Saxena, S., Chandiramani, K., Amir, M., Bar-On, D., Tazaki, M., Noji, A., Sartorius, N. (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychological Medicine*, 28(3), 551–558. <https://doi.org/10.1017/S0033291798006667>
- Juliasih, N. N., Mertaniasih, N. M., Hadi, C., Soedarsono, Sari, R. M., & Alfian, I. N. (2020). Factors Affecting Tuberculosis Patients Quality of Life in Surabaya, Indonesia. *Journal of Multidisciplinary Healthcare*, 13, 1475–1480. <https://doi.org/10.2147/JMDH.S274386>



- Kastien-Hilka, T., Abulfathi, A., Rosenkranz, B., Bennett, B., Schwenkglens, M., & Sinanovic, E. (2016). Health-related quality of life and its association with medication adherence in active pulmonary tuberculosis- a systematic review of global literature with focus on South Africa. *Health and Quality of Life Outcomes*, 14(1). <https://doi.org/10.1186/s12955-016-0442-6>
- Laxmeshwar, C., Stewart, A. G., Dalal, A., Kumar, A. M. V., Kalaiselvi, S., Das, M., & Gawde, N. (2019). Beyond 'cure' and 'treatment success': quality of life of patients with multidrug-resistant tuberculosis. 23(February 2018), 73–81. <https://doi.org/https://doi.org/10.5588/ijtld.18.0149>
- Mamani, M., Majzooobi, M. M., Ghahfarokhi, S. M., Esna-Ashari, F., & Keramat, F. (2014). Assessment of Health-related Quality of Life among Patients with Tuberculosis in Hamadan, Western Iran. *Oman Medical Journal*, 29(2), 102. <https://doi.org/10.5001/OMJ.2014.25>
- Masumoto, S., Yamamoto, T., Ohkado, A., Yoshimatsu, S., Querri, A. G., & Kamiya, Y. (2014). Factors associated with health-related quality of life among pulmonary tuberculosis patients in Manila, the Philippines. *Quality of Life Research*, 23(5), 1523–1533. <https://doi.org/10.1007/s11136-013-0571-x>
- Nurhidayati, A. (2016). A Survey on Lung Tuberculosis Patients in Pamarican Primary Health Care, Ciamis, Indonesia. <https://repository.maranatha.edu/21934/>
- Pokam, B. D. ., Fokam, P., Njamen, T. N., Guemdjom, P. W., & Asuquo, A. E. (2020). Assessment of Health-Related Quality of Life of Tuberculosis Patients in Fako Division, South-West Region of Cameroon. *Journal of Tuberculosis Research*, 8(3), 93–110. <https://doi.org/10.4236/JTR.2020.83009>
- Quarcoopome, L., & Tornu, E. (2022). Health-related quality of life of persons living with tuberculosis: A cross-sectional study. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, 28(June), 100324. <https://doi.org/10.1016/j.jctube.2022.100324>
- Rafiq, M., Saqib, S. E., & Atiq, M. (2021). Health-Related Quality of Life of Tuberculosis Patients and the Role of Socioeconomic Factors: A Mixed-Method Study. *The American Journal of Tropical Medicine and Hygiene*, 106(1), 80–87. <https://doi.org/10.4269/ajtmh.21-0494>
- Sartika, I., Insani, W., & Abdulah, R. (2019). Assessment of Health-Related Quality of Life among Tuberculosis Patients in a Public Primary Care Facility in Indonesia. *Journal of Global Infectious Diseases*, 11(3), 102. [https://doi.org/10.4103/JGID.JGID\\_136\\_18](https://doi.org/10.4103/JGID.JGID_136_18)
- Sofiana, L., Ayu, S. M., Wardani, Y., Puspaningrum, E., & Hadiani, D. D. (2022). Risk factors of quality of life among tuberculosis patients. *International Journal of Public Health Science*, 11(3), 756–762. <https://doi.org/10.11591/ijphs.v11i3.21005>
- Wahyuni, A. S., Soeroso, N., Harahap, J., Amelia, R., & Alona, I. (2018). Quality of life of pulmonary TB patients after intensive phase treatment in the health centers of Medan city, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 125(1), 012142. <https://doi.org/10.1088/1755-1315/125/1/012142>
- World Health Organization. (2012). WHOQOL User Manual, 2012 Revision. <https://www.who.int/publications/i/item/WHO-HIS-HSI-Rev.2012-3>
- World Health Organization. (2023a). Tuberculosis. <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
- World Health Organization.(2023b). WHO Global Tuberculosis Report 2023. In January (Issue March). [https://reliefweb.int/report/world/global-tuberculosis-report-2023?gad\\_source=1&gclid=CjwKCAiAqNSsBhAvEiwAn\\_tmxcUStoiAZJ0RQOPrtZvT1y-FsB7JWxgwpIHdPEJAIFFOp5KzCWYPCxoCUkQQAvD\\_BwE](https://reliefweb.int/report/world/global-tuberculosis-report-2023?gad_source=1&gclid=CjwKCAiAqNSsBhAvEiwAn_tmxcUStoiAZJ0RQOPrtZvT1y-FsB7JWxgwpIHdPEJAIFFOp5KzCWYPCxoCUkQQAvD_BwE)
- World Health Organization. (2023c). WHOQOL: Measuring Quality of Life. <https://www.who.int/tools/whoqol>

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