Journal of Community Medicine and Primary Health Care. 35 (2) 76-88
https://dx.doi.org/10.4314/jcmphc.v35i2.8

JOURNAL OF COMMUNITY MEDICINE AND PRIMARY HEALTH CARE

ORIGINAL ARTICLE

A Comparative Study of Health-Related Quality of Life among Adults with Pulmonary Tuberculosis in Southwest Nigeria

Bisola I. Adebayo[1,2], *Olumuyiwa O. Odusanya*[1,2]

[1]Department of Community Health and Primary Health Care, Lagos State University College of Medicine, Lagos State, Nigeria
[2]Lagos State University Teaching Hospital, Lagos State, Nigeria

Keywords

Tuberculosis;

Quality of life;

Comparator group;

Lagos;

Nigeria;

WHOQOL-BREF

ABSTRACT

Background: Current models of care for tuberculosis (TB) focus on bacteriological cures with less emphasis on the effect of TB on physical, mental, and social well-being. There is also a paucity of data on normative values for Nigeria against which health-related quality of life (HRQOL) measures of TB patients could be assessed. The objective of this study was to compare HRQOL of adults diagnosed with TB against a comparator group from similar socio-demographic backgrounds.

Methods: A comparative cross-sectional study was undertaken with 210 patients with pulmonary TB and a comparator group of 285 individuals from catchment communities. The World Health Organization Quality of Life Questionnaire-Short Version (WHOQOL-BREF) was used to assess HRQOL. Patients were selected using a multi-stage sampling technique. Data were analysed using IBM-SPSS version 23. A multiple linear regression model was used to identify potential predictors of HRQOL. Ethical approval was obtained from the Lagos State University Teaching Hospital health research ethics committee.

Results: More than half of the TB patients and those in the comparator group were men (63.3% and 59.0%, respectively), and their mean ages were 36.40±11.76 years and 36.69±12.30 years, respectively. Respondents with TB had significantly lower HRQOL domain scores across all domains ($p<0.001$). Domain scores for HRQOL ranged between 45.3 ±14.5 (environmental domain) and 50.9±17.3 (social relationships). Independent predictors of quality of life among TB patients included education, employment, and socio-economic status.

Conclusion: Tuberculosis was significantly associated with an impairment in health-related quality of life. The environment domain was most affected among respondents with PTB. Employment status, socio-economic class and educational level were predictive of HRQOL.

Correspondence to:
Dr Bisola Ibironke Adebayo,
Department of Community Health and Primary Health Care,
Lagos State University College of Medicine,
1-5 Oba Akinjobi Road, Ikeja GRA
PMB. 21266. Lagos State, Nigeria.
Email: bisola.adebayo@gmail.com

INTRODUCTION

Tuberculosis (TB) is a major public health problem globally and a leading cause of death from a single infectious agent, only surpassed by coronavirus (SARS-CoV-2). [1] It can affect anyone regardless of age or sex. According to the World Health Organization, about one-fourth of the global population has been infected at least once with *Mycobacterium tuberculosis* in their lifetime. [2] About 10.6 million people were diagnosed with TB worldwide in 2021, an increase of 4.5% from 10.1 million in 2021; and of these, 23% were in the African region. [2] Nigeria remains on the list of thirty high-burden countries that account for 87% of all cases of tuberculosis and accounted for 4% of the incident cases in 2021. [2] Lagos State has the highest case notification rates for TB in the Southwest region. It is also responsible for about

11% of the TB cases reported in Nigeria annually. [3] Lagos is the commercial capital of Nigeria and is characterized by an extremely high population density and rapid urbanization with the proliferation of urban slums. [4] The Oxford Poverty and Human Development Initiative (OPHI) reported in 2021, that 20 percent of the Lagos population was vulnerable to poverty, and the intensity of economic deprivation in Lagos stood at 41.1%. [5] These factors tend to favour overcrowding and poor housing, which are well-known risk factors for the transmission of TB. Tuberculosis in itself has also been recognized as a social disease, closely linked with poverty. [6]

Most models of treatment for TB focus on biological cures as a yardstick for successful treatment.[7] Although this is important, it puts less emphasis on the effect of TB on the physical, mental and social well-being effect on patients. These domains, which are usually patient reported, describe their quality of life. Health-related quality of life is a broad, multi-dimensional concept that describes patients' functioning in terms of self-care, their roles and work-related activities and well-being in addition to physical, mental, social and environmental domains of life. [8] It also takes into cognizance the degree to which they interact with family, friends and society.[1] It goes beyond direct measures of morbidity and mortality and focuses on the impact that health status has on quality of life and how satisfied a person is with life. It describes an individual's perception of their position in life with respect to the value, culture and context in which they live and in relation to their expectations, standards and concerns. [9] It can be influenced by factors relating to the patient, the disease or the treatment. [10] Some studies have shown that patients with active TB have perceived their quality of life to be worse than those with latent TB or those who have completed treatment for the illness. [11,12] Quality of life in patients with TB is often adversely affected by the presence of co-morbidities such as HIV & AIDS and Diabetes Mellitus. [13,14] The physical domains of HRQOL have been shown to be affected by the presence of pain, sleep disturbances, low energy, while the environmental domain considers access to services, transportation and recreation and satisfaction with their living spaces. [8] The social domain of HRQOL may be affected by satisfaction with personal relationships, social support and the presence or absence of stigma. [15] The perceived risk of transmission of TB from those infected to others may lead to stigma. [16] The association of TB with HIV and myths about TB may also perpetuate stigma against those affected by the disease.[13]

Research on health-related quality of life has grown exponentially over time. [17] Several tools have been developed aimed at an objective measurement of quality of life. Tools that have commonly been used in patients with TB include generic tools such as the World Health Organization Quality of Life Questionnaire-Short Version (WHOQOL-BREF), the 36-Item Short Form Survey (SF-36) and the EuroQol instrument (EQ-5D). [11,18.] Generic tools can be used across a wide range of diseases and situations, including healthy individuals. They allow for comparators across diseases, diagnostic categories and interventions. [19] Disease-specific instruments may capture details specific to a particular disease or its treatment but are limited with regards to comparator across different groups.[7,20]

The WHOQOL-BREF is a generic tool that has been applied to a wide range of diseases and contexts. Globally several studies have compared patients with active and those with latent TB as controls. Some others have compared those with drug-sensitive TB with those diagnosed with multi-drug-resistant TB. Research on HRQOL of patients with TB has steadily grown in Nigeria. However, most studies have been cross-sectional in nature and have not examined HRQOL within the context of the settings in which patients live. 2[1–24] Although studies show that TB is associated with impaired HRQOL, there is a paucity of data on what could be considered normal values for a Nigerian population which could provide a reference, against which HRQOL measures of TB patients could be assessed. Globally, normative cross-cultural data are also limited, considering how vastly the instrument has been used. [25–27]

The objective of this study was to measure and evaluate the health-related quality of life (HRQOL) among adults, newly diagnosed with pulmonary TB in comparator with apparently healthy individuals from the community with similar socio-demographic backgrounds in a Southwestern Nigerian state; and assess factors associated with HRQOL.

METHODOLOGY

Study Setting

The study was conducted in Lagos State, Southwestern Nigeria. It is the smallest state geographically occupying an area of 358,862 hectares (3,577 sq. km), but the second most populous state, with an estimated population of about 24.6 million inhabitants in 2015. [28] The population growth rate is about 600,000 per annum and the population density is 2,594 persons per square kilometre. It is divided administratively into three senatorial districts which are then divided into 20 local government areas

(LGAs). [28] The Lagos State Tuberculosis Control Programme (LASTBLP) introduced the directly-observed treatment short-course (DOTS) strategy for TB control in 2003. [29] Each DOTS centre has a focal person who coordinates TB control and reports to the State Coordinator. The DOTS facilities offer free laboratory and treatment services, in accordance with national guidelines. Patients are expected to receive treatment in the DOTS centre nearest to their residence or workplace.[30]

Study Design and Population

A comparative cross-sectional study design was employed that compared health-related quality of life among adults diagnosed with TB and a comparator group made up of individuals within the community. The study targeted individuals aged 15 years and above, diagnosed with pulmonary tuberculosis, classified as new cases (no previous history of TB treatment), and initiating anti-tuberculosis treatment in a state-owned DOTS facility. The comparator group was made up of apparently well individuals chosen from the same geographical area, that is, within the catchment area of DOTS facilities, and with similar living conditions (the assumption being that the guidelines recommend that patients receive treatment in the facility closest to their residence). Both groups were matched by age category and sex to control for confounding factors. Individuals with pre-existing chronic respiratory diseases and those who were severely debilitated were excluded from the study.

Sample size calculation and sampling technique

The minimum sample size was determined using the formula for comparator of two means where the observations are independent ($n = (Z\alpha/2+Z\beta)2 *2*\sigma2 / d2$). Values were taken from a previous study. 31 With a difference (d) of 0.7 units in means of untransformed WHOQOL-BREF domain scores and a pooled standard deviation (σ) of 2.53, a minimum sample size of 206 was obtained for each group to achieve a power of 80% and level of significance of 5% (two-sided). With a non-response rate of 10%, a sample size of 229 was calculated.

Patients with TB were selected using a two-stage sampling technique. In the first stage, one LGA was selected from each of the three senatorial districts by simple random sampling. In the second stage, one health facility was selected from a list of DOTS facilities in the selected LGA by simple random sampling. The facilities had to have been providing DOTS services for at least two years and had the capacity for both diagnosis and treatment of TB as well as HIV. In each of the selected facilities, patients were consecutively recruited until the required number was made up. Patients on admission and those in a debilitated condition were excluded. Those with a history of other respiratory illnesses such as chronic obstructive pulmonary disease and asthma were also excluded from the study.

Those in the comparator group were selected using a multi-stage sampling technique. Three communities were selected by simple random sampling from a list of communities within the catchment area of the selected DOTS facility. The number of houses in the selected communities was calculated based on their population. This was used to generate a sampling frame for each community from which a proportionate allocation of the respondents was selected. Houses were then selected by systematic random sampling based on the sampling interval. One household was selected in each house by simple random sampling, and an eligible adult in the household one was chosen by balloting. If there was no eligible adult in the selected household, the next eligible household was selected.

Data Collection

Data was collected using a pre-tested semi-structured interviewer-administered questionnaire which included information on socio-demographics, characteristics, socio-economic statistics medical and social history, and health-seeking behaviour. The World Health Organization Quality of Life Questionnaire-Short Version (WHOQOL-BREF) was used to assess the HRQOL of the respondents. The WHOQOL-BREF is made up of 26 Likert-type questions in four domains. namely the physical health domain, the psychological well-being domain, the social relationships domain and the environment.[9] The first two questions are global questions relating to overall satisfaction with health and global rating of the quality of life. The scale is positively ranged with 1 indicating negative perceptions, and 5 indicating the highest positive perception, and a better quality of life score. Negatively worded items were reversed in scoring. The domain scores were computed and transformed to a score out of 100, as per WHO guidelines for scoring the scale.[9] The tool has been validated in Nigeria, including versions using Nigerian languages such as Yoruba.[32]

A diagnosis of TB was made either through a Gene Xpert test that reported "Mycobacterium tuberculosis detected, not Rifampicin (RIF) resistant", two sputum samples positive for acid-fast bacilli (AFB), or a

physician's diagnosis as per the national guidelines. 30

Data Analysis

Data were analysed using SPSS version 23. Mean scores were determined for each domain of the WHOQOL-BREF and the two summary questions. Respondents' characteristics were presented as frequencies and proportions, while mean and standard deviation were calculated for continuous variables. The independent T-test was used to test for significant differences between mean domain scores for both groups; as well as to test differences in mean domain scores by socio-demographic characteristics. A multiple linear regression model was used for multi-variable analysis to identify variables significantly associated with HRQOL. Models were developed for the physical domain, psychological domain, social relationship domain, environmental domain, overall satisfaction with life, and global quality of life rating. Sex, age, marital status, education status, residence, occupation, socioeconomic status, and TB status were included as independent variables, with dummy variables created for each of the options. Variable selection and linear regression made use of the least absolute shrinkage and selection operator (LASSO). A p-value ≤ 0.05 was considered statistically significant.

Ethical approval was obtained from the Health Research and Ethics Committee of the Lagos State University Teaching Hospital (HREC-LASUTH) (reference number: LREC/10/06/460) and permission to conduct the study was obtained from the Lagos State Ministry of Health (LSMOH). Written informed consent was obtained from each respondent.

Results

A total of two hundred and ten (210) TB patients from the DOTS facilities and two hundred and eighty-five (285) individuals selected from communities served by the DOTS centre, were enrolled in the study. The age distribution for both groups ranged between 15 and 70 years of age, with a mean age of 36.40 ± 11.76 years for PTB patients and 36.69 ±12.30 years for the comparator group. There were more males across both groups (63.3% of the PTB patients and 59.0% of the comparator group).

Up to 80.0% of those with TB and 85.3% of the comparator group had a minimum of secondary school education. There was a statistically significant difference in socio-economic status ($p<0.001$) and employment status ($p<0.001$) between both groups with unemployment being reported by 44.7% of the PTB patients as against 10.5% of the comparator group. As regards socio-economic status, 44.3% of the PTB patients were within the lowest socio-economic stratum as opposed to 28.4% of the comparator group ($p<0.001$) (Table 1).

Cronbach's alpha coefficient was between 0.836 and 0.897 for all the domains of the WHOQOL-BREF. Table 2 showed that those with TB had significantly lower scores across all the WHOQOL-BREF domains compared with the comparator group ($p<0.001$). In both groups, the lowest score was in "overall satisfaction with life", with a mean score of 39.3 ± 19.0 among those with TB and 61.6 ± 18.6 among those without TB. With respect to the four domains, the lowest mean score among those with TB was in the environment domain (45.3 ±14.5) while the highest was in the social relationship domain (50.9 ±17.3). The highest domain score in the comparator group was also in the social relationship domain (78.0 ± 16.3), while the lowest domain score was in the psychological domain (64.9 ± 12.1).

Associations between the quality-of-life domains of the respondents and socio-demographic characteristics are shown in Table 3. Among patients with TB, those who were employed had significantly higher scores in all four domains and in "overall satisfaction with life", Those in the low socio-economic stratum had lower mean scores in the psychological domain($p=0.001$). Global quality of life rating was lowest in those in the lower socio-economic strata (57.9 ± 18.1) and highest in those in the middle socio-economic strata (68.4 ± 15.3).

Multiple linear regression was carried out to investigate the relationship between domain scores and the socio-demographic characteristics of the respondents (Table 4). Tuberculosis disease status remained significantly associated with scores across all the HRQOL domains ($p<0.001$). In the physical domain, those with PTB scored on average 16.8 points lower than those in the comparator group ($p=<0.001$). Domain scores in the psychological domain were on average, 17.9 points lower in those with PTB while domain scores for social relationships were on average, 25.9 points lower in those with TB. In the environment domain, those with TB scored 23.1 points lower than the comparator group.

There was a significant relationship between "overall satisfaction with life" and age ($p<0.001$) and sex ($p=0.022$). The predictors explained about 61% of the variation in the domain score. Being in full-time employment was a significant positive predictor of HRQOL across the physical, social relationships and environment domains. Domain scores for male respondents were on average, higher than scores for female respondents, in the physical, psychological, and social relationships domains. Looking at the

standardized coefficients, disease status was the biggest contributor among the predictor variables in all the HRQOL domain measures.

Predictors of domain scores in respondents with TB were also examined separately (Table 5). There was no significant relationship between any of the domain scores with age or sex. Those in full-time paid employment had significantly higher domain scores in overall satisfaction with life (p=0.003), the physical domain (p=0.011), social relationships (p=0.014) and the environment domain (p=0.001). Respondents with a tertiary education also had significantly higher domain scores in the physical (p=0.016) and psychological domains (p=007). Those who were in the middle socio-economic stratum had significantly higher domain scores compared to those in the lower socioeconomic stratum in the psychological domain (p=0.010) and global quality of life rating (p<0.001).

Discussion

This study compared health-related quality of life in patients with TB and healthy individuals from the community using the WHOQOL-BREF tool. To our knowledge, normative values have not been established for the Nigerian population, hence the use of a comparator group. Although both groups were matched for sex and age, they were also similar in terms of marital status and household size. Domain scores for patients with TB ranged between 45.3 ± 14.5 (environment domain) and 50.9 ± 17.3 (social relationship domain). These were significantly lower than domain scores for the comparator group which ranged between 64.9 ± 12.1 (psychological domain) and 78.0 ± 16.3 (social relationship domain). In an earlier study conducted in Lagos, Nigeria, the highest domain score was also in the social relationships while the lowest was in the environment domain. However, domain scores in the earlier study were higher than scores reported in this study for the patients but were lower than scores reported in this present study for those without TB. [21] This may be due to differences in the study population. Patients in our present study were newly diagnosed while the earlier study included patients at different stages of treatment.

Our findings were also in contrast to findings from a study conducted in Ghana where the lowest scores were in the social relationship domain and the highest scores were in the environment domain. The relatively higher scores in the social domain may be explained by culture and norms that foster social relationships and promotes family support, even in difficult situations. Domain scores for those with TB in our present study were lower than that reported by a similar study conducted in Taiwan. However, HQROL scores for those without TB study were higher than those reported for controls in the Taiwanese study, where the lowest domain scores were in the psychological domain for both cases and healthy referents, while the highest score was in the physical domain for referents and the highest was also in social relationships[31]

About 44.4% of the TB patients were unemployed, despite most of them being within the productive age group. This was higher than the national figure for unemployment which stood at 33% in the fourth quarter of 2020. [33] This was higher than figures previously reported in a study conducted in Lagos where unemployment was 27% among patients but it was lower than values found in a South African study where 73% of the PTB patients were unemployed. [21,34] It was not surprising that employment status was a predictor for the physical domain, psychological domain, social relationships, environment domain and overall satisfaction with health, with those who were unemployed having poorer HRQOL. Tuberculosis has been associated with loss of livelihood and poverty. Even though the provision of medication is free, studies have shown that TB is an impoverishing disease, with nearly 60% of tuberculosis patients living below the poverty line and 69% of drug-susceptible (DS) TB patients experiencing catastrophic financial burdens as a result of the diseases. [35] Although the majority rated the global quality of life score high, most of the respondents with TB were dissatisfied with their health.

Among the comparator group, HRQOL domain scores were lower than that reported for a sample of the Portuguese general population as well as for a Danish population with the exception of the social relationship domain.[26,36] Male respondents also had higher domain scores than females in the comparator group. This was comparable to a study conducted in Ghana among older adults.[37]

Study Limitations

The study had some limitations. The respondents with TB were selected from government DOTS centres and their experiences may not be reflective of those treated in private health facilities. The scales are subjective as they are self-reported and as such different individuals may assign different values to the same health state, and consequently vary in their assessment of HRQOL. The scope of the study is limited to patients who were newly diagnosed with pulmonary tuberculosis and as such, the results may not be generalizable to other patient groups, such as those with extra-pulmonary TB.

Conclusion

This study provides evidence that TB negatively impacts HRQOL and that HRQOL is significantly affected by sociodemographic characteristics such as employment status, educational level, and socio-economic status.

Recommendation

We recommend that the TB Control programme should incorporate HRQOL measurements to monitor the functional well-being of patients.

Acknowledgments

The researchers would like to acknowledge Bolaji Erinfolami and Esther Agboola for their help in administering the questionnaires. We also acknowledge the staff and patients of the DOTS facilities where patients were interviewed, for their cooperation.

Conflict of Interest: The authors declare that they have no personal, institutional, or financial relationship that may have inappropriately influenced the writing of this manuscript.

Funding: The research was self-funded

Authors' contributions: Study conceptualization and design were performed by BIA and OOO. Literature search, data analysis and collection were performed by BIA. BIA wrote the manuscript and OOO edited and reviewed the manuscript. Both authors read and approved the final draft.

Table 1 Socio-demographic Characteristics of PTB Patients and Comparator group

Characteristics	PTB Patients	Comparator group	χ^2	p-value
Age (in years)				
≤ 24	23 (10.9)	52 (18.2)	7.09	0.131
25 – 34	79 (37.6)	90 (31.5)		
35 – 44	62 (29.5)	73 (25.6)		
45 – 54	25 (11.9)	46 (16.1)		
≥55	21 (10.0)	24 (8.2)		
Mean age	36.40 ±11.76	36.69 ±12.30		
Sex				
Female	77 (36.7)	117 (41.0)	0.98	0.323
Male	133 (63.3)	168 (59.0)		
Marital Status				
Single	77 (36.7)	106 (37.6)	0.44	0.931
Married	124 (59.0)	166 (58.9)		
Separated/divorced.	5 (2.4)	5(1.8)		
Widowed	4 (1.9)	5(1.8)		
Highest educational qualification				
Primary or less	42 (20.0)	42 (14.7)	3.73	0.155
Secondary	120 (57.1)	186 (65.3)		
Tertiary	48 (22.9)	57 (20.0)		

Characteristics	PTB Patients	Comparator group	χ^2	p-value
Employment Status				
Full-time paid employment	25 (11.9)	50 (17.5)	76.54	<0.001
Self-employed	79 (37.6)	186 (65.3)		
Full-time student	12 (5.7)	19 (6.7)		
Unemployed	94 (44.8)	30 (10.5)		
Socio-economic status				
High	47 (22.4)	53 (18.6)	19.97	<0.001
Middle	70 (33.3)	151 (53.0)		
Low	93 (44.3)	81 (28.4)		
Household size				
1 – 4	158 (75.2)	174 (61.1)	12.59	<0.001
5 – 9	49 (23.3)	97 (34.0)		
≥ 10	3 (1.5)	14 (4.9)		

Table 2: Comparison of HRQOL of TB Patients and Comparator group without TB

Domain	PTB Patients N=210 Mean ± SD	Comparator group N = 285 Mean ± SD	t	p-value
Physical	47.1 ±16.5	64.9 ± 10.2	-13.72	<0.001
Psychological	47.0 ±16.8	64.9 ± 12.1	-12.92	<0.001
Social Relationships	50.9 ±17.3	78.0 ± 16.3	-17.62	<0.001
Environment	45.3 ±14.5	68.3 ± 14.7	-17.09	<0.001
Overall satisfaction with health	39.3 ± 19.0	61.6 ± 18.6	-26.59	<0.001
Global quality of life rating	61.6 ± 18.4	80.6 ± 18.4	-11.19	<0.001

Table 3: Association between domain scores and socio-demographic characteristics among patients with TB

	Physical			Psychological			Social Relationships			Environment		
Variable	**Mean ± SD**	**F**	**p-value**	**Mean ± SD**	**F**	**p-value**	**Mean ± SD**	**F**	**p-value**	**Mean ± SD**	**F**	**p-value**
Age												
≤ 24	49.9 ± 19.5	1.252	0.290	54.3 ± 19.8	1.636	0.187	57.6 ± 20.1	1.710	0.149	50.5 ± 17.3	1.083	0.366
25 – 34	45.5 ± 15.7			45.8 ± 16.9			48.9 ± 16.7			44.9 ± 14.7		
35 – 44	46.7 ± 15.5			45.8 ± 14.4			49.4 ± 16.1			43.3 ± 12.0		
45 – 54	44.9 ± 18.2			44.5 ± 19.1			50.0 ± 19.8			45.1 ± 16.2		
≥55	53.6 ± 16.3			50.0 ± 15.2			55.8 ± 14.8			46.2 ± 14.9		
Sex												
Male	47.9 ± 17.0	0.951[a]	0.343	47.7 ± 17.5	0.694[a]	0.489	52.2 ± 16.8	1.343[a]	0.181	45.8 ± 14.5	0.637[a]	0.525
Female	45.7 ± 15.8			46.0 ± 15.7			48.8 ± 18.1			44.4 ± 14.6		
Marital Status												
Single	46.9 ± 18.2	0.329	0.805	48.6 ± 19.1	0.808	0.491	50.5 ± 18.4	0.026	0.994	47.1 ± 16.8	0.802	0.494
Married	46.7 ± 15.7			45.8 ± 15.6			50.6 ± 6.9			44.1 ± 13.0		
Divorced	40.2 ± 11.8			41.7 ± 11.8			52.1 ± 12.5			39.8 ± 12.6		
Widowed	52.4 ± 4.1			55.6 ± 9.6			52.8 ± 12.8			44.8 ± 18.8		
Highest educational qualification												
Primary or less	45.5 ± 14.8	1.946	0.146	42.0 ± 14.5	2.930	0.056	47.8 ± 15.8	1.427	0.243	42.8 ± 12.9	2.897	0.058
Secondary	46.0 ± 15.7			47.5 ± 16.9			50.8 ± 17.6			44.6 ± 14.0		
Tertiary	51.3 ± 19.6			50.5 ± 18.1			54.1 ± 17.7			49.7 ± 16.6		
Employment Status												
Full-time paid employment	52.1 ± 14.6	4.305	**0.006***	49.9 ± 15.2	2.651	**0.050***	57.8 ± 14.0	3.213	**0.024***	52.0 ± 13.6	3.826	**0.011***
Self-employed	49.1 ± 15.2			49.4 ± 15.1			51.7 ± 16.2			45.6 ± 12.8		
Full-time student	33.0 ± 16.6			42.7 ± 19.1			45.8 ± 8.33			41.4 ± 22.3		
Unemployed	42.7 ± 18.9			42.7 ± 19.0			46.9 ± 19.5			41.9 ± 15.9		
Socio-economic status												
High	49.0 ± 19.3	0.593	0.554	48.6 ± 18.5	4.993	**0.008***	51.8 ± 19.1	1.527	0.220	48.0 ± 16.3	1.413	0.246
Middle	47.4 ± 12.9			51.2 ± 13.4			53.3 ± 14.3			45.7 ± 12.4		
Low	46.0 ± 17.3			43.1 ± 17.5			48.6 ± 18.1			43.6 ± 15.0		

SD standard deviation, a - Student's t test

Table 4: Multivariable predictors of HRQOL among respondents

Global quality of life rating	**B**	**SE**	**β**	**p-value**
Constant	78.58	1.41		
Category				
Comparator group (ref)				
PTB Patients	-18.11	1.71	-0.43	**<0.01***
Age	0.20	0.07	0.12	**0.004**
Socio-economic status				
Low (ref)				
Middle	3.70	1.70	0.09	**0.030**
R^2 adj.		0.22		
Overall satisfaction with life	**B**	**SE**	**β**	**p-value**
Constant	81.42	1.46		
Category				
Comparator group (ref)				
PTB Patients	-44.41	1.62	-0.78	**<0.01***
Age	0.24	0.07	0.10	**<0.01***
Sex				
Female (ref)				
Male	3.79	1.65	0.07	**0.022**
R^2 adj.		0.61		
Physical Domain	**B**	**SE**	**β**	**p-value**
Constant	58.21	2.57		
Category				
Comparator group (ref)				
PTB Patients	-16.76	1.24	-0.52	**<0.01***
Age (Mean centre)	0.11	0.05	0.08	**0.039**
Gender				
Female (ref)				
Male	2.70	1.22	0.08	**0.027**
Employment Status				
Unemployed (ref)				
Self-employed	5.57	1.61	0.17	**0.001***
Full-time Paid	4.86	1.92	0.12	**0.012***
Educational level				
Primary or less (ref)				
Tertiary	4.01	1.56	0.102	**0.010**
Marital Status				
Single (ref)				
Divorced/Separated	-7.35	3.67	-0.75	**0.045**
R^2 adj.		0.36		
Psychological domain	**B**	**SE**	**β**	**p-value**
Constant	62.49	1.18		
Category				
Comparator group (ref)				
PTB Patients	-17.90	1.38	-0.53	**<0.01***
Gender				
Female (ref)				
Male	3.93	1.33	0.114	0.03
R^2 adj.		0.29		
Social Relationships	**β**	**SE**	**β**	**p-value**
Constant	71.21	2.18		
Category				
Comparator group (ref)				
PTB Patients	-25.93	1.58	-0.60	**<0.01***
Gender				
Female (ref)				
Male	3.84	1.55	0.087	**0.01**
Age	0.10	0.064	0.057	0.12
Employment status				
Full-time paid employment	7.56	2.43	0.14	**0.002**
Self-employed	4.34	1.99	0.10	**0.030**
R^2 adj.		0.42		
Environment	**B**	**SE**	**β**	**p-value**
Constant	67.40	0.93		
Category				
Comparator group (ref)				
PTB Patients	-23.06	1.33	-0.62	**<0.01***
Age	0.11	0.05	0.07	**0.042**
Educational level				
Up to primary level (ref)				
Tertiary education	4.36	1.62	0.10	**0.008**
R^2 adj.		0.39		

B-unstandardized coefficient; SE-standard error; β-standardized coefficient; R^2 adj.- adjusted R square

Table 5: Multivariable predictors of HRQOL among respondents with TB

Overall satisfaction with life	**B**	**SE**	**β**	**p-value**
Constant	37.64	1.41		
Employment status				
Unemployed (ref)				
Full-time paid employment	10.79	3.59	0.21	**0.003**
R^2 adj.		0.04		
Global quality of life rating	**B**	**SE**	**β**	**p-value**
Constant	58.33	1.52		
Socio-economic status				
Low socio-economic status (ref)				
Middle socio-economic status	10.05	2.64	0.26	**<0.001**
R^2 adj.		0.06		
Physical Domain	**B**	**SE**	**β**	**p-value**
Constant	40.03	2.05		
Educational level				
None/Primary (ref)				
Tertiary	7.06	2.90	0.18	**0.016**
Employment status				
Unemployed (ref)				
Self-employed	8.57	2.54	0.26	**0.001**
Full time paid employment	8.78	3.40	0.19	**0.011**
R^2 adj.		0.07		
Psychological domain	**B**	**SE**	**β**	**p-value**
Constant	40.37	2.03		
Socio-economic status				
Low (ref)				
Middle	6.42	2.47	0.18	**0.010**
Educational level				
None/Primary (ref)				
Tertiary	8.05	2.95	0.20	**0.007**
Employment status				
Unemployed (ref				
Self-employed	5.77	2.44	0.17	**0.019**
R^2 adj.		0.06		
Social Relationships domain	**B**	**SE**	**β**	**p-value**
Constant	49.62	1.30		
Employment status				
Unemployed (ref				
Full-time paid employed	8.19	3.29	0.17	0.014
R^2 adj.		0.03		
Environment domain	**B**	**SE**	**β**	**p-value**
Constant	44.02	2.08		
Employment status				
Unemployed (ref				
Full-time paid employed	8.03	2.75	0.20	**0.004**
R^2 adj.		0.04		

B-unstandardized coefficient; SE-standard error; β-standardized coefficient; R2 adj.- adjusted R square

References

1. Chakaya J, Khan M, Ntoumi F, Aklillu E, Fatima R, Mwaba P, et al. Global Tuberculosis Report 2020 – Reflections on the Global TB burden, treatment and prevention efforts. Int J Infect Dis [Internet]. 2021 Dec 1 [cited 2023 Apr 5];113:S7–12. Available from: https://www.doi.org/10.1016/j.ijid.2021.02.107

2. World Health Organization. Global Tuberculosis Report [Internet]. Geneva, Switzerland; 2021 [cited 2022 Feb 19]. Available from: https://www.who.int/publications/i/item/9789240037021

3. NTBLCP. 2014 NTBLCP Annual Report [Internet]. 2014 [cited 2021 Aug 9]. Available from: http://www.health.gov.ng/doc/NTBLCP 2014 Annual report-2.pdf

4. Olowoporoku AO, Longhurst JWS, Barnes JH. Framing air pollution as a major health risk in Lagos, Nigeria. In: WIT Transactions on Ecology and the Environment [Internet]. WIT Press; 2012 [cited 2017 Aug 9]. p. 479–86. Available from: https://www.doi.org/10.2495/AIR120421

5. Oxford Poverty and Human Development Initiative. Global MPI Country Briefing 2021: Nigeria (Sub-Saharan Africa) [Internet]. Oxford; 2021 Oct [cited 2023 Apr 8]. Available from: https://ophi.org.uk/wp-content/uploads/CB_NGA_2021.pdf

6. Carter DJ, Glaziou P, Lönnroth K, Siroka A, Floyd K, Weil D, et al. The impact of social protection and poverty elimination on global tuberculosis incidence: a statistical modelling analysis of Sustainable Development Goal 1. Lancet Glob Heal [Internet]. 2018 May 1 [cited 2023 Apr 19];6(5):e514–22. Available from: https://www.doi.org/10.1016/S2214-109X(18)30195-5

7. Aggarwal AN. Quality of life with tuberculosis [Internet]. Journal of Clinical Tuberculosis and Other Mycobacterial Diseases Elsevier; Dec 1, 2019 p. 100121. Available from: https://www.doi.org/10.1016/j.jctube.2019.100121

8. Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A Report from the WHOQOL Group. Qual Life Res [Internet]. 2004 Mar [cited 2017 Aug 18];13(2):299–310. Available from: https://www.doi.org/10.1023/B:QURE.0000018486.91360.00

9. Kuyken W, Orley J, Power M, Schofield H, Murphy B. The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. Soc Sci Med [Internet]. 1995 [cited 2017 Aug 9];41(10):1403–9. Available from: https://www.doi.org/10.1016/0277-9536(95)00112-K

10. Bauer M, Leavens A, Schwartzman K. A systematic review and meta-analysis of the impact of tuberculosis on health-related quality of life. Qual Life Res [Internet]. 2013 Oct 12 [cited 2017 Apr 2];22(8):2213–35. Available from: https://www.doi.org/10.1007/s11136-012-0329-x

11. Brown J, Capocci S, Smith C, Morris S, Abubakar I, Lipman M. Health status and quality of life in tuberculosis. Int J Infect Dis [Internet]. 2015 Mar 1 [cited 2017 Jan 4];32:68–75. Available from: https://www.doi.org/10.1016/j.ijid.2014.12.045

12. Guo N, Marra CA, Marra F, Moadebi S, Elwood RK, FitzGerald JM, et al. Health State Utilities in Latent and Active Tuberculosis. Value Heal [Internet]. 2008 Dec [cited 2017 Apr 2];11(7):1154–61. Available from: https://www.doi.org/10.1016/j.ijid.2014.12.045

13. Deribew A, Tesfaye M, Hailmichael Y, Negussu N, Daba S, Wogi A, et al. Tuberculosis and HIV co-infection: its impact on quality of life. Health Qual Life Outcomes [Internet]. 2009 [cited 2017 Apr 2];7(1):105. Available from: https://www.doi.org/10.1186/1477-7525-7-105

14. Al-Qahtani MF, El Mahalli AA, Al Dossary N, Al Muhaish A, Al Otaibi S, Al Baker F Al. Health-related quality of life of tuberculosis patients in the Eastern Province, Saudi Arabia. J Taibah Univ Med Sci [Internet]. 2014 Dec [cited 2017 Apr 2];9(4):311–7. Available from: http://dx.doi.org/10.1016/j.jtumed.2014.04.005

15. Sartika I, Insani W, Abdulah R. Assessment of health-related quality of life among tuberculosis patients in a public primary care facility in Indonesia. J Glob Infect Dis [Internet]. 2019 Jul 1 [cited 2022 Mar 28];11(3):102–6. Available from: https://doi.org/10.1016/j.jtumed.2014.04.005

16. Courtwright A, Turner AN. Tuberculosis and Stigmatization: Pathways and Interventions. Public Health Rep [Internet]. 2010 Jul 1 [cited 2017 Aug 18];125(4_suppl):34–42. Available from: http://journals.sagepub.com/doi/10.1177/00333549101250S407

17. Kaplan RM, Hays RD. Health-Related Quality of Life Measurement in Public Health [Internet]. Vol. 43, Annual Review of Public Health. Annual Reviews; 2022 [cited 2023 Apr 6]. p. 355–73. Available from: https://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-052120-012811

18. Khan S, Tangiisuran B, Imtiaz A, Zainal H. Health Status and Quality of Life in Tuberculosis: Systematic Review of Study Design, Instruments, Measuring Properties and Outcomes. Heal Sci J [Internet]. 2017 [cited 2022 Dec 4];11(1). Available from: https://www.doi.org/10.21767/1791-809X.1000484

19. Endarti D, Zulaikha HU, Rachmawati L, Trijayanti C, Kristina SA. Measurement of Health Related Quality of Life in Tuberculosis Patients Using Specific and Generic Instruments. Value Heal [Internet]. 2019;22(November):S662. Available from: https://doi.org/10.1016/j.jval.2019.09.1384

20. Guo N, Marra F, Marra CA. Measuring health-related quality of life in tuberculosis: a systematic review. Health Qual Life Outcomes [Internet]. 2009 Feb 18 [cited 2017 Apr 2];7(1):14. Available from: https://www.doi.org/10.1186/1477-7525-7-14

21. Adeyeye OO, Ogunleye OO, Coker A, Kuyinu Y, Bamisile RT, Ekrikpo U, et al. Factors influencing quality of life and predictors of low quality of life scores in patients on treatment for pulmonary tuberculosis: A cross sectional study. J Public Health Africa [Internet]. 2014 Jun 29 [cited 2017 Apr 2];5(2):88–92. Available from: https://www.doi.org/10.4081/jphia.2014.366

22. Ojuawo OB, Desalu OO, Fawibe AE, Aladesanmi AO, Ojuawo AB, Salami AK. Assessment of Post-Treatment Health-Related Quality of Life among Patients with Pulmonary Tuberculosis in Ilorin, Nigeria. West Afr J Med [Internet]. 2021 Jan 1 [cited 2022 Mar 28];38(1):28–34. Available from: https://europepmc.org/article/MED/33463704

23. Tobin-West C, Kanu NE, Tobin-West CI. Health-related quality of life of HIV patients with and without tuberculosis registered in a Tertiary Hospital in Port Harcourt, Nigeria. HIV AIDS Rev [Internet]. 2018 [cited 2022 Mar 28];17(3). Available from: https://doi.org/10.5114/hivar.2018.78494

24. Ozoh OB, Ojo OO, Dania MG, Dede SK, Adegboyega OA, Irurhe NK, et al. Impact of post-tuberculosis lung disease on health-related quality of life in patients from two tertiary hospitals in Lagos, Nigeria. African J Thorac Crit care Med [Internet]. 2021 [cited 2022 Mar 28];27(2):46–52. Available from: https://www.doi.org/10.7196/AJTCCM.2021.v27i2.135

25. Cruz LN, Polanczyk CA, Camey SA, Hoffmann JF, Fleck MP. Quality of life in Brazil: normative values for the WHOQOL-bref in a southern general population sample. Qual life Res [Internet]. 2011 Sep [cited 2022 May 11];20(7):1123–9. Available from: https://www.doi.org/10.1007/S11136-011-9845-3

26. Noerholm V, Groenvold M, Watt T, Bjorner JB, Rasmussen NA, Bech P. Quality of life in the Danish general population - Normative data and validity of WHOQOL-BREF using Rasch and item response theory models. Qual Life Res [Internet]. 2004 Mar [cited 2023 Apr 15];13(2):531–40. Available from: https://www.doi.org/10.1023/B:QURE.0000018485.05372.d6

27. Kalfoss MH, Reidunsdatter RJ, Klöckner CA, Nilsen M. Validation of the WHOQOL-Bref: psychometric properties and normative data for the Norwegian general population. Health Qual Life Outcomes [Internet]. 2021 Dec 1 [cited 2023 Apr 19];19(1):1–12. Available from: https://www.doi.org/10.1186/S12955-020-01656-X

28. Lagos State Government. About Lagos [Internet]. 2023 [cited 2023 Apr 19]. Available from: https://lagosstate.gov.ng/about-lagos/

29. Lagsos State Government. Tuberculosis Control Program - Minsitry of Health [Internet]. Lagos State Ministry of Health; 2021 [cited 2015 Aug 21]. Available from: https://health.lagosstate.gov.ng/tuberculosis-control-program/

30. NTBLCP. National Tuberculosis, Leprosy and Buruli ulcer Management and control Guidelines. 2015.

31. Chung W-S, Lan Y-L, Yang M-C. Psychometric testing of the short version of the world health organization quality of life (WHOQOL-BREF) questionnaire among pulmonary tuberculosis patients in Taiwan. BMC Public Health [Internet]. 2012 Aug 9 [cited 2017 Apr 2];12:630. Available from: https://www.doi.org/10.1186/1471-2458-12-630

32. Akinpelu A, Maruf FA, Adegoke B. Validation of a Yoruba translation of the World Health Organization's quality of life scale-short form among stroke survivors in Southwest Nigeria. African J Biomed Sci. 2007;35(4):417–24.

33. National Bureau of Statistics (NBS). Labor force statistics: unemployment and underemployment report (Q4 2020) [Internet]. Abuja, Nigeria; 2021 [cited 2023 Apr 20]. Available from: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=labor+force+statistics%3A+unemployment+and+underemployment+report+nigeria&btnG=

34. Kastien-Hilka T, Abulfathi A, Rosenkranz B, Bennett B, Schwenkglenks M, Sinanovic E. 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 Qual Life Outcomes [Internet]. 2016 Mar 11 [cited 2017 Apr 2];14(1):42. Available from: https://doi.org/10.1186/s12955-016-0442-6

35. World Health Organization. National surveys of costs faced by tuberculosis patients and their households 2015-2021 [Internet]. 2022 [cited 2023 Apr 22]. Available from: https://apps.who.int/iris/bitstream/handle/10665/366277/9789240065536-eng.pdf?sequence=1

36. Patrício B, Jesus LMT, Cruice M, Hall A. Quality of Life Predictors and Normative Data. Soc Indic Res [Internet]. 2014 [cited 2022 May 11];119(3):1557–70. Available from: https://doi.org/10.1007/s11205-013-0559-5

37. Attafuah PYA, Everink I, Abuosi AA, Lohrmann C, Schols JMGA. Quality of life of older adults and associated factors in Ghanaian urban slums: a cross-sectional study. BMJ Open [Internet]. 2022 [cited 2022 May 11];12:57264. Available from: https://doi.org/10.1136/bmjopen-2021-057264