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Quality of Life and Its Associated Factors among Inpatients with Pulmonary Tuberculosis

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ABSTRACT

Background: *Tuberculosis (TB) remains a major public health burden in Indonesia, disproportionately affecting the working-age population and significantly impairing patients' quality of life across physical, psychological, and social domains. Demographic factors play a pivotal role in shaping patients' health-related quality of life (HRQoL); however, evidence on these associations from Indonesian hospital settings remains limited.* ***Objective:*** *This study aimed to analyze the associations between demographic factors (age, gender, education, and occupation) and quality of life among hospitalized pulmonary tuberculosis patients in a regional hospital in North Kalimantan, Indonesia.* ***Methods:*** *A cross-sectional analytical survey was conducted at the Daisy Ward of RSUD Dr. H. Soemarno Sosroatmodjo, Tanjung Selor, from August to November 2022. Sixty-eight hospitalized pulmonary tuberculosis patients were selected using purposive sampling based on predetermined inclusion criteria. Sample size was determined using the Slovin formula with a margin of error of 0.05 ($n = N / (1 + N \cdot e^2)$), yielding a minimum of 63 respondents from a reference population of 82 patients. Data were collected using demographic questionnaires and the internationally validated WHOQoL-BREF instrument. Bivariate associations were examined using Chi-Square tests at a significance level of $\alpha = 0.05$.* ***Results:*** *The majority of respondents were elderly aged 46–60 years (67.6%), female (52.9%), highly educated (55.9%), employed (51.5%), and reported good quality of life (64.7%). All four demographic variables were significantly associated with quality of life: age ($p = 0.001$), gender ($p = 0.032$), education ($p = 0.046$), and occupation ($p = 0.035$). Adult patients predominantly reported good quality of life, whereas elderly patients showed an equal distribution between poor and good QoL. Female patients demonstrated better quality of life than males. Higher education and unemployment were each associated with better quality of life outcomes.* ***Conclusion:*** *All examined demographic factors significantly correlate with quality of life among hospitalized TB patients. Healthcare providers should integrate demographic assessments into holistic TB care planning, with particular attention to elderly patients and those with lower educational attainment. The cross-sectional design and purposive sampling limit causal inference and generalizability; future studies should employ probability sampling and multivariate models.*

Keywords: *tuberculosis; quality of life; demographic factors; hospitalization; WHOQoL-BREF; Indonesia*

ABSTRAK

Latar Belakang: Tuberkulosis (TB) tetap menjadi beban kesehatan masyarakat utama di Indonesia, yang secara tidak proporsional memengaruhi populasi usia kerja dan secara signifikan mengganggu kualitas hidup pasien di berbagai domain fisik, psikologis, dan sosial. Faktor demografis memainkan peran penting dalam membentuk kualitas hidup terkait kesehatan (HRQoL) pasien; namun, bukti tentang hubungan ini dari lingkungan rumah sakit di Indonesia masih terbatas. Tujuan: Studi ini bertujuan untuk menganalisis hubungan antara faktor demografis (usia, jenis kelamin, pendidikan, dan pekerjaan) dan kualitas hidup di antara pasien tuberkulosis paru yang dirawat di rumah sakit di sebuah rumah sakit daerah di Kalimantan Utara, Indonesia. Metode: Survei analitik potong lintang dilakukan di Bangsal Daisy RSUD Dr. H. Soemarno Sosroatmodjo, Tanjung Selor, dari Agustus hingga November 2022. Enam puluh delapan pasien tuberkulosis paru yang dirawat di rumah sakit dipilih menggunakan pengambilan sampel bertujuan berdasarkan kriteria inklusi yang telah ditentukan. Ukuran sampel ditentukan menggunakan rumus Slovin dengan margin kesalahan 0,05 ($n = N / (1 + N \cdot e^2)$), menghasilkan minimal 63 responden dari populasi referensi sebanyak 82 pasien. Data dikumpulkan menggunakan kuesioner demografis dan instrumen WHOQoL-BREF yang telah divalidasi secara internasional. Asosiasi bivariat diperiksa menggunakan uji Chi-Square pada tingkat signifikansi $\alpha = 0,05$. Hasil: Mayoritas responden adalah lansia berusia 46–60 tahun (67,6%), perempuan (52,9%), berpendidikan tinggi (55,9%), bekerja (51,5%), dan melaporkan kualitas hidup yang baik (64,7%). Keempat variabel demografis tersebut secara signifikan berhubungan dengan kualitas hidup: usia ($p = 0,001$), jenis kelamin ($p = 0,032$), pendidikan ($p = 0,046$), dan pekerjaan ($p = 0,035$). Pasien dewasa sebagian besar melaporkan kualitas hidup yang baik, sedangkan pasien lansia menunjukkan distribusi yang sama antara kualitas hidup yang buruk dan baik. Pasien perempuan menunjukkan kualitas hidup yang lebih baik daripada pasien laki-laki. Pendidikan yang lebih tinggi dan pengangguran masing-masing dikaitkan dengan hasil kualitas hidup yang lebih baik. Kesimpulan: Semua faktor demografis yang diteliti berkorelasi signifikan dengan kualitas hidup di antara pasien TB yang dirawat di rumah sakit. Penyedia layanan kesehatan harus mengintegrasikan penilaian demografis ke dalam perencanaan perawatan TB holistik, dengan perhatian khusus pada pasien lanjut usia dan mereka yang memiliki tingkat pendidikan lebih rendah. Desain studi potong lintang dan pengambilan sampel bertujuan membatasi inferensi kausal dan generalisasi; studi masa depan harus menggunakan pengambilan sampel probabilitas dan model multivariat.

Kata kunci: tuberkulosis; kualitas hidup; faktor demografis; rawat inap; WHOQoL-BREF; Indonesia

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INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious disease burdens globally, with an estimated 10.6 million new cases and 1.3 million deaths recorded in 2022 (WHO, 2023). In Indonesia, TB constitutes a critical public health challenge; the country ranks second worldwide in TB incidence, accounting for approximately 10% of the global burden, with an estimated 1,060,000 new cases and 134,000 deaths reported annually (WHO, 2022; Kemenkes RI, 2024). The disease disproportionately affects the productive working-age population (15–64 years), which accounts for approximately 81% of total cases, resulting in substantial economic consequences at both individual and household levels.

Patients undergoing TB treatment, which spans 6 to 24 months, frequently experience loss of employment, income reduction averaging 58% of annual earnings, and catastrophic household expenditure exceeding 20% of annual income (Portnoy *et al.*, 2023).

Beyond its economic impact, TB profoundly affects patients' well-being through a complex interplay of physical, psychological, and social consequences. The World Health Organization (WHO) defines quality of life as an individual's multidimensional perception of their position in life within the context of the culture and value system in which they live (Verster and Išeri, 2024). To facilitate comprehensive measurement, the WHO developed the WHOQOL-BREF instrument, encompassing four core domains: physical health, psychological health, social relationships, and environmental conditions (West *et al.*, 2023). Among TB patients, these domains are frequently impaired; previous studies report that 47.6%–75% of patients exhibit moderate-to-poor quality of life during treatment (Datta *et al.*, 2020; Dires *et al.*, 2020).

A growing body of evidence identifies demographic and socioeconomic factors as significant correlates of health-related quality of life (HRQoL) among TB patients. Age, gender, education level, and occupational status have been consistently associated with QoL outcomes (Tornu and Id, 2022; Adebayo, Adejumo and Odusanya, 2023). Higher education is associated with greater health literacy and improved treatment adherence, while employment status intersects with both social engagement and financial capacity for healthcare access. Gender differences in QoL have been observed, with female patients demonstrating paradoxically better psychosocial coping despite reporting lower overall well-being in other contexts (Baral and Kaphle, 2023).

Despite this growing international evidence base, studies examining demographic determinants of QoL among hospitalized TB patients in the Indonesian context particularly in regional hospitals outside major urban centers remain scarce. Most existing Indonesian TB studies focus on treatment outcomes or medication adherence, leaving the psychosocial and demographic dimensions of QoL insufficiently explored. This gap is particularly relevant given that North Kalimantan Province, where this study was conducted, faces unique challenges including geographic remoteness, limited healthcare infrastructure, and a predominantly rural working population.

This study therefore aimed to analyze the relationship between demographic factors (age, gender, education, and occupation) and quality of life among tuberculosis patients hospitalized in the Daisy Ward of RSUD Dr. H. Soemarno Sosroatmodjo, Tanjung Selor. Findings are expected to contribute to evidence-based, demographically-informed care planning for TB patients in similar regional healthcare settings in Indonesia.

METHOD

Study Design and Setting

This study employed an analytical survey design with a cross-sectional approach, in which independent and dependent variables were measured simultaneously at a single time point (Pérez-Guerrero et al., 2024). The research was conducted in the Daisy Ward (Ruang Dahlia) of RSUD Dr. H. Soemarno Sosroatmodjo Hospital, a public regional referral hospital located in Tanjung Selor, the capital of Bulungan Regency, North Kalimantan Province, Indonesia. The hospital operates with 210 beds across multiple specialized units including VIP, ICU/ICCU, NICU/Perinatology, pediatrics, surgery, internal medicine, and infectious disease ward. It was established in 1994 (Class D), upgraded to Class C in 2008, and designated as a full Public Service Agency (BLU) in August 2009.

The Daisy Ward serves as the primary unit for managing infectious disease cases, including pulmonary tuberculosis.

Population and Sample

The study population comprised all pulmonary tuberculosis patients hospitalized in the Daisy Ward during the data collection period. Based on preliminary data collection in June–July 2022, 82 tuberculosis cases were identified as the reference population. Sample size was determined using the Slovin formula:

$$n = N / (1 + N \cdot e^2) = 82 / (1 + 82 \times 0.05^2) = 82 / 1.205 = 68 \text{ respondents}$$

where N = population size and e = margin of error (0.05). This yielded a minimum required sample of 68 respondents.

Purposive sampling was employed to select participants meeting the following inclusion criteria: (1) written informed consent; (2) confirmed pulmonary tuberculosis diagnosis documented in medical records; (3) ability to communicate and respond to questionnaires independently or with family assistance; and (4) aged 17–60 years. Exclusion criteria included: (1) clinically documented cognitive impairment; and (2) poor general condition precluding study participation. All 68 eligible patients who presented during the data collection period from August to November 2022 were enrolled.

Instruments and Measures

Data collection instruments included: (1) informed consent forms; (2) a structured demographic questionnaire capturing age, gender, education level, and occupational status; and (3) the WHOQoL-BREF questionnaire. Demographic variables were operationalized as follows: age (elderly: 46–60 years; adult: 26–45 years; adolescent: 17–25 years); gender (male/female); education level (low: elementary–junior high school; high: senior high school–university); and occupational status (employed/unemployed).

The WHOQoL-BREF instrument comprises 26 items measuring four domains: (1) physical health, (2) psychological health, (3) social relationships, and (4) environmental conditions. Domain scores are transformed to a 0–100 scale. For this study, overall quality of life was dichotomized as poor (aggregate score 0–65) and good (score 66–130) to enable categorical analysis. The instrument has been extensively validated internationally and demonstrates established reliability across diverse clinical populations, including TB patients (West *et al.*, 2023).

Data Analysis

Data analysis comprised univariate and bivariate components. Univariate analysis provided frequency distributions and percentages for all demographic and quality of life variables. Bivariate analysis employed Pearson's Chi-Square test to examine associations between each demographic variable (age, gender, education, occupation) and quality of life category (poor/good), at a significance level of $\alpha = 0.05$. Statistical conclusions followed the criterion that $p < 0.05$ indicates a significant association (H_a accepted, H_0 rejected). All analyses were performed using SPSS version 16.0 for Windows.

Ethical Considerations

This study adhered to the ethical principles of beneficence, non-maleficence, autonomy, and justice. All participants received a comprehensive explanation of the research purpose and procedures and provided written informed consent prior to enrollment. Participants retained the right to withdraw at any time without consequence. Participant identities were protected through a coding system, with no personal identifiers recorded on research instruments. Research approval was obtained from

RSUD Dr. H. Soemarno Sosroatmodjo Hospital and Poltekkes Kemenkes Kalimantan Timur (Ethical Clearance No. DP.04.03/F.XLII.25/00355/2024).

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1 presents the univariate analysis results for 68 respondents. The majority of respondents were elderly aged 46-60 years (n=46, 67.6%), followed by adults aged 26-45 years (n=21, 30.9%), and adolescents aged 17-25 years (n=1, 1.5%). Gender distribution showed slightly more females (n=36, 52.9%) than males (n=32, 47.1%). Education levels were predominantly high (n=38, 55.9%) compared to low (n=30, 44.1%). Employment status showed similar distribution between employed (n=35, 51.5%) and unemployed (n=33, 48.5%) respondents. Quality of life assessment revealed that the majority reported good quality of life (n=44, 64.7%) while 35.3% (n=24) reported poor quality of life.

Table 1 ***Respondent Characteristics (n=68)***

Variable	n	%
Age		
Elderly (46-60 years)	46	67.6
Adult (26-45 years)	21	30.9
Adolescent (17-25 years)	1	1.5
Gender		
Male	32	47.1
Female	36	52.9
Education		
Low	30	44.1
High	38	55.9
Occupation		
Unemployed	33	48.5
Employed	35	51.5
Quality of Life		
Poor	24	35.3
Good	44	64.7

Bivariate Analysis

Table 2 presents the bivariate analysis examining associations between each demographic factor and quality of life. All four variables demonstrated statistically significant associations ($p < 0.05$).

Table 2 ***Relationship Between Demographic Factors and Quality of Life (n=68)***

Variable	Quality of Life		p-value
	Poor n(%)	Good n(%)	
Age			
Elderly (46-60 years)	23 (33.8)	23 (33.8)	**0.001***
Adult (26-45 years)	1 (1.5)	20 (29.4)	
Adolescent (17-25 years)	0 (0.0)	1 (1.5)	
Gender			
Male	16 (23.5)	16 (23.5)	**0.032***
Female	8 (11.8)	28 (41.2)	
Education			
Low	15 (22.1)	15 (22.1)	**0.046***
High	9 (13.2)	29 (42.6)	
Occupation			
Unemployed	7 (10.3)	26 (38.2)	**0.035***
Employed	17 (25.0)	18 (26.5)	

*Note. *Chi-Square test, statistically significant at $p < 0.05$. Percentages are computed relative to total sample (n = 68).*

Discussion

Age and Quality of Life

Analysis revealed a highly significant association between age and quality of life (p = 0.001). Among elderly respondents (46–60 years), quality of life was equally distributed between poor and good categories (33.8% each), whereas adult respondents (26–45 years) predominantly demonstrated good quality of life (29.4% vs. 1.5%). These findings are consistent with (Claessens *et al.*, 2020), who reported a significant positive correlation between age and quality of life (p = 0.003, r = 0.514) in a chronic disease cohort.

The comparable prevalence of poor and good QoL among elderly patients likely reflects the compounding burden of age-related comorbidities, physiological decline, and prolonged TB symptom duration — factors that collectively erode physical and psychological functioning. Conversely, the higher QoL observed among adult patients may reflect preserved physical reserve and more active social engagement. Notably, (Stone *et al.*, 2020) proposed that individuals who have navigated major life transitions in older adulthood may evaluate their lives more positively than younger peers, suggesting a nuanced relationship between chronological age and subjective well-being that merits further investigation.

These findings highlight the importance of age-stratified care planning. Elderly TB patients require enhanced symptom monitoring and psychosocial support to prevent deterioration in quality of life, while adult patients may benefit from vocational and social reintegration programs.

Gender and Quality of Life

Gender demonstrated a significant association with quality of life (p = 0.032). Female respondents showed a substantially higher proportion of good quality of life (41.2%) compared to males (23.5%), with male patients showing an equal distribution between poor and good QoL. These results align with (Olsen, Möller and Ahrenfeldt, 2021), who identified a significant gender–QoL relationship (p = 0.030, r = 0.358) in a large European population study.

The relatively better QoL observed among female patients may reflect gender-specific coping strategies and health-seeking behaviors. Literature indicates that women, despite experiencing greater negative affect in certain health domains, are more likely to actively engage in health consultations and adhere to therapeutic regimens behaviors that may partially buffer the adverse effects of TB on quality of life (Baral and Kaphle, 2023). Additionally, stronger social support networks commonly reported among female patients may contribute to resilience during hospitalization. Healthcare providers should remain attentive to male patients' psychosocial needs, as their equal distribution between poor and good QoL suggests greater vulnerability to QoL deterioration during TB treatment.

Education Level and Quality of Life

Education level showed a significant association with quality of life (p = 0.046). Respondents with higher educational attainment predominantly reported good quality of life (42.6%), while those with low education showed an equal distribution between poor and good QoL categories (22.1% each). These findings corroborate (Kefale *et al.*, 2019), who identified significant education QoL associations (p < 0.001) in a chronic kidney disease population, and extend the evidence to TB patients in an Indonesian regional hospital setting.

Education serves as a health-enabling resource through multiple pathways: higher education correlates with greater health literacy, increased capacity to comprehend and adhere to treatment

instructions, better self-efficacy in navigating healthcare systems, and stronger occupational resilience (Tran, Pham and Nguyen, 2021). Patients with lower educational attainment may experience diminished confidence in interacting with healthcare providers and perceiving themselves as capable contributors to their recovery. These findings underscore the need for tailored patient education interventions that accommodate varying literacy levels, particularly for TB patients with lower educational backgrounds.

Occupation and Quality of Life

Occupational status was significantly associated with quality of life ($p = 0.035$). Notably, unemployed respondents showed a higher proportion of good quality of life (38.2%) compared to employed respondents (26.5%), while employed respondents demonstrated a higher proportion of poor quality of life (25.0% vs. 10.3%). These findings align with (Tran, Pham and Nguyen, 2021) and (Norström *et al.*, 2019), who reported significant work QoL associations.

The seemingly paradoxical finding that unemployed patients reported better QoL warrants contextual interpretation. Several explanatory mechanisms are plausible. First, for hospitalized TB patients, employment may represent an active source of stress through concerns about job security, financial instability, and employer expectations during prolonged absence factors that could substantially impair psychological QoL. Second, unemployed patients, many of whom may be homemakers, retirees, or individuals engaged in informal economic activities, may experience less role disruption during hospitalization and have more time for adequate rest and recovery, which are critical for TB convalescence. Third, the dichotomization of the employment variable (employed vs. unemployed) does not capture important heterogeneity within these categories for example, self-employed individuals may experience different stressors than formal-sector employees.

It is also important to acknowledge that cross-sectional assessment cannot establish temporal directionality: it remains possible that patients with pre-existing poor QoL were more likely to be employed in physically demanding occupations that exacerbated symptom burden, or conversely, that unemployed status preceded hospitalization as a consequence of prior health deterioration. Future studies should disaggregate employment type, capture income levels, and examine employment-related stress as a mediating variable.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that all four examined demographic factors age ($p = 0.001$), gender ($p = 0.032$), education level ($p = 0.046$), and occupational status ($p = 0.035$) are significantly associated with quality of life among hospitalized pulmonary tuberculosis patients, as assessed by the WHOQoL-BREF instrument. The majority of respondents (64.7%) reported good quality of life. Elderly patients showed equal distribution between poor and good QoL, whereas adults predominantly reported good QoL. Female patients and those with higher educational attainment demonstrated better quality of life outcomes. The paradoxical finding that unemployed respondents reported higher proportions of good QoL warrants further investigation in the context of work-related stressors and hospitalization dynamics.

Healthcare providers should integrate systematic demographic assessments into routine TB care planning, with particular attention to elderly patients, male patients, and those with lower educational backgrounds as priority groups for psychosocial support. Patient education programs should be designed with appropriate health literacy accommodations. Multi-disciplinary care teams including

nurses, social workers, and community health workers should address the intersecting social determinants of quality of life throughout the continuum of TB treatment.

Future research should employ probability sampling techniques (e.g., systematic random sampling) to improve generalizability, incorporate multivariate logistic regression to identify independent demographic predictors of QoL while controlling for confounders, and expand the variable set to include family support, treatment adherence, disease severity, treatment phase (intensive vs. continuation), stigma, and domain-level WHOQoL-BREF analysis. Longitudinal designs would additionally allow examination of QoL trajectories across the treatment course.

LIMITATIONS

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal inference; while significant associations were identified, the directionality and temporal sequence of demographic influences on quality of life cannot be established. Second, purposive sampling, while appropriate for identifying participants meeting specific clinical criteria, introduces potential selection bias and limits the generalizability of findings to the broader TB patient population, including those receiving outpatient treatment. Third, the study was restricted to a single ward of one regional hospital, constraining external validity. Fourth, only bivariate analyses were conducted; the absence of multivariate adjustment means that observed associations may partly reflect confounding among correlated demographic variables. Fifth, treatment phase (intensive vs. continuation) and disease severity were not recorded, both of which may independently influence quality of life outcomes. These limitations should be addressed in future, larger-scale, multi-site investigations.

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ETHICAL CONSIDERATIONS

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Conflict of Interest Statement

The authors declare no conflict of interest in the publication of this article.

Ethical Consent

This research was approved by RSUD Dr. H. Soemarno Sosroatmodjo Hospital and Poltekkes Kemenkes Kalimantan Timur. All procedures involving human participants adhered to ethical standards including informed consent, anonymity, and confidentiality (Ethical Clearance No. DP.04.03/F.XLII.25/00355/2024).

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