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Factors Associated with Quality of Life among Women Living with HIV in Bali

Putu Dian Prima Kusuma Dewi[1*], Putu Sukma Megaputri[2], Ni Made Karlina Sumiari Tangkas[3]

[1]Sekolah Tinggi Ilmu Kesehatan Buleleng, Bali, Indonesia
[2]Sekolah Tinggi Ilmu Kesehatan Buleleng, Bali, Indonesia
[3]Sekolah Tinggi Ilmu Kesehatan Buleleng, Bali, Indonesia

Correspondence: Putu Dian Prima Kusuma Dewi. Email: dianpreema@gmail.com

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ABSTRACT

Introduction: Women living with HIV (WLHIV) face greater social, economic, and psychological burdens than men, which directly affect their quality of life. This study aimed to examine factors associated with quality of life among women living with HIV receiving antiretroviral therapy (ART) in Bali, Indonesia.

Methods: This quantitative cross-sectional study included 197 women receiving ART in Jembrana and Gianyar districts, Bali. Data were collected through structured interviews using the WHOQOL-HIV BREF questionnaire and analyzed using ordinal logistic regression (ologit) in Stata 17. Quality of life (QoL) was categorized as high, moderate, or low.

Results: Most respondents (90.4%) had low quality of life. Factors significantly associated with quality of life included educational attainment (β = −0.958, AOR = 0.38, 95% CI: 0.20–0.74, p = 0.005), employment status (β = −1.37, AOR = 0.25, 95% CI: 0.06–0.94, p = 0.040), medication adherence support (β = 0.39, AOR = 1.48, 95% CI: 1.01–2.17, p = 0.040), and a history of forgetting antiretroviral medication (β = 4.61, AOR = 100.76, 95% CI: 6.31–1610.08, p = 0.001). Lower educational attainment and unemployment were associated with poorer quality of life, whereas treatment adherence and medication adherence support were associated with better well-being among women living with HIV.

Conclusion: A holistic approach integrating medical, psychosocial, and family support may help improve quality of life among women living with HIV and support adaptation to chronic illness. Promotive and preventive interventions should focus on strengthening family and peer support, expanding health education, and addressing social stigma to help women living with HIV maintain optimal QoL.

Keywords: Women with HIV; Quality of Life; Antiretroviral Therapy; Medication Adherence; Social Support

INTRODUCTION

HIV/AIDS remains an unresolved global health challenge. Its impact extends beyond health to social consequences arising from stigma and discrimination, which can substantially affect quality of life (QoL). In 2023, cases among women living with HIV in the Asia-Pacific region were reported as 85% compared with 75% among men, while the number of women living with HIV in Indonesia reportedly increased from 170,000 in 2015 to 180,000 in 2023 (1). Women often experience more severe social, economic, and psychological impacts than men (2). Women living with HIV face a double burden as individuals with a chronic illness and as members of a vulnerable group that frequently experiences stigma and discrimination (3). Women living with HIV experience higher levels of depression, anxiety, and post-traumatic stress symptoms than their male counterparts and more frequently than women without HIV (2,4,5). Other studies have shown more severe socioeconomic impacts among women than men, including higher levels of violence, isolation, workplace discrimination, physical violence, and extortion (2). HIV was once considered a fatal disease, but it can now be managed as a chronic condition when antiretroviral (ARV) therapy is taken regularly and continuously. ARV therapy reduces morbidity and mortality and increases life expectancy among people living with HIV (6). However, successful HIV management is not determined by clinical parameters alone; quality of life is also an important patient-centered outcome. Quality of life reflects physical, psychological, social, and environmental well-being. Studies indicate that quality of life among women living with HIV is associated with ARV adherence, social support, employment, education, economic status, and mental-health conditions such as depression and anxiety (7). In addition, internalized and external HIV-related stigma can contribute to low self-esteem and social isolation, negatively affecting quality of life (8).

Access to ARV therapy has expanded in Indonesia, but women living with HIV continue to face barriers to holistic health services. Cultural factors, gender inequality, and limited information may exacerbate these challenges (9). Identifying factors associated with quality of life among women receiving ARV therapy is therefore important for developing more targeted interventions. Quality of life is particularly relevant in HIV care because the condition is chronic and can affect physical, psychological, social, and spiritual aspects of life (10). Studies conducted in Bali have suggested that gender-related burdens among Balinese women may increase the risk of treatment discontinuation, which may in turn increase mortality risk (9,11–13). Although previous evidence indicates that mortality incidence may be higher among men than women—35 versus 14 per 1,000 person-years, respectively, with an incidence rate ratio (IRR) of 2.39 ($p < 0.01$)—women may face distinct treatment and social challenges (9).

Major challenges in antiretroviral therapy include treatment-related adverse effects and adherence. ARV therapy can reduce transmission and help prevent opportunistic infections (14). Adherence to ARV therapy is associated with the physical, mental, and social well-being of people living with HIV/AIDS. Regular use of appropriate antiretroviral medicines is therefore important for maintaining health and QoL. The manuscript also states that this therapy forms antibodies and produces pro-inflammatory agents to reduce viral growth. In addition, early initiation of effective HIV treatment is important for clinical management. Mother-to-child transmission can be reduced through appropriate antiretroviral therapy during pregnancy and the perinatal period (15). Previous research has reported an association between quality of life and duration of living with HIV (16). Support from family, friends, and peer groups has also been associated with QoL, with family support reported as an important factor among people living with HIV at the Makassar Peer Support Group Care Foundation (17). Counseling, family assistance, and treatment reminders may also support adherence to ARV therapy (4,18). Interpersonal circumstances, experiences of stigma and discrimination, and perceptions of treatment may further influence engagement with HIV care (6).

Although previous studies have consistently demonstrated associations between ART adherence, social support, education, employment, and QoL among people living with HIV/AIDS, evidence focusing specifically on women living with HIV in Bali remains limited. Balinese women may face distinct sociocultural challenges, including gender-based caregiving responsibilities, family obligations, HIV-related stigma, and dependence on family support systems. Furthermore, medication adherence support (MAS) as a structured treatment-support mechanism has received limited attention in the Indonesian context. This study therefore examined the combined associations of individual characteristics, treatment behavior, and medication adherence support with quality of life among women living with HIV receiving ART in Bali.

Quality of life among people living with HIV/AIDS is increasingly understood within a biopsychosocial framework in which health outcomes are shaped by biological, psychological, behavioral, and social determinants. According to the World Health Organization Quality of Life (WHOQOL) framework, quality of life reflects individuals' perceptions of their physical health, psychological well-being, social relationships, environment, and spiritual beliefs. Previous studies have demonstrated that treatment adherence, social support, educational attainment, and socioeconomic status are independently associated with QoL among people living with HIV/AIDS. However, these determinants are often examined separately, limiting understanding of how individual characteristics and treatment-related factors jointly shape overall well-being.

The present study integrates individual characteristics (age, education, employment status, and body weight), treatment behavior (ARV adherence), and medication adherence support within a single analytical framework to examine QoL among women living with HIV/AIDS. Unlike studies focused primarily on clinical outcomes or isolated psychosocial factors, this study considers medication adherence support as a treatment-support mechanism linking behavioral and social determinants of health. Evidence focusing specifically on women living with HIV in Bali remains limited despite a sociocultural context characterized by strong family obligations, gender-based caregiving roles, and persistent HIV-related stigma. This study therefore provides a gender-sensitive, context-specific assessment of quality of life among women receiving antiretroviral therapy in Indonesia. The study aimed to examine factors associated with QoL among women with HIV receiving ART in Bali, Indonesia.

METHODS

The study methods, population, sample, instruments, data-collection procedures, analytical approach, and ethical considerations are described below.

Research Type

This analytical cross-sectional study assessed quality of life among women living with HIV receiving ARV therapy. Data were collected from two regions, Jembrana Regency and Gianyar Regency, with a total sample of 197 participants recruited from hospitals and community health centers. Data were recorded on a data-collection form and transferred from hard copy to Microsoft Excel to facilitate analysis.

Population and Sample/Informants

Purposive sampling was used to recruit 197 women living with HIV (WLHIV) in Jembrana Regency and Gianyar Regency.

Research Location

The study was conducted at Melaya I Primary Health Center (Jembrana Regency) and Sanjiwani Regional Hospital (Gianyar Regency).

Instrumentation or Tools

In this study, QoL was assessed across four domains—physical, psychological, social relationships, and environment—using the WHOQOL-HIV BREF (World Health Organization Quality of Life-HIV BREF) questionnaire. The validity and reliability of the instrument were evaluated before the main analysis. Corrected item-total correlation (CITC) was used to assess item validity, with values greater than 0.30 considered acceptable. Internal consistency reliability was assessed using Cronbach's alpha coefficient. According to Nunnally and Bernstein, Cronbach's alpha values greater than 0.70 indicate acceptable reliability. The assessed WHOQOL-HIV BREF domains demonstrated good to excellent reliability in this study.

Table 1. Operational Definition and Variable Coding

Variable	Coding
Quality of Life	0 = High quality of life 1 = Moderate quality of life 2 = Low quality of life
Education	0 = Elementary 1 = Junior High 2 = Senior High 3 = University
Employment	0 = Unemployed 1 = Employed
ARV Forgetting	0 = Never, 1 = Ever
Medication Adherence Support	0 = No Support 1 = Family, 2 = Husband, 3 = Self-support 4 = NGO

Lower numerical codes represented better quality of life for interpretation of the ordinal logistic regression. The original WHOQOL-HIV BREF comprises six domains. However, the present study focused on four domains (physical, psychological, social relationships, and environment) because these domains were considered most directly related to treatment adherence, medication support, and daily functioning among women living with HIV/AIDS. The selected domains demonstrated good internal consistency reliability in the present sample (Cronbach's alpha = 0.827–0.923).

Medication adherence was assessed using participants' self-reported history of forgetting to take antiretroviral (ARV) medication. Respondents were categorized into two groups: those who reported ever forgetting to take ARV medication and those who reported never forgetting ARV medication. For regression analysis, medication adherence was coded as a binary variable, with “never forgot ARV medication” serving as the reference category.

Medication adherence support was assessed based on the presence of an individual or organization providing support and monitoring for ARV adherence. Initially, respondents were classified into five categories: no supervisor, family member, spouse, self-managed, and non-governmental organization (NGO) support. For analytical purposes, these categories were recoded into a binary variable. Participants supported by a family member, spouse, or NGO were categorized as having medication adherence support, whereas participants without a supervisor or those managing treatment independently were categorized as not having medication adherence support. In the regression analysis, medication adherence support was coded as 0 = support available and 1 = no support available.

Data Collection Procedures

The sample consisted of people with HIV/AIDS who had received ARV therapy. Quality of life was measured using the WHOQOL-HIV BREF questionnaire and transformed to a 0–100 scale. Because the WHOQOL-HIV BREF does not provide

universally accepted cut-off values, the present study used study-defined categories for descriptive and ordinal analyses: scores <60 were classified as low quality of life, scores of 60–75 as moderate quality of life, and scores >75 as high quality of life. These thresholds should therefore be interpreted as analytical categories used in this study rather than official WHOQOL-HIV BREF cut-off values. The data obtained from the collection results were summarized using frequency distributions. Univariate analysis was performed to determine the distribution and percentage of respondents, including age, employment status, education, number of children, marital status, medication adherence (medication adherence support), risk of HIV transmission, duration of HIV infection, level of therapy adherence, CD4 count, body weight, opportunistic infection, clinical stage, and hemoglobin (Hb) level. The data were analyzed using multivariable ordinal logistic regression with backward selection, with confounding variables assessed at a significance level of 5% using Stata 17 software. Inclusion criteria were women aged ≥18 years, diagnosed with HIV/AIDS, receiving ART for ≥6 months, and willing to participate. Exclusion criteria were severe illness, cognitive impairment, and incomplete questionnaire data. Women living with HIV receiving ART at Sanjiwani Hospital and Melaya I Health Center during the study period numbered 223. Twenty-six were excluded (10 incomplete records and 16 who refused participation), leaving a final analytical sample of 197.

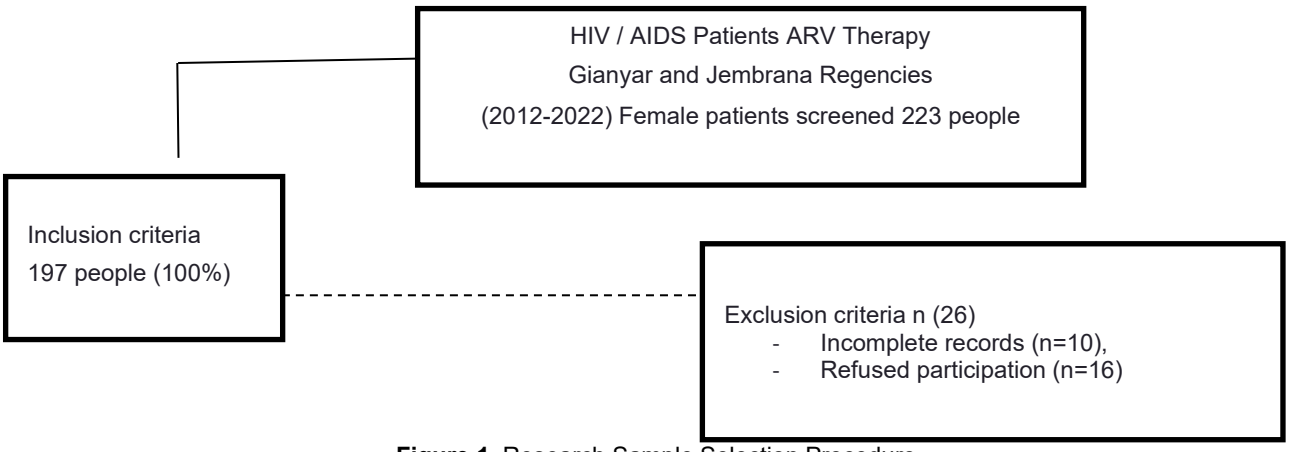


Figure 1. Research Sample Selection Procedure
Direct interviews were conducted using the WHOQOL-HIV questionnaire.

Data Analysis

Data were collected through interviews and observations using questionnaires and interview sheets. Univariate and multivariable analyses were then performed using ordinal logistic regression.

The proportional odds assumption was evaluated using multiple post-estimation tests implemented through the oparallel procedure. The Wolfe-Gould test ($p = 0.229$) and Wald test ($p = 0.785$) supported the proportional odds assumption, whereas the Brant and likelihood-ratio tests suggested potential departures from the assumption. Given the mixed results across tests and the ordinal nature of the outcome variable, the ordinal logistic regression model was retained and interpreted cautiously. For hemoglobin and CD4 variables, zero values indicated the absence of recorded laboratory results rather than the participants' actual clinical status; these observations were therefore coded as missing. Descriptive analysis showed a median hemoglobin level of 9.5 g/dL (IQR: 9.0–11.0) and a median CD4 count of 331.5 cells/mm³ (IQR: 250–520). CD4 counts were excluded from the multivariable analysis because of incomplete laboratory records.

Ethical Approval

The study obtained ethical approval from the Buleleng Health Sciences Institute Ethics Committee, with ID number KEPK 9631125 and approval number 1026/EC-KEPK-SB/VII/2023.

RESULTS

Validity and Reliability Testing

The validity and reliability analysis, using Pearson correlation and Cronbach's alpha, indicated that nearly all WHOQOL-HIV BREF items met the validity criteria, with correlation values ranging from 0.505 to 0.768 for the Physical domain, 0.497 to 0.858 for the Psychological domain, and 0.589 to 0.792 for the Social Relationships domain. In the Environment domain, most items were valid; however, item li6 had a correlation value of −0.170, suggesting a potential issue with its coding or directionality.

Reliability analysis demonstrated good internal consistency across all domains. Cronbach's alpha coefficients were 0.827 for the Physical domain, 0.923 for the Psychological domain, 0.835 for the Social Relationships domain, and 0.845 for the Environment domain. The overall reliability coefficient for the WHOQOL-HIV BREF instrument was 0.826, indicating good reliability for assessing QoL among women with HIV/AIDS.

Table 2. Reliability of WHOQOL-HIV BREF Domains

Domain	Number of Items	Cronbach's Alpha	Interpretation
Physical	5	0.827	Good
Psychological	9	0.923	Excellent
Social Relationships	3	0.835	Good
Environment	7	0.845	Good
Overall Instrument	24	0.826	Good

Table 3. Summary of Item Validity Testing

Domain	Range of CITC	Interpretation
Physical	0.505–0.768	Valid
Psychological	0.497–0.858	Valid
Social Relationships	0.589–0.792	Valid
Environment	-0.170–0.819	One item (li6) invalid

Despite the low CITC value, the item was retained because the WHOQOL-HIV BREF is a standardized instrument with established psychometric properties. Therefore, all original items were retained despite one item demonstrating a low corrected item-total correlation. Medication adherence was measured based on participants' self-reported history of forgetting ARV medication, whereas medication adherence support was measured based on the presence of family, spouse, or NGO support for treatment adherence. Both variables were recoded into binary categories to facilitate regression analysis and improve interpretability.

Table 3 presents the quality of life and characteristics of participants. Based on the study-defined WHOQOL-HIV BREF score categories, quality-of-life scores were categorized as low (<60), moderate (60–75), or high (>75). These categories were used to facilitate interpretation of quality-of-life status among women living with HIV receiving antiretroviral therapy.

Table 4. Frequency Distribution of Respondent Characteristics and Analysis of Relationships Between Variables

Characteristic	High Quality of Life (N=6) n (3.05 %)	Moderate Quality of Life (N=13) n (6.6 %)	Low Quality of Life (N=178) n (90.36%)	Total N (%)
Age, median (IQR)				43.2 (41.6-44.7)
Education				
Elementary Education	0 (0)	2 (1.71)	115 (98.29)	117 (100)
Junior High School	3 (7.14)	5 (11.90)	34 (80.95)	42 (100)
Senior High School	3 (11.11)	5 (18.52)	19 (70.37)	27 (100)
University Education	0 (0)	1 (9.09)	10 (90.91)	11 (100)
Employment				
Unemployed	1 (1.11)	3 (3.33)	86 (95.6)	90 (100)
Employed	5 (4.67)	10 (9.35)	92 (85.9)	107 (100)
Marital status				
Married	4 (3.20)	9 (7.20)	112 (89.6)	125 (100)
Single	0 (0)	1 (14.29)	3 (4.62)	7 (100)
Missing	2 (3.08)	3 (4.62)	60 (92.31)	65 (100)
Medication Adherence Support				
No support	0 (0)	0 (0)	6 (100)	6 (100)
Family	2 (5.56)	1 (2.78)	33 (91.67)	36 (100)
Husband	4 (9.52)	6 (14.29)	32 (76.19)	42 (100)
Self-support	0 (0)	5 (4.95)	96 (95.05)	101 (100)
NGO	0 (0)	1 (8.33)	11 (91.67)	12 (100)
Ever Forgot to Take Your ARVs				
No	5 (3.25)	13 (8.44)	136 (88.31)	154 (100)
Yes	1 (2.33)	0 (0)	42 (97.67)	43 (100)
ARV Therapy Adherence Status				
Moderate adherence	0 (0)	0 (0)	11 (100)	11 (100)
Low adherence	6 (3.23)	13 (6.99)	167 (89.78)	186 (100)
Long-term HIV diagnosis				
1–5 years	1 (16.67)	4 (30.77)	65 (36,52)	70 (35.53)
>5 years	5 (83.33)	9 (69.23)	113 (63.48)	127 (64.47)
CD4 (n=18)				331.5 (250.0–510.0)
Hb (n=33)				9.5 (9.0–11.0)
Weight				55.5 (54.2-56.9)

CD4 and hemoglobin values were available only for a subset of participants. Observations with unavailable laboratory records were treated as missing data and excluded from descriptive calculations. Median and interquartile range (IQR) are presented because of the limited number of available observations.

Table 4 shows the sociodemographic and clinical characteristics of 197 women living with HIV/AIDS who were receiving ARV therapy. Overall, 90.4% had low QoL, 6.6% had moderate QoL, and 3.0% had high QoL. The median age was 43.2 years (IQR: 41.6–44.7).

Most respondents had elementary education (59.4%), and only a small proportion had university education (5.6%). Low quality of life was predominant among participants with lower educational attainment, whereas moderate or high quality of life was more common among those with secondary or higher education. A total of 54.3% of respondents were employed and had a higher proportion of moderate or high quality of life than the unemployed group. Most respondents (63.5%) were married, although low quality of life remained predominant in this group. Respondents who received medication adherence support from family members or spouses generally had better quality of life than those without such support. Most respondents (94.4%) were classified as having low adherence to ARV therapy. Respondents who reported never forgetting medication tended to have better quality of life. Most respondents (64.5%) had been living with HIV for more than five years. Laboratory data were available only for subsets of participants: valid CD4 measurements were available for 18 participants, and hemoglobin measurements were available for 33 participants. Observations without laboratory records were treated as missing values and excluded from descriptive calculations. Because higher outcome categories represented poorer quality of life, negative regression coefficients indicate reduced odds of belonging to poorer quality-of-life categories, whereas positive coefficients indicate increased odds of belonging to poorer quality-of-life categories.

Table 5. Factors Associated with Quality of Life among Women Living with HIV Receiving ART

Independent Variables	Coefficient (β)	AOR	Std. Error	z	p-value	95% CI (Lower–Upper)	Description
Age	-0.05	0.95	0.03	-1.77	0.07	0.88-1.00	Not significant
Body Weight	-0.06	0.93	0.03	-1.92	0.055	0.88-1.00	Not significant
Marital Status	0.23	1.27	0.54	0.44	0.66	0.43-3.69	Not significant
Education	-0.958	0.38	0.33	-2.84	0.005	0.20-0.74	Significant
Occupation	-1.37	0.25	0.66	-2.06	0.040	0.06-0.94	Significant
Medication adherence support	0.39	1.48	0.19	2.02	0.040	1.01-2.17	Significant
History of Forgetting ARV Medication	4.61	100.76	1.41	3.26	0.001	6.31-1610.08	Significant

Reference category: Never forgot ARV medication; unemployed; lower education.

Quality of life was coded as 0 = high quality of life, 1 = moderate quality of life, and 2 = low quality of life. Adjusted odds ratios (AORs) were calculated as exp(β). For descriptive purposes, the original five medication-adherence-support categories are presented in Table 5, whereas binary recoding was applied for multivariable analysis. A negative coefficient indicates lower odds of falling into a poorer quality-of-life category, whereas a positive coefficient indicates higher odds of falling into a poorer quality-of-life category.

Ordinal logistic regression was performed to identify factors associated with quality-of-life categories among women living with HIV. The independent variables included age, body weight, marital status, education, occupation, medication adherence support, and a history of forgetting to take ARVs, with never forgetting ARV medication as the reference category. Because higher outcome categories represented poorer quality of life (0 = high, 1 = moderate, and 2 = low), negative regression coefficients indicate lower odds of belonging to poorer quality-of-life categories, whereas positive coefficients indicate higher odds.

Educational attainment was significantly associated with quality of life (β = −0.958, AOR = 0.38, 95% CI: 0.20–0.74, p = 0.005). Women with higher educational attainment had 62% lower odds of belonging to poorer quality-of-life categories than women with lower educational attainment. Employment status was also significantly associated with quality of life (β = −1.37, AOR = 0.25, 95% CI: 0.06–0.94, p = 0.040). Employed women had approximately 75% lower odds of experiencing poorer quality of life than unemployed women after adjustment for the other variables in the model. Medication adherence support remained significantly associated with quality of life (β = 0.39, AOR = 1.48, 95% CI: 1.01–2.17, p = 0.040). Based on the variable coding used in the analysis, women without medication adherence support had significantly higher odds of belonging to poorer quality-of-life categories than those who received support. Women who reported forgetting ARV medication had 100.8-fold higher odds of belonging to poorer quality-of-life categories than women who never forgot their medication (p = 0.001), indicating that medication adherence plays an important role in maintaining better QoL among women with HIV. This large effect estimate should be interpreted cautiously because only a small proportion of participants belonged to the moderate- and high-quality-of-life categories, resulting in wide confidence intervals.

In contrast, age (β = −0.05, AOR = 0.95, 95% CI: 0.88–1.00, p = 0.070), body weight (β = −0.06, AOR = 0.93, 95% CI: 0.88–1.00, p = 0.055), and marital status (β = 0.23, AOR = 1.27, 95% CI: 0.43–3.69, p = 0.660) were not significantly associated with quality of life after adjustment for potential confounding variables.

Overall, educational attainment, employment status, medication adherence support, and ARV adherence behavior were independently associated with QoL among women living with HIV receiving antiretroviral therapy, whereas age, body weight, and marital status were not independently associated with quality of life.

The findings indicate significant associations between QoL and education, employment, medication adherence support, and ARV adherence.

The ordinal logistic regression model showed an overall significant fit (LR $\chi^2 = 35.20$, $p < 0.001$), indicating that the predictors improved model performance compared with the null model. The model pseudo-R^2 was 0.2367.

The Wolfe-Gould test ($\chi^2 = 8.127$, p = 0.229) and Wald test ($\chi^2 = 2.444$, p = 0.785) supported the proportional odds assumption. However, the Brant test ($\chi^2 = 20.66$, p = 0.002), likelihood-ratio test ($\chi^2 = 19.53$, p = 0.003), and score test ($\chi^2 = 669.2$, p <

0.001) suggested potential departures from the assumption. Future studies with larger sample sizes may consider partial proportional odds models or generalized ordered logistic regression.

DISCUSSION

A crucial finding of this study is that 90.4% of respondents reported a low quality of life. This result reflects the participants' relatively disadvantaged socioeconomic backgrounds. Using the study-defined threshold score of 60, the majority fell into the "low quality of life" category. These findings highlight the significant psychosocial, economic, and health-related challenges faced by women living with HIV in Bali, including stigma, caregiving burdens, and the demands of long-term antiretroviral (ARV) treatment. The study also identifies associations between quality of life and factors such as education level, employment status, and adherence to ARV treatment. Conversely, variables such as age, body weight, and marital status showed no direct relationship with quality of life.

Socioeconomic factors appeared to be important correlates of QoL among women living with HIV in Bali. Education level and employment status were associated with quality of life, whereas age was not independently associated in the present study. Studies in Uganda have reported lower quality of life among older people living with HIV than among younger groups, potentially because of chronic disease burden and social limitations (20). People living with HIV aged over 70 years have also been reported to have a substantially higher likelihood of frailty, which may affect quality of life, and frailty risk may increase with longer duration since HIV diagnosis (21).

Body weight also showed a negative regression coefficient but did not reach statistical significance ($p = 0.055$). Although adequate nutritional status remains important for maintaining physical health among women living with HIV, body weight alone was not an independent predictor of QoL in the present study. This finding may indicate that psychosocial and behavioral determinants exert stronger influences on quality of life than anthropometric characteristics. Because body weight rather than weight change was included in the model, the results should not be interpreted as evidence that weight loss directly causes poorer quality of life (22).

CD4 levels indicate immunity in the body. Higher CD4 levels correlate with lower viral loads in people with HIV/AIDS (23). People with HIV are indeed very susceptible to metabolic disorders, including weight loss, which can be exacerbated by anemia. Anemia can also occur as a side effect of therapies such as zidovudine (24,25). Good nutritional status and Hb levels support improvements in the physical domain of quality of life. Research in Medan, Indonesia also found a significant relationship between anemia, fatigue, and a decline in the QoL of HIV patients (26). Weight gain and loss in people with HIV depend on the type of ARV given or consumed. DTG-based regimens result in more weight gain than those receiving other non-XTC NRTI regimens (27).

The Role of Education and Employment

The findings indicate that higher educational attainment was associated with better quality of life among women living with HIV/AIDS. The negative regression coefficient suggests that women with higher levels of education were less likely to belong to poorer quality-of-life categories. Education may improve health literacy, treatment-related knowledge, self-management skills, and the ability to access healthcare services effectively. Similarly, employment status was associated with better quality of life. Employed women had lower odds of reporting poorer quality of life, possibly because employment provides financial security, social engagement, and greater self-efficacy. These findings support previous studies showing that education and employment are important social determinants of quality of life among women living with HIV. According to the study, women with low education and income have a higher risk of experiencing depression and stigma, which reduces the psychological and social aspects in the WHOQOL-HIV BREF (28). Employment status and income are significantly related to the quality of life of people living with HIV in Semarang ($p=0.009$) (8). Employment may contribute to quality of life through financial stability, social participation, self-esteem, and greater access to healthcare services. Nevertheless, the relationship may be bidirectional. Women with better physical and mental health may be more likely to maintain employment, whereas those experiencing poorer health may face challenges in sustaining work. Because of the cross-sectional design, the temporal direction of this relationship cannot be determined (2).

The adjusted odds ratios indicate that higher educational attainment was associated with approximately 62% lower odds of belonging to poorer quality-of-life categories, whereas employment was associated with approximately 75% lower odds. These findings emphasize the importance of socioeconomic resources in promoting long-term well-being among women living with HIV.

These findings may be particularly relevant within the sociocultural context of Bali. Balinese women often hold multiple responsibilities as wives, mothers, caregivers, and active participants in customary and religious activities. Such responsibilities may increase physical, emotional, and economic burdens, particularly among women living with HIV/AIDS. Consequently, higher education and stable employment may provide important advantages by improving health literacy, economic independence, access to healthcare resources, and the ability to manage treatment-related challenges while fulfilling family and community obligations (4,29). Previous studies have shown that educational attainment is an important determinant of health-related quality of life because it facilitates health literacy, treatment adherence, and utilization of healthcare resources (4,19). In this study, socio-economic variables, income, financial security and social networks were not included.

Medication Adherence and Support

Medication adherence support was significantly associated with quality of life (p = 0.040). Women without medication adherence support were more likely to fall into a poorer quality-of-life category than those who received such support. Previous studies have highlighted that social and interpersonal support, particularly from family members and partners, can contribute to mental health and retention in care among women living with HIV (4). Consistent with the regression findings, a history of forgetting to take ARV medication was significantly associated with quality of life, highlighting the importance of sustained medication adherence in maintaining physical, psychological, and social well-being. High adherence to ART can reduce morbidity and mortality and increase life expectancy, helping make HIV a manageable chronic condition (6,8,18). Research in Indonesia also suggests that ARV adherence is associated with improved physical well-being and fewer opportunistic infections (4,22). HIV/AIDS requires integrated care delivered through connected, guideline-based, multiprofessional, multidisciplinary, and patient-centered approaches for people with complex chronic conditions (30).

Adherence to ART has a strong and consistent impact on improving QoL. People with HIV who do not adhere to their ART regimen score low across all domains of quality of life (31). Adherence to ARV treatment is linked to quality of life due to its beneficial effects on immunity, viral load control and disease progression. Life expectancy for people living with HIV increases if they adhere to their ARV treatment; at least 95 per cent adherence to ART can prevent treatment failure and reduce the development of drug resistance (31).

The positive contribution of medication adherence support observed in this study may also reflect the importance of family-centered support systems in Bali. Family members, partners and community-based organisations play a central role in encouraging adherence to treatment, providing emotional support, practical assistance and monitoring of treatment; this also depends on the quality of interpersonal relationships, levels of stigma and HIV disclosure status. Previous studies in Indonesia have shown that strong social support can improve adherence behavior, reduce psychological distress, and contribute to better quality of life among people living with HIV/AIDS (29). The significant association observed in relation to support for treatment adherence highlights the importance of social and interpersonal factors in HIV care. Social support is associated with improved adherence to treatment, reduced psychological stress and a better quality of life amongst people living with HIV/AIDS (4,29).

Social Aspects and Psychological Support

The QoL of women with HIV is determined not only by medical conditions, but also by social, psychological, and cultural factors. Social stigma and discrimination experienced by women remain major barriers to accessing services (8). Women often face a double stigma as carriers of the virus and as those who are considered morally at fault (1). Research shows that women with HIV are more vulnerable to violence, exclusion, and psychological pressure than men (26). These factors worsen quality of life, especially in the social and spiritual domains. Social support, particularly from medication adherence supports and family members, plays an important role in improving treatment adherence and mental health (4,18). Conversely, poor adherence to ARV therapy is strongly associated with lower QoL and increased risk of complications (32).

The findings identify drivers and barriers to adherence and retention in care and suggest that case management can provide holistic, patient-centered services that help patients overcome barriers (33). Social conditions may also influence quality of life among people living with HIV and may contribute to differences between mental and physical quality-of-life domains (34). Women living with HIV are more prone to depression, anxiety, and post-traumatic stress than men (4). These results confirm that most women with HIV in the study area still face significant challenges in maintaining physical, social, and psychological well-being despite routine ARV therapy. Although age was not independently associated with quality of life in the present study, previous studies have reported inconsistent findings, across different settings, suggesting that the influence of age may depend on contextual and socioeconomic factors (20). Advanced age is often associated with chronic fatigue and activity limitations that lower the WHOQOL-HIV BREF physical domain score (9). The negative predictor QoI of PLHIV was Depression ($\beta = -0.672$, $P < 0.001$). Negative predictors of QoL among people with HIV include level of education, living within a nuclear family, having an HIV-positive wife, having an HIV-positive child, acquiring the infection through homosexual contact, a history of suicide attempts, and a history of alcohol consumption (22). This is in line with findings that report that education level is significantly related to the QoL of PLHIV in Semarang City (p = 0.002) (35).

Marital status does not always protect against psychological stress. In some cases, women experience stigma or rejection from their partners after an HIV diagnosis. Women with HIV often experience negative moral judgments and stigma in family and social environments, which contributes to low quality of life (4).

This support served not only as a reminder to undergo therapy, but also provided emotional and spiritual encouragement that improved treatment compliance. A study reported that social support is an important predictor of ARV adherence and mental health in women with HIV (4). Family support has even been shown to increase the probability of successful therapy by up to 7 times (17).

Poor adherence to ARV therapy has been shown to contribute to a decline in quality of life due to physical weakness and susceptibility to depression (OR=2.16; 95% CI: 1.70, 2.74) (28). Adherence to ARV plays a direct role in suppressing viral replication, boosting immunity (CD4), and reducing the risk of opportunistic infections. Regular and continuous ART can transform HIV from a fatal disease into a manageable chronic condition (6). Research in Indonesia also shows that treatment adherence is associated with improved physical and psychological quality of life (5,32,36).

Studies support these findings by showing that the length of time living with HIV is positively associated with greater self-acceptance and a better quality of life (17). Disclosure of HIV status to family members is positively correlated with social support, with path analysis reveals that the direct effect of disclosure on physical and mental quality of life is not significant

(37). Future interventions aimed at promoting quality of life may need to include disclosure management and communication skills that can trigger social support, as well as inviting family members of patients to participate in interventions as needed. Women need support in disclosing their HIV status to their children to minimize parenting stress and strengthen parenting skills (38).

Collectively, these findings suggest that QoL among women with HIV is influenced predominantly by socioeconomic and treatment-related factors rather than demographic characteristics. Interventions aimed at improving educational opportunities, economic empowerment, medication adherence support, and sustained ART adherence may therefore provide greater benefits for improving long-term quality of life than interventions targeting demographic characteristics alone.

Implications for Health Services

The findings reinforce the view that successful HIV treatment requires more than viral-load control; quality of life should also be considered as an indicator of long-term success. Integrating gender-responsive services, psychosocial support, and ongoing education on ARV adherence may support a people-centered approach that combines treatment with social support to advance the 95–95–95 targets in a gender-equitable manner (1,6,18).

The results have several practical implications for public health programs, HIV-service delivery, and pharmaceutical care. The associations of education, employment status, medication adherence support, and antiretroviral therapy adherence with quality of life indicate that efforts to improve the well-being of women living with HIV should not be limited to clinical management. A broader approach is needed, particularly through initiatives that enhance health literacy and provide relevant education on HIV management and the importance of maintaining treatment over the long term. Economic empowerment may also contribute by improving financial security, facilitating access to healthcare, and supporting psychosocial well-being. ARV treatment services should be optimized to support consistent adherence. Pharmaceutical services and HIV counselors can play important roles in identifying adherence barriers, providing tailored information on medication use, and assisting women living with HIV/AIDS in Bali with ARV treatment management. Integrating continuous adherence assessment with women-centered counseling may reduce non-adherence and contribute to better long-term health outcomes (18).

Supporting ARV adherence and quality of life requires stronger support systems, including peer support (39), community groups, and family-centered programs to improve treatment engagement and emotional well-being (33,40–42). Family and community relationships are particularly important in the context of HIV/AIDS in Bali. Involving partners and family members and providing trained treatment support may improve quality of life; previous evidence indicates that social support is associated with better adherence, reduced stigma, and improved quality of life among people living with HIV/AIDS (4,29).

The findings highlight the importance of developing gender-responsive HIV services that address the specific needs and challenges faced by women living with HIV. Comprehensive HIV services should therefore extend beyond biomedical treatment to integrate psychosocial support, stigma-reduction strategies, family involvement, and interventions that strengthen economic capacity. Integrating these components may foster a holistic, patient-centered approach to treatment, sustain treatment engagement, and improve clinical outcomes, quality of life, and psychosocial well-being among women living with HIV.

Overall, quality of life among women living with HIV was associated not only with individual and treatment-related factors but also with broader sociocultural conditions. In Bali, HIV-related stigma, concerns about family reputation, economic dependence, and competing family responsibilities may be associated with health-seeking behavior, treatment adherence, and psychosocial well-being. Interventions to improve quality of life should therefore incorporate culturally sensitive approaches that strengthen family engagement, reduce stigma, and support women's social and economic empowerment (18,43,44).

Study Limitations

This study has several limitations that should be considered when interpreting the results. Quality of life categories were based on score interpretation rather than globally established threshold values for the WHOQOL-HIV BREF questionnaire, which significantly affects comparability with other studies. The distribution of quality of life was skewed toward the low-quality-of-life group, potentially reducing the precision and stability of the regression results. The study employed purposive sampling from specific healthcare facilities. The small number of participants in the high and moderate QoL categories may have compromised the stability and precision of the ordinal logistic regression estimates. While this approach facilitated the inclusion of eligible women living with HIV/AIDS, it may have introduced selection bias and limited sample representativeness. Consequently, the findings may not be fully generalizable to all women living with HIV in Bali or elsewhere. Quality of life was evaluated using four selected WHOQOL-HIV BREF domains rather than the full six-domain structure; thus, aspects related to environment and spirituality may not be fully represented. Furthermore, the cross-sectional design precluded the determination of temporal or causal relationships between variables. Future research should employ a longitudinal design to strengthen external validity and better understand the pathways linking individual characteristics, treatment-related factors, and quality of life.

In addition, tests of the proportional odds assumption yielded mixed findings, suggesting that the reported associations should be interpreted cautiously and confirmed in future studies using larger samples and alternative ordinal modeling approaches.

CONCLUSION

This study found that higher educational attainment, employment, medication adherence support, and consistent ARV use were associated with better quality of life among women living with HIV/AIDS. Age, body weight, and marital status were not

significantly associated with quality of life. After adjustment for other variables in the model, educational attainment remained significantly associated with QoL. Longitudinal studies are recommended to better understand the mechanisms linking education to quality of life in this population. Because this was a cross-sectional study, the findings do not establish causal relationships. Improving access to education and employment support, together with programs promoting medication adherence through patient- and family-centered multidisciplinary HIV care, may help improve QoL among women living with HIV in Indonesia.

DECLARATIONS

Author contributions: All authors contributed substantially to the conception, development, and completion of this research and manuscript. The specific contributions of each author are as follows: Putu Dian Prima Kusuma Dewi: Conceptualized the study; designed the research framework; supervised data collection; performed data analysis and interpretation; drafted the initial manuscript; and coordinated the revision process. Putu Sukma Megaputri: Assisted in developing the study methodology; coordinated field data collection; contributed to data cleaning and validation; and supported the writing of the results and discussion sections. Ni Made Karlina Sumiari Tangkas: Contributed to statistical analysis; reviewed data interpretation for accuracy; provided critical inputs to the analytical framework; and participated in manuscript editing and refinement.

Conflicts of interest: The authors declare that they have no conflicts of interest related to the research, authorship, or publication of this article. They confirm that there are no financial, personal, or organizational relationships that could inappropriately influence, or be perceived to influence, the integrity, objectivity, or outcomes of this study. The research was conducted independently, and all interpretations and conclusions presented are solely based on the data and analysis performed by the authors.

Declaration of Generative AI And AI-Assisted Technologies in the Writing Process: The authors declare that generative artificial intelligence (AI) tools and AI-assisted technologies were used solely to support language refinement and improve clarity during the preparation of this manuscript. Tools such as ChatGPT and Grammarly were utilized to assist in grammar enhancement, structural refinement, and readability improvement. No AI tools were used to generate, analyze, or interpret the research data, nor to create original scientific content, results, or conclusions.
The authors take full responsibility for the content of the manuscript, affirming that all intellectual contributions, analyses, and interpretations are entirely their own.

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