


Assessment of Health-Related Quality of Life in Adults Living with HIV Attending Antiretroviral Clinics versus Traditional Healers' Offices in Bukavu City, Democratic Republic of the Congo

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Background: The benefits of antiretroviral therapy (ART) for people living with HIV/AIDS (PLHIV) include immune system strengthening, viral load suppression, and improved health-related quality of life (HRQOL). This present study compares the HRQOL of PLHIV visiting ART clinics versus that of PLHIV attending traditional healers (THs)' offices, assesses the adherence of PLHIV to ART, identifies possible predictors of nonadherence of PLHIV to ART and HRQOL, and estimates the proportion of patients with HIV referred by THs to health centers in Bukavu.

Patients and methods: Between February and June 2023, a cross-sectional comparative study was conducted on 150 adult PLHIV attending ART clinics and 150 adult PLHIV visiting THs' offices in the 3 urban health zones of Bukavu. The World Health Organization Quality of Life questionnaire (WHOQOL-BREF) and a self-report questionnaire measuring ART adherence were used to collect the data. Regression models were used to identify the predictors of no adherence to ART and the HRQOL of PLHIV.

Results: Compared with those attending THs, PLHIV attending ART clinics had higher mean scores in all HRQOL domains. Approximately 84% of the participants were compliant with ART. The predictors associated with nonadherence to ART included illiterate participants [OR=23.3 (95% CI=1.23–439.5), p=0.004] and divorced or separated participants [OR=10.3 (95% CI=1.12–94.4), p=0.034]. The proportion of PLHIV referred to ART clinics by THs was only 10.7%.

Conclusion: PLHIV visiting ART clinics had a better HRQOL than did PLHIV attending THs' offices. The rate of adherence to ART among PLHIV who attended ART clinics was high. It is recommended that PLHIV visiting THs be referred to ART clinics for improved HRQOL.

Keywords: HIV/AIDS infection, Health-related quality of life, Compliance, Antiretroviral medications

Background

Human immunodeficiency virus (HIV) infection is one of the most serious public health problems in the world and has high morbidity and mortality rates. Since the beginning of the epidemic, 85.6 million people were infected, and 40.4 million people were killed in 2022.¹ Approximately 39 million individuals were living with HIV at the end of 2022, and 630,000 died from AIDS-related illnesses.² Sub-Saharan Africa is the most severely affected region, with nearly one in every twenty-five adults (3.2%) living with HIV and accounting for more than two-thirds of the PLHIV worldwide.¹ New HIV infections are particularly common in low- and middle-income countries (LMICs), such as the Democratic Republic of the Congo (DRC). In 2020, there were 510,000 PLHIV in the DRC, including approximately 20,000 new cases.³

Life expectancy for PLHIV has increased,⁴ and HIV-related morbidity and death have significantly decreased as a result of combined antiretroviral therapy (cART) and its adherence.⁵ Since the advent of safe and effective ART, HIV/AIDS infection has transformed from a fatal disease to a chronic disease that may be managed.⁶ When PLHIV receive ART, their viral load is suppressed,⁷ their immune system is strengthened,⁸ and their HRQOL is enhanced.⁹

In traditional African societies, THs play a multifaceted role in the community. They serve as guardians of religion and customs, offering guidance and counsel on matters pertaining to culture, psychology, social work, and healthcare.¹⁰ Approximately 80% of sub-Saharan Africans regularly benefit from TH health services due to their accessibility and acceptability.¹¹ Some studies have shown that most PLHIV use traditional medicine (TM) alongside modern medicine.^{12,13} The practice of TM is governed by a ministerial decree in the DRC, where the Ministry of Health (MOH) has a National Program for the Promotion of Traditional Medicine and Medicinal Plants (PNMT/PM).¹⁴

When a health professional at one level of the health system lacks the resources to manage a clinical condition, he or she can refer a patient to a facility at a higher or better level to receive help in managing the client's case or to receive better resources. Patient referrals are important because they guarantee that each patient receives the required specialized care, hence improving the quality of care.¹⁵

Health-related quality of life is multifaceted¹⁶ and can be considered a subjective evaluation that patients make of themselves based on their perception of the impact of the disease and/or its treatment on their well-being¹⁷ in the physical, spiritual, social, psychological, and environmental domains. HRQOL is a crucial metric that helps medical professionals understand patients' perceived satisfaction and perception of disease.^{5,6} There is a complex relationship between HIV/AIDS incidence, ART, and HRQOL.¹⁸ The HRQOL of PLHIV on ART is essential for monitoring the impact of medication therapy on the progression of the disease.^{18,19}

To our knowledge, no study has been conducted to compare the HRQOL of PLHIV attending ART clinics and PLHIV visiting THs' offices in Bukavu. The current study will provide essential baseline information that will help health authorities design evidence-based interventions that are suitable for PLHIV in Bukavu.

The current study aimed to compare the HRQOL of PLHIV who visited ART clinics versus those who visited THs' offices. Additionally, the study sought to evaluate the adherence of PLHIV to ART, identify potential predictors of PLHIV nonadherence to ART and to their HRQOL, and estimate the proportion of PLHIV who were referred to health centers in Bukavu by THs.

Methods

Study Design and Setting

A comparative cross-sectional study employing quantitative approach was carried out between February and June 2023 among HIV-positive patients attending ART clinics and PLHIV visiting THs' offices.

The study was conducted in Bukavu city, the capital city of the South Kivu Province in the eastern DRC. Bukavu city is subdivided into three health zones: the Ibanda Health Zone, the Kadutu Health Zone, and the Bagira Health Zone.

Study Participants and Sampling Procedure

The target population consisted of adult patients with HIV (≥ 18 years old) who had been diagnosed at ART clinics for at least a year and adult PLHIV (≥ 18 years old) who visited THs.

In the Bukavu health zones, there are 30 ART clinics and 71 THs' offices recognized by the PNMT/PM in South Kivu. The sample size was calculated using the StatCalc TM function in Epi Info[®] 7.4 software. Since the proportion of PLHIV who have a poor HRQOL is unknown in our setting, this proportion was set at 0.5 (ie, 50%), which provides a conservative estimate of the variance.²⁰ Based on the assumptions that PLHIV should experience poor HRQOL 50% of the time, an odds ratio of 2, two-sided confidence levels of 95%, a power of 80%,²¹ a ratio of unexposed/exposed of 1, a prevalence ratio of 1.3, and a percentage of outcome in the exposed group of 66.7%, the Fleiss with continuity correction formula produced a sample size of 296 patients with HIV, which was rounded to 300 (150 patients with HIV per group).

To select PLHIV from the ART clinics, a three-stage sampling technique was used. The first stage is the health zones. The city of Bukavu has three health zones, and all three zones were included in the study. In the second stage, we have the ART clinics. A list of all ART clinics was obtained from the provincial office of the National AIDS Control Program (PNLS) and used as a sampling frame. There are 10 ART clinics in each health zone. Five ART clinics were randomly selected in each health zone using a simple random sampling technique. A total of 15 ART clinics were selected. And in the third stage, we selected HIV-positive patients. In each ART clinic, we consecutively selected 10 HIV-positive patients using convenience sampling. A total of 150 PLHIV were recruited.

All THs' offices (71) were visited for the recruitment of PLHIV. Some patients visiting THs were known to have HIV, and they visited THs in search of possible treatment. On the other hand, others come to THs for treatment because of poisoning or bewitchment. In this case, THs require them to take an HIV test in a hospital or health center before treatment. Only HIV-positive patients were selected for this study. HIV-positive patients visiting the THs were consecutively recruited until the desired sample size was reached (150 PLHIV were selected).

Data Collection

A predesigned structured interviewer-assisted questionnaire was used to collect the following data from PLHIV: personal and demographic characteristics (age, sex, marital status, level of education, religious affiliation, ethnicity, occupation, area of residence, family size, income, and insurance status); clinical characteristics (signs and symptoms); reasons for using traditional medicine; and other health providers consulted and sources of the referral of HIV-positive patients to clinical facilities.

The French version of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF) was used to collect data about the QOL of PLHIV. The WHOQOL-BREF provides a valid and reliable alternative to the lengthier WHOQOL-100.²² The tool has 26 items and four domains, namely:

- The physical health domain (7 items) included activities of daily living, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, and work capacity.
- Psychological health (6 items): bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality/religion/personal beliefs, thinking, learning, memory, and concentration.
- Social relationships (3 items): personal relationships, social support, and sexual activity.
- Environmental health (8 items): financial resources, freedom, physical safety and security, health, and social care: accessibility and quality, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation/leisure activities, physical environment (pollution/noise/traffic/climate), and transport.

Items are rated on a five-point Likert scale, with 1 indicating a low score and five indicating a high score. In most questions, options 1 and 5 represent the lowest and highest values, respectively. However, for questions where a higher score did not indicate a better HRQOL, the responses were first reversed and subsequently calculated. The score for each domain was calculated by adding up the total points for the questions in each domain, dividing the total value by the number of questions, and then multiplying the result by four. The score for each domain ranged from 4 to 20, with a score of 4 indicating the worst condition and a score of 20 representing the best condition in the domain. The total HRQOL was calculated based on the 26-item questionnaire. The scores were then linearly transformed to a 0–100 scale, with a higher score representing better HRQOL. Cronbach's alpha was used to check the reliability of the WHOQOL-BREF questionnaire, with a value greater than 0.7 indicating high reliability.

Finally, we used the validated French version of a self-assessment questionnaire²³ to assess adherence to antiretroviral treatment among PLHIV attending ART clinics. This version comprises nine main questions. First, patients were asked to name their antiretroviral medication and the daily dosage. A chart with a picture and the name of each available antiretroviral on the market was provided to help respondents recall the name of their antiretroviral medication. Subsequently, they reported the number of antiretroviral pills missed on the preceding and penultimate days. Then, three questions were used as aid-recall tools for situations that might have hampered regular adherence to medication

during the preceding seven days. Two questions were used to assess nonadherence during the preceding seven days. Respondents were asked to indicate how many times they missed taking one or more of their antiretroviral pills during the preceding seven days and then to translate this information into the total number of antiretroviral pills missed during this period of time. The last three questions referred to the preceding 30 days as a time frame.

The original version of the questionnaire was in French and was used because the language of the participants was French. The clarity of the questionnaire was tested beforehand on a group of 20 patients from the target population. PLHIV were considered nonadherent if they reported forgetting to take their antiretroviral treatment pills at least once in the week prior to the survey. Conversely, patients who took all their antiretroviral treatment pills during the same period were considered adherent.

Data Management and Analysis

The completeness of the data was checked during the data collection process. The data were entered into Kobocollect, cleaned, and coded in Microsoft Excel. Epi Info version 3.5.1 and the Statistical Package for the Social Sciences (SPSS) version 16 were used to analyze the data.

The mean and standard deviation (SD) or median and interquartile range (IQR) were used to summarize quantitative variables, depending upon the distribution of the data. Categorical variables were summarized using the frequency and percentage of subjects in each category.

The *T*-test was used to compare means. Bivariate comparisons of categorical variables were assessed using Pearson's chi-square (X^2) test. Whenever X^2 was not valid, Fisher's exact test was used for 2*2 tables. A multivariate logistic regression model was used to identify the significant predictors of nonadherence to ART as the dependent variable. The independent variables were sociodemographic characteristics such as age, sex, education level, religion, tribe, place of residence and training in taking care of HIV infection. Multivariate linear regression was used to identify the predictors of HRQOL as the dependent variable. Sociodemographic factors such as age, sex, education level, religion, tribe, place of residence, occupation, number of family members, monthly income in US dollars, and health insurance status were the independent variables. The correlation coefficient was used to verify the existence of a link between the HRQOL domains. The significance level was set at a *p* value of less than 0.05.

Ethical Considerations

The study was conducted in accordance with International Guidelines for Research Ethics. Approval was obtained from the Ethics Committee of the High Institute of Public Health, Alexandria University, Egypt (IRB N°: 00013692). All study participants provided informed written consent following the explanation of the purpose and benefits of the research. Anonymity and confidentiality were maintained and guaranteed.

To rationalize the study execution, the necessary administrative and preparatory communications with the health structures' authorities were completed. The competent authority of the South Kivu Provincial Health Division (N°003/CD/DPS-SK/2019 and N°002/CD-DPS-SK/2022) and the Provincial Directorate of the National Health Ethics Committee (CNES/SK: 001-4125/001-113/2019) authorized the conduction of the study.

Results

Distribution of PLHIV Attending ART Clinics and Those Visiting THs' Offices According to Their Personal and Socio-Demographic Characteristics

The mean age of the participants attending THs' offices was 41.3 ± 11.4 years, and that of participants attending ART clinics was 42.9 ± 13.1 years. Female participants were predominant in both groups (64.7% vs 35.3% among PLHIV visiting THs' offices and 72.7% vs 27.3% among PLHIV attending ART clinics). Married participants represented the majority of individuals in both groups (52.0% among PLHIV visiting THs' offices and 45.5% among PLHIV attending ART clinics). The highest percentage of patients visiting the THs' offices had completed secondary education (46.7%), followed by those with university education (30.7%), while most patients attending ART clinics had secondary or primary education (49.3% and 24.0%, respectively). Most of those visiting THs' offices had a household size of more

than six individuals (45.3%) and a monthly income of less than \$100 (62.7%). On the other hand, those attending ART clinics had a household size of three to six individuals and a monthly income of less than \$100. The participants whose healthcare expenditures came from their mutual health insurance predominated in both groups (55.4% and 45.4%, respectively). These results are presented in [Supplementary Table 1](#).

A comparison of the sociodemographic characteristics of the PLHIV attending ART clinics with those visiting THs' offices revealed that PLHIV attending THs' offices were more likely to be separated and widowed and had a low level of education, a household size \leq six years and a low monthly income; additionally, their source of healthcare expenditure was the family. ([Supplementary Table 1](#))

Distribution of PLHIV Visiting THs' Offices and Those Attending ART Clinics According to Their HRQOL

The results of the HRQOL comparison between patients with HIV/AIDS visiting THs' offices and those attending ART clinics are presented in [Table 1](#). Patients attending ART clinics had a better HRQOL than did those attending THs' offices in all HRQOL domains; physical (11.8 ± 2.5 versus 7.99 ± 2.3), psychological (10.9 ± 2.8 versus 7.96 ± 2.4), social (14.4 ± 3.1 versus 7.43 ± 2.0) and environmental aspects (10.4 ± 2.2 versus 7.43 ± 2.0). The same was true for overall HRQOL (11.0 ± 2.2 versus 8.24 ± 1.8). The differences in overall HRQOL and in different domains between HIV-positive patients attending THs' offices and those attending ART clinics were statistically significant. ($p < 0.05$).

Multiple Linear Regression Analysis of the Predictors of HRQOL in PLHIV Visiting THs' Offices and Those Attending ART Clinics

The findings of multiple linear regression analysis of predictors of HRQOL in patients with HIV/AIDS are summarized in [Table 2](#). Place of residence was the only significant predictor of the overall HRQOL of patients who visited THs' offices ($p < 0.05$). The model correctly classified 15% of the changes in HRQOL. For patients attending ART clinics, adherence to antiretroviral therapy was the only significant predictor of HRQOL ($p < 0.05$). Of the changes in HRQOL, 12.3% were correctly categorized by the model.

Distribution of PLHIV Attending ART Clinics Referred by THs and Their Adherence to ART

The referral rate of patients with HIV/AIDS to ART clinics by THs is presented in [Figure 1](#). Only 10.7% of patients attending the ART clinics were referred by THs. The data related to adherence to ART therapy among PLHIV attending

Table 1 Distribution of PLHIV Visiting THs' Offices and Those Attending ART Clinics According to Their HRQOL (Bukavu, 2023)

Domains of HRQOL	PLHIV		T test p value
	Visiting THs' Offices (n=150)	Attending ART clinics (n=150)	
Physical			
Mean \pm SD	8.00 \pm 2.28	11.8 \pm 2.49	< 0.0001**
Psychological			
Mean \pm SD	7.96 \pm 2.36	10.9 \pm 2.84	< 0.0001**
Social relations			
Mean \pm SD	12.8 \pm 3.17	14.4 \pm 3.11	< 0.0001**
Environment			
Mean \pm SD	7.43 \pm 2.01	10.4 \pm 2.55	< 0.0001**
Overall HRQOL			
Mean \pm SD	8.24 \pm 1.80	11.0 \pm 2.24	< 0.0001**

Notes: ** $p < 0.01$.

Abbreviations: SD, standard deviation; HRQOL, health-related quality of life; T test, independent-samples T test.

Table 2 Results of the Multiple Linear Regression Analysis of the Predictors of HRQOL in PLHIV Visiting THs' Offices and Those Attending ART Clinics (Bukavu, 2023)

Independent Predictors	B	Std Error	Beta	T Test	p value
Patients with HIV/AIDS visiting THs' offices					
Age	-0.110	0.446	-0.023	-0.247	0.805
Gender	0.077	0.358	0.019	0.214	0.831
Marital status	0.277	0.166	0.163	1.665	0.098
Level of education	-0.133	0.194	-0.065	-0.687	0.493
Religion	0.192	0.158	0.098	1.217	0.226
Tribe	0.014	0.150	0.008	0.093	0.926
Place of residence	-0.499	0.172	-0.236	-2.903	0.004**
Occupation	-0.185	0.160	-0.098	-1.153	0.251
Number of family members	-0.204	0.197	-0.086	-1.038	0.301
Monthly income in US dollars	-0.273	0.311	-0.077	-0.877	0.382
Source of health expenditure	0.236	0.177	0.113	1.329	0.186
Correlation coefficient	$r^2 = 0.150$				
Patients with HIV/AIDS attending ART clinics					
Age	-2.068	3.198	-0.056	-0.647	0.519
Gender	0.998	2.036	0.043	0.490	0.625
Marital status	-0.886	1.249	-0.062	-0.709	0.479
Level of education	-1.430	1.167	-0.117	-1.226	0.222
Religion	0.241	1.000	0.020	0.241	0.810
Tribe	-0.861	0.932	-0.080	-0.924	0.357
Place of residence	2.022	1.099	0.154	1.839	0.068
Occupation	-1.510	1.081	-0.124	-1.397	0.165
Number of family members	1.192	1.334	0.085	0.968	0.335
Monthly income in US dollars	-0.341	1.625	-0.019	-0.210	0.834
Source of health expenditure	-1.581	1.145	-0.121	-1.381	0.170
Adherence to treatment	6.049	2.522	-0.199	2.399	0.018*
Correlation coefficient	$r^2 = 0.123$				

Notes: *p<0.05. **p<0.01.

Abbreviations: Std Error, standard error; T Test, independent-samples T test.

ART clinics are presented in [Figure 2](#). In total, 83.9% of the participants were compliant, and 16.1% were noncompliant. These adherence and nonadherence percentages have been calculated from the results presented in [Supplementary Table 2](#).

Distribution of PLHIV Attending ART Clinics According to Their Personal and Sociodemographic Characteristics and Their Adherence to ART

[Table 3](#) summarizes the results of the bivariate analysis of the personal and demographic characteristics of PLHIV attending ART clinics according to their adherence to ART. The following sociodemographic characteristics were significantly associated with nonadherence to ART: illiterate participants [OR=23.3 (95% CI= 1.23–439.5), p=0.004] and divorced or living separated participants [OR=10.3 (95% CI=1.12–94.4), p=0.034].

Independent Predictors of Nonadherence in PLHIV Attending ART Clinics

[Table 4](#) presents the results of the multivariate analysis of independent predictors of nonadherence using the logistic regression model. Only the level of education (being illiterate) was significantly associated with nonadherence to ART [adjusted OR=2.07 (95% CI=1.13–3.78), p=0.018].

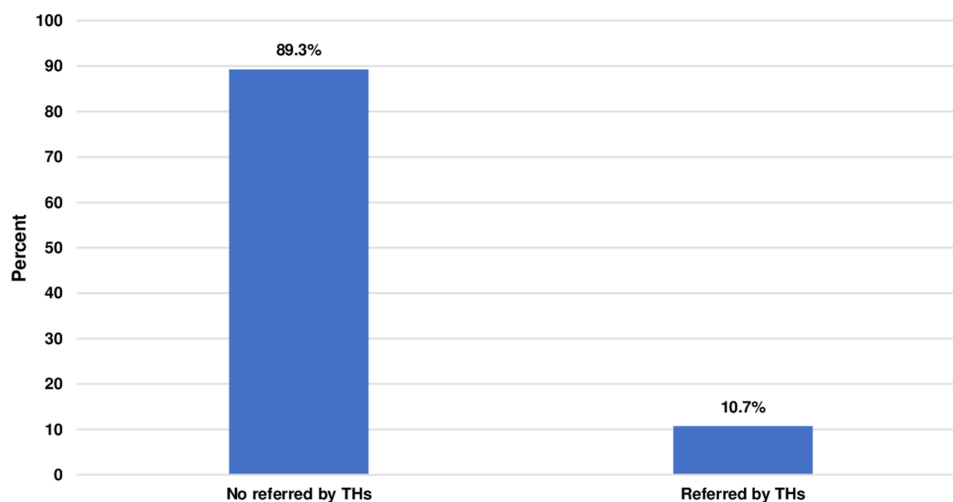


Figure 1 PLHIV attending ART clinics referred by THs.

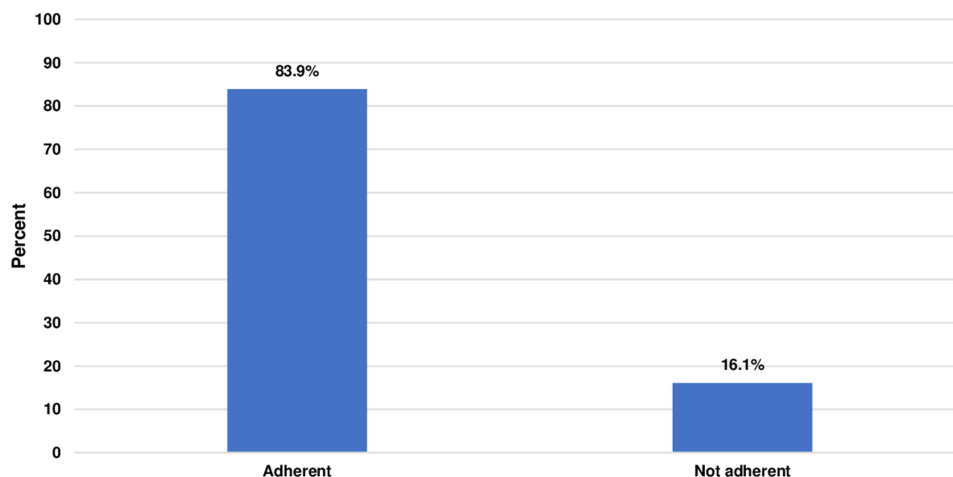


Figure 2 ART adherence of PLHIV attending ART clinics.

Relationships Between the HRQOL of Patients Attending ART Clinics and Their Adherence to ART

Higher mean HRQOL scores in all domains were observed among PLHIV who were adherent to ART than among those who were not adherent to treatment (Table 5). The overall HRQOL also showed similar results (11.2 ± 2.13 versus 9.99 ± 2.53). A significant relationship was observed between treatment adherence and the overall HRQOL score and between the physical domain and environmental domain scores of HRQOL ($p < 0.05$).

Discussion

The current study found that PLHIV attending ART clinics had better HRQOL compared to PLHIV visiting THs' offices, and the residence of PLHIV attending THs' offices was the only significant predictor of poor HRQOL. Approximately 84% of PLHIV attending ART clinics were adherent to ART, and the predictive factors associated with nonadherence were illiteracy and being divorced or separated. The proportion of PLHIV referred by THs to ART clinics was only 10.7%. This study is the first in Bukavu to compare the HRQOL of PLHIV who visit ART clinics versus PLHIV who visit THs' offices. The number of HIV cases increased in 2022,³ so it is relevant to understand what influences HRQOL to tailor better health and social care services and improve the HRQOL of PLHIV. Because current HIV/AIDS treatment

Table 3 Distribution of PLHIV Attending ART Clinics According to Their Personal and Sociodemographic Characteristics and Their Adherence to ART (Bukavu, 2023)

Characteristics	Not adherent		Adherent		OR (95% CI)	p value
	No.	%	No.	%		
Age in years						
18 –	1	8.3	11	91.7	2.48 (0.09–68.1)	1.000
40 –	23	18.0	105	82.0	4.23 (0.24–75.3)	0.356
62+	0	0.0	9	100	1	
Gender						
Female	18	16.7	90	83.3	1.17 (0.43–3.18)	0.763
Male	6	14.6	35	85.4	1	
Marital status						
Single	1	4.0	24	96.0	1	
Married	9	13.8	56	86.2	3.86 (0.46–32.2)	0.273
Separated	6	30.0	14	70.0	10.3 (1.12–94.4)	0.034*
Widowed	8	20.5	31	79.5	6.19 (0.72–53.0)	0.078
Level of education						
Illiterate	8	38.1	13	61.9	23.3 (1.23–439)	0.004**
Primary	6	16.7	30	83.3	7.89 (0.42–148)	0.163
Secondary	10	13.5	64	86.5	6.02 (0.34–107)	0.201
University	0	0.0	18	100	1	
Place of residence						
Ibanda	11	17.5	52	82.5	2.22 (0.66–7.48)	0.263
Kadutu	9	22.5	31	77.5	3.05 (0.86–10.8)	0.129
Bagira	4	8.7	42	91.3	1	
Occupation						
Unemployed	13	17.3	62	82.7	4.82 (0.60–39.0)	0.177
Paid employment	1	4.2	23	95.8	1	
Private business	10	21.7	36	78.3	6.39 (0.77–53.3)	0.083
Agropastoral activities	0	0.0	4	100	1.74 (0.06–49.9)	1.000
Income in US dollars						
< 100	19	17.4	90	82.6	1.94 (0.10–37.5)	1.000
100–	5	13.9	31	86.1	1.57 (0.07–33.5)	1.000
300 +	0	0.0	4	100	1	

Notes: *p<0.05, **p<0.01.

Abbreviations: OR, odds ratio; CI, confidence interval.

strategies allow patients to live longer, HRQOL has emerged as a key indicator of health outcomes, and improving HRQOL is a key objective.⁷

The present study showed that PLHIV attending ART clinics had a greater overall HRQOL than did PLHIV visiting THs' offices. The same was true for all domains of HRQOL, with PLHIV attending ART clinics having a better HRQOL than PLHIV visiting THs. The greater HRQOL of PLHIV attending ART clinics than of PLHIV visiting THs' offices could be explained by the fact that the majority (83.9%) of PLHIV attending clinics were adherent to ART. Numerous studies have demonstrated a strong correlation between ART adherence and the HRQOL of PLHIV. Patients with low/moderate ART adherence were 60% less likely than patients with high adherence to have a high overall HRQOL score, according to a study performed in Ethiopia (2020).⁷ Similar findings were also reported by other studies conducted in Tunisia²⁴ and Ethiopia,²⁵ which suggest that adherence to antiretroviral treatment is associated with a greater HRQOL for

Table 4 Results of the Logistic Regression Analysis of the Independent Predictors of Nonadherence in PLHIV Attending ART Clinics (Bukavu, 2023)

Independent Predictors	AOR	95% CI	Coefficient	S.E	Z-Statistic	p value
Age	2.48	0.61–9.92	0.907	0.708	1.280	0.200
Gender	0.64	0.20–2.08	−0.443	0.601	−0.738	0.461
Marital status	0.70	0.41–1.19	−0.359	0.271	−1.324	0.186
Level of education	2.07	1.13–3.78	0.728	0.307	2.372	0.018*
Place of residence	1.21	0.68–2.15	0.191	0.294	0.648	0.517
Occupation	0.96	0.58–1.60	−0.039	0.260	−0.150	0.881
Income in US dollars	1.21	0.41–3.58	0.189	0.555	0.341	0.733

Notes: *p<0.05.

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; S.E, standard error.

Table 5 Relationships Between the HRQOL of Patients Attending ART Clinics and Their Adherence to ART (Bukavu, 2023)

Domains of HRQOL	PLHIV		T test p value
	Not Adherent (n=24)	Adherent (n=125)	
Physical			
Mean ± SD	10.54 ± 2.65	12.00 ± 2.40	0.0091**
Psychological			
Mean ± SD	9.89 ± 3.02	11.10 ± 2.77	0.0551
Social relations			
Mean ± SD	13.89 ± 3.19	14.52 ± 3.09	0.3569
Environment			
Mean ± SD	9.31 ± 3.02	10.61 ± 2.41	0.0223*
Overall HRQOL			
Mean ± SD	9.99 ± 2.53	11.2 ± 2.13	0.0117*

Notes: *p<0.05. **p<0.01.

Abbreviations: SD, standard deviation; HRQOL, health-related quality of life; T test, independent-samples T test.

PLHIV. The reasons for the low HRQoL of PLHIV attending THs may be due to the lack of clinical, immunological and virological follow-up, as well as poor management of opportunistic infections. A regimen lowers the viral load and enhances patients' clinical status, both of which have an impact on HRQOL.^{26–28}

In the present study, multiple linear regression analysis revealed that only the place of residence of PLHIV visiting THs was a significant predictor of their HRQOL. These results were different from those obtained in Brazilian and Italian studies.^{9,29} Increased education can help people deal with HIV more effectively, increase patient awareness of illness, and ultimately improve HRQOL.^{30,31} Age causes a decline in HRQOL, but these findings are different from those from Brazil and the United States.^{9,32}

Adherence to ART, defined as the patient's ability to follow the medication regimen and dietary restrictions, must be 70–90% to effectively suppress the viral load and reduce the risk of transmitting HIV to another person. Poor adherence can also lead to higher hospitalization rates and lost productivity.^{33,34}

The issue of nonadherence is far more serious, especially for individuals who are HIV/AIDS positive. In addition to having an impact on nonadherent people, poor patient adherence can also have a broad societal impact. Adherence is necessary for viral suppression, decreased infection, minimized opportunistic infections, and decreased resistance to antiretroviral medications.^{35–37} The results of the present study showed a therapeutic nonadherence rate of 16.1% among PLHIV attending ART clinics. This low rate of nonadherence could be explained by the therapeutic education and awareness that PLHIV received in ART clinics about the advantages of adherence and the disadvantages of

nonadherence. The rate of nonadherence found in this study was lower than that reported in studies carried out in Gabon, Ethiopia and Cameroon,^{38–40} and higher than that reported in Madagascar (2023).⁴¹ The current findings also differed from those observed in certain towns in the DRC.^{42,43} This variability in nonadherence rates could be explained by differences in the populations studied on the one hand and by the method used to assess compliance on the other hand.

Regarding the relationship between adherence to ART by PLHIV and their HRQOL, the present study showed that good adherence to ART increased HRQOL. This may be explained by the fact that adherence to treatment is the most important factor in determining the success of ART and long-term viral suppression.⁴⁴ In other words, adherence prevents the virus from multiplying, which reduces the risk of mutation and resistance to HIV, thus strengthening the immune system. A previous literature review and studies conducted in South Africa,⁴⁵ Brazil,⁴⁶ and Ethiopia^{7,47,48} revealed that ART adherence improves HRQOL. In addition, a study from Colombia showed that nonadherence to combined ART was associated with lower HRQOL.⁴⁹

According to our bivariate analysis, being separated and having a low level of education were determinants of nonadherence and therefore of poor therapeutic outcomes. Only a low level of education remained significantly associated with nonadherence to ART according to multivariate analysis via the logistic regression model. Having a low level of education as a predictor of nonadherence was not consistent with the results obtained by other authors in most of the studies that explored this issue.^{39,40,43,50} In itself, level of education does not encourage people to take their treatment as planned. However, when a patient and doctor agree on the best course of treatment, a shared decision-making process is followed, and the level of education helps patients adhere to their treatment.⁵¹

Strengths and Limitations

The strength of this study lies in its evaluation of the HRQOL of PLHIV attending ART clinics versus those attending THs' offices, which provides a broader perspective on the need for integrated preventive care strategies to improve the health of PLHIV. The multicenter nature of the study provides a diverse picture. Although it included a moderate number of participants, it represents a relatively generalizable population of PLHIV in the city of Bukavu.

The study also has certain limitations related to the lack of assessment of treatment adherence among PLHIV who visit THs, as well as the lack of assessment of the clinical, immunological, and virological staging of the participants. In addition, we did not specify the level of HIV care provided by the THs.

Conclusion

The HRQOL of PLHIV visiting THs is lower than that of PLHIV attending ART clinics. The latter had high scores in all HRQOL domains. Adherence to ART by PLHIV attending ART clinics was high. Adherence to ART improves the HRQOL of PLHIV. People living with HIV are encouraged to go to ART clinics for better care and to improve their HRQOL. The implementation of community HIV awareness, information and education activities, as well as future research into the prevention and management of HIV in this population, could improve the HRQOL of PLHIV.

Abbreviations

PLHIV, People living with HIV; ART, Antiretroviral Therapy; HRQOL, Health-Related Quality of Life; HIV/AIDS, Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome.

Authors' Information

We would like to report the death of the Professor ZMG, which occurred sometime after the study protocol and data collection tools had been developed.

Data Sharing Statement

There is unrestricted access to all the information. All relevant data are included in the paper and additional files.

Ethics Approval and Consent to Participate

The current study complies with the Declaration of Helsinki. It was authorized by the Ethics Committee of the High Institute of Public Health, Alexandria University, Egypt (IRB N^o: 00013692), the Provincial Directorate of the National Health Ethics Committee (CNES/SK: 001-4125/001-113/2019), and the Provincial Health Division of South Kivu (N^o 003/CD/DPS-SK/2019 and N^o002/CD-DPS-SK/2022). All the procedures were followed in accordance with the international Guidelines of Research Ethics.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation. They took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work. With the exception of the late ZMG, who contributed to the creation of the data collection instruments and the study protocol, may she rest in peace.

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Disclosure

The authors declare that they have no conflicting interests. This paper has been uploaded to Research Square as a preprint: <https://www.researchsquare.com/article/rs-3943678/v1>

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