Dialogues in Health 6 (2025) 100207

Contents lists available at ScienceDirect

Dialogues in Health

journal homepage: www.elsevier.com/locate/dialog

Beyond antiretroviral treatment: Health-related quality of life of patients receiving antiretroviral treatment at a tertiary hospital in South Africa

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ARTICLE INFO

Keywords:
Health-related quality of life
Treatment outcomes
Adherence
People living with HIV and AIDS
Well-being

ABSTRACT

Antiretroviral therapy (ART) has significantly transformed the management of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), positively impacting the health-related quality of life (HRQoL) and life expectancy of people living with HIV and AIDS (PLWHA). HRQoL is a critical consideration for HIV and AIDS patients as it reflects their overall well-being and treatment outcomes. This study aimed to investigate the HRQoL of PLWHA receiving an ART regimen containing tenofovir, lamivudine, and dolutegravir at a tertiary hospital in Johannesburg, South Africa. This descriptive, quantitative, cross-sectional study included 103 patients who consented in writing to participate. Data was collected using WHOQOL HIV-BREF, socio-demographic, health characteristics, and adherence questionnaires. Participants who reported 'excellent' and 'very good' on the descriptive rating scale were considered to have optimal adherence (≥95 %). This study's statistical significance was set at $p \leq 0.05$. More than half of the participants were male (n = 53; 51.5 %), employed (n = 54; 52.4 %) had an income less than 2000 South African Rands (n = 59; 57.3 %), and reported high levels of adherence over a 7-day (n = 71; 68.9 %) and 4-week (n = 70; 67.9 %) reporting period. Majority of the sample considered their health as 'good' (n = 82; 79.6 %) and did not consider themselves ill (n = 85; 82.5 %). This study found that education level, income, health status, and perception of illness significantly ($p \leq 0.05$) affected most domains of HRQoL and Overall HRQoL. While adherent (≥95 %) patients indicated superior HRQoL across most dimensions relative to non-adherent (≥95 %) patients, significant disparities in mean scores were exclusively noted only in the psychological domain ($p = 0.01$). Multivariate linear regression analysis revealed that level of education ($\beta = 1.18$; $p = 0.01$), income ($\beta = 0.72$; $p = 0.00$), perception of illness ($\beta = 1.75$; $p < 0.001$), and health status ($\beta = 1.68$; $p < 0.001$) are the predictors of overall HRQoL. Monitoring HRQoL in HIV patients is essential for providing holistic care and improving outcomes. By addressing comorbidities, psychosocial challenges, and unmet needs, healthcare providers can enhance the overall well-being and HRQoL of PLWHA.

1. Introduction

In December 2020, the Joint United Nations Programme on HIV and AIDS (UNAIDS) set the "95–95-95" global targets for 2025, which aimed for 95 % of patients living with HIV to be aware of their status, 95 % of the diagnosed receiving antiretroviral therapy (ART), and 95 % of those receiving ART to reach viral suppression [1]. These ambitious targets were universal efforts to eradicate HIV by 2030 [2] and prioritised the health and well-being of all the individuals living with HIV and AIDS (PLWHA) [3,4].

Although ART has resulted in positive physical and biological outcomes in PLWHA, significantly increased the life span of PLWHA and has transformed the life-threatening HIV infection into a more manageable chronic illness [5]. However, they are still confronted with challenges that are often psychological, social, and economic in nature, and can exacerbate the difficulties associated with managing the disease, all which may negatively impact their quality of life (QoL) [6,7]. Quality of life is a comprehensive, multidimensional concept that measures an individual's overall well-being and satisfaction with life. It encompasses various domains, including physical, psychological, social, and environmental factors. According to the World Health Organization (WHO), QoL is defined as "individuals' perception of their position in

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https://doi.org/10.1016/j.dialog.2025.100207
Received 11 November 2024; Received in revised form 18 January 2025; Accepted 25 January 2025
Available online 27 January 2025

life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" [8]. This definition emphasises that QoL is a subjective measure and may be influenced by personal values, life experiences, and social situations.

Conversely, health-related quality of life (HRQoL) specifically focuses on various aspects of an individual's well-being that are directly linked to their health status and healthcare experiences. HRQoL assesses how health conditions, treatments, and health policies impact an individual's overall quality of life (OQoL). It is often measured using standardised questionnaires that evaluate aspects such as physical functioning, mental health, and social well-being as they directly relate to health [9]. For instance, health-related factors such as the presence of chronic diseases, side effects relating to treatment, and access to healthcare services may significantly affect HRQoL, as highlighted by studies examining the impact of various health conditions on patients' lives [10,11].

The relationship between QoL and HRQoL is interdependent; yet they can provide distinct insights. For example, a person may report a high QoL despite having a chronic illness if they have strong social support and coping mechanisms. In contrast, an individual with a chronic illness may experience a low HRQoL due to the direct effects of their health condition, even if they have a generally positive outlook on life [12]. This distinction is crucial for healthcare providers and researchers, as interventions aimed at improving HRQoL may not necessarily enhance overall QoL if they do not address broader life circumstances.

Assessing and understanding HRQoL of PLWHA in South Africa is crucial for several reasons, including improving healthcare delivery, informing policy decisions, and enhancing the overall well-being. Moreover, HRQoL assessments can help monitor the long-term effects of ART on patients' lives. Research indicates that while ART significantly improves clinical outcomes, its impact on HRQoL can vary widely among individuals [13]. By regularly evaluating HRQoL, healthcare providers can better understand the broader implications of treatment adherence and the psychosocial factors that influence patients' experiences with ART. This is crucial in a country where many individuals may face barriers to accessing care, such as stigma, economic hardship, and inadequate healthcare infrastructure [14,15].

Lastly, the COVID-19 pandemic has further highlighted the importance of HRQoL assessments in South Africa. The pandemic has disrupted healthcare services and exacerbated existing inequalities, making it essential to understand how these changes affect the well-being of PLHIV [16,17]. By focusing on HRQoL, researchers and healthcare providers can identify the specific challenges faced by this population during and after the pandemic, enabling them to adapt services accordingly.

Although HRQoL studies exist on PLWHA receiving previous ART regimens, limited research is available on patient satisfaction with aspects of HRQoL who are receiving tenofovir, lamivudine, and dolutegravir (TLD) ART regimen as a first line therapy, which is currently provided to PLWHA in public sector hospitals in South Africa. Therefore, this study aimed to examine the HRQoL of PLWHA receiving TLD ART regimen, the relationship between socio-demographic and health characteristics, adherence to ART with HRQoL at a tertiary public hospital in South Africa.

2. Methodology

2.1. Study design and site

This descriptive and quantitative study was conducted using a questionnaire-based cross-sectional analysis. This study was conducted at a tertiary hospital in Gauteng province, South Africa, which is also a referral center in the province, providing services such as ART, tuberculosis treatment, cervical screening, medical male circumcision, and breast clinic services.

2.2. Study sample, size and sampling method

The sample included HIV patients who are treatment-experienced and received TLD ART regimen as a first line therapy.

Yamane's formula was used to calculate the sample size resulting in a sample size of 103 patients.

$$n = N/(1 + N^{*} e^{2}).$$

n: Sample size
N: Population size
e: Margin of error (0.05)

Approximately 140 treatment-experienced patients who satisfied the established inclusion criteria visited the clinic each month.

$1 + N * e^{2} = (1 + 140 * 0.0025) = 1.35$

$n = 140 / 1.35 = 103$

The criteria for sample inclusion in this study were as follows: participants must be 18 years of age or older, currently undergoing TLD as a first-line treatment, free from tuberculosis co-infection, and must have provided consent to participate in the study. Treatment naïve patients, treatment-experienced patients who received TLD as second and third line treatment and who did not provide a written consent were excluded from this study.

The purposive convenience sampling method was used to recruit the participants in this study. The research team examined each patient's clinical file to determine if they are relevant to the study and met the established inclusion criteria. As this study employed stringent inclusion criteria mentioned above, only a limited sample were eligible for participation.

2.3. Data collection instruments

The following questionnaires were self-administered to the participants in this study.

2.3.1. HRQoL questionnaire

This study measured HRQoL using the WHOQoL-HIV BREF questionnaire,

The six domains and facets specific to each domain are listed below.

1. *Physical:* pain and discomfort, energy and exhaustion, sleep and rest, and symptoms associated with HIV and AIDS.
2. *Psychological:* positive emotions, cognition, memory, memory and focus, self-esteem, bodily image and appearance, and negative feelings.
3. *Level of independence:* mobility, activities of daily living, work capacity, dependence on medication and treatment
4. *Social relationships:* personal relationships, social support, sexual activity, and social inclusion.
5. *Environment:* physical safety and security, home environment, financial resources, health, and social care, opportunities for acquiring new information and skills; participation in and opportunities for recreational and leisure activities; physical environment; and transport.
6. *Spirituality/religion/personal beliefs (SRPB):* spirituality, religion and personal beliefs, forgiveness and blame, concerns about the future, and death and dying.

2.3.2. Socio-demographic, health-related characteristics, and adherence to ART questionnaires

This questionnaire determined the various socio-demographic variables such as gender, age, race, gender, education, income, employment, and marital status. Health-related characteristics included patient's health status and their perception of illness. Patients reported their adherence to ART for the past 7 days and the last 4 weeks through a self-reported descriptive rating scale [18,19].

2.4. Data collection

Prior to recruitment, the research team informed the patients of the study and supplied an information booklet detailing its aims, objectives, and importance. Patients' concerns and questions were addressed before they agreed to participate in this study. Participants who met the inclusion criteria and consented to participate in the study were conveniently recruited throughout a four-week period in August 2023. Data collection instruments were administered to the participants while they waited for the collection of their medication.

2.5. Reliability, validity, and bias

The questionnaires administered in this study were previously validated in various study settings. The WHOQOL-HIV BREF is a cross-cultural instrument created by WHOQOL, demonstrating strong internal consistency, reliability, and discriminant validity across established illness phases. The confirmatory analysis demonstrated a robust alignment with a six-domain model (comparative for index of 0.097), validating the score [20].

The researchers deliberately selected a sample that fairly reflected the target population to guarantee the quality and dependability of the results in this study. This strategy improved the transferability and dissemination of the study findings. The researchers employed rigorous data collection techniques in their investigation. The study team solely performed participant briefings and data collecting to guarantee adherence to uniform data-gathering methodologies. The researchers used data validation techniques to ensure the data's completeness and quality. The correctness and completeness of data entry were verified to enhance reliability prior to the initiation of data analysis.

The study rigorously followed the established inclusion and exclusion criteria to reduce selection bias. All questionnaires were self-administered to eliminate the risk of interviewer bias. Translation bias was mitigated by providing forms exclusively in English.

2.6. Ethical considerations

The Human Research Ethics Committee at the University of Witwatersrand (WHREC) (M230239 MED 23–01-094) approved this study, and the chief Executive Officer of the study location also gave permission.

Participants received a patient information leaflet outlining the study's aims, objectives, and significance. All participants provided written agreement and were informed that their participation in this study was optional. They could withdraw at any moment without justification, ensuring anonymity. Confidentiality was ensured by securely storing all the data about the study, and access was restricted to the researcher team only. This study complied with all ethical requirements and conformed to established research protocols.

2.7. Data entry and analysis

A biostatistician was consulted for guidance and assistance with the statistical analysis. Data from the questionnaires were recorded in Microsoft Office Excel and analysed using IBM's Statistical Package for the Social Sciences (SPSS) version 29.0. Socio-demographic and health characteristics were expressed in frequencies and percentages to provide an overview of the study population. Optimal adherence was assessed as ≥95 %, classed as 'excellent' and 'very good'. Participants who reported their adherence as 'good', fair, poor', and 'very poor' were categorised as non-adherent (≤95 %).

The WHOQoL-HIV BREF items were evaluated using a five-point Likert Scale, with one indicating a poor or negative evaluation and five representing a high or positive opinion. All HRQoL domain scores are transformed into a scale of four to twenty as per the scoring guidelines provided by the authors of the questionnaire. Overall HRQoL was calculated by summing up all the domain scores divided by the number of domains. Associations between socio-demographic and health characteristics, adherence, with mean scores of HRQoL domains were assessed using independent *t*-tests and one-way analysis of variance (ANOVA). A multiple linear regression analysis was conducted to determine health-related quality of life predictors based on socio-demographic and health-related characteristics. Statistical significance was set at $p \leq 0.05$, using two-sided tests.

3. Results

Table 1 provides the socio-demographic, health characteristics, and self-reported adherence of the recruited sample ($n = 103$). The mean age of the participants was 41.7 years (SD ± 0.763). More than half of the subjects were male (n = 53; 51.5 %), with ages ranging from 36 to 50 years (n = 53; 51.5 %), employed (n = 54; 52.4 %), and earned less than 2000 South African Rands (ZAR) (n = 59; 57.3 %). Most of the sample completed education between Grades 0 and 12 (n = 79; 76.7 %), were single (n = 77; 74.8 %), lived with either family or friends (n = 85; 82.5 %), considered their health as 'good' (n = 82; 79.6 %), and did not consider themselves ill (n = 85; 82.5 %). The participants reported a high level of adherence over a 7-day (n = 71; 68.9 %) and 4-week (n = 70; 67.9 %) self-reporting period.

3.1. Association between socio-demographic, health characteristics, and adherence to ART with HRQoL

In this study, the participants reported a moderate HRQoL (14.32 ± 1.91). Table 2 shows the association between socio-demographics, health characteristics, and adherence to ART with HRQoL. Level of education had a significant ($p \leq 0.05$) influence on all the HRQoL domains, including overall HRQoL. Participants with a diploma or tertiary qualification reported higher mean scores in all the domains compared to participants with a lower level of education. In this study, patients who disclosed their health as 'good' and income above ZAR 5000 reported

Table 1
Socio-demographic, health-related, and adherence characteristics (n = 103).

Socio-demographic, health characteristics and Adherence Variables		Number of participants (n)	Percentage (%)
Gender	Male	53	51.5
	Female	50	48.5
Age (in years)	18–35	27	26.2
	36–50	53	51.5
	≥51	23	22.3
Education	0–12 Grade	79	76.7
	Tertiary/Diploma	24	23.3
Marital status	Married	26	25.2
	Separated/Divorced/ Widowed	77	74.8
Living conditions	Alone	18	17.5
	In family/ Friends/ Other	85	82.5
Employment	Employed	54	52.4
	Unemployed	49	47.6
Income (in ZAR)	0–2000	59	57.3
	2001–5000	23	22.3
	≥ 5001	21	20.4
Health status	Poor	21	20.4
	Good	82	79.6
Perception of illness	Yes	18	17.5
	No	85	82.5
Months on Treatment	0–6 months	17	16.5
	7–24 months	18	17.5
	25–59 months	25	24.3
	≥60 months	43	41.7
Adherence-4 weeks	Adherent	71	68.9
	Non-Adherent	32	31.0
Adherence-7 days	Adherent	70	67.9
	Non-Adherent	33	32.1

Table 2
Association between socio-demographic and health characteristics and adherence to ART with HRQoL (n = 103).

Socio-demographic, health characteristics and adherence to ART		Physical		Psychological		Level of Independence		Social Relationships		Environment		SRPB		OHQoL	
		Mean (±SD)	P	Mean (±SD)	p	Mean (±SD)	p	Mean (±SD)	P	Mean (±SD)	p	Mean (±SD)	p	Mean (±SD)	P
Gender	**Male**	15.79 (±2.66)	0.87	11.55 (±2.02)	0.94	15.23 (±2.53)	0.98	15.23 (±3.36)	0.95	13.98 (±2.56)	0.97	13.64 (±1.68)	0.69	14.32 (±2.00)	0.92
	Female	15.88 (±3.08)		11.52 (±1.90)		15.24 (±2.90		15.26 (±3.30)		14.00 (±2.72)		13.78 (±1.87)		14.36 (±1.97)	
Age (in years)	**18–35**	16.00 (±2.73)	0.92	11.30 (±2.12)	0.25	15.81 (±2.18)	0.24	15.00 (±3.45)	0.85	15.11 (±2.72)	0.02#	13.56 (±1.90)	0.82	14.52 (±2.20)	0.77
	36–50	15.74 (±2.93)		11.40 (±2.06)		14.81 (±2.82)		15.42 (±3.51)		13.47 (±2.58)		13.81 (±1.81)		14.21 (±2.04)	
	≥51	15.87 (±2.95)		12.13 (±1.35)		15.52 (±2.90)		15.13 (±2.76)		13.87 (±2.30)		13.65 (±1.55)		14.43 (±1.59)	
Education	**0–12 Grade**	15.41 (±2.65)	0.01#	11.38 (±1.80)	0.21	14.84 (±2.67)	0.00#	14.94 (±3.28)	0.09	13.52 (±2.55)	<0.001#	13.65 (±1.77)	0.51	14.06 (±1.86)	0.01#
	Tertiary/Diploma	17.25 (±3.09)		12.04 (±2.36)		16.54 (±2.41)		16.25 (±3.28)		15.54 (±2.28)		13.92 (±1.79)		15.25 (±2.132)	
Marital status	**Married**	16.23 (±2.45)	0.37	11.85 (±1.82)	0.33	15.15 (±2.78)	0.86	15.73 (±3.21)	0.38	13.92 (±2.09)	0.86	13.46 (±1.60)	0.38	14.46 (±1,79)	0.70
	Separated/Divorced/ Widowed	15.70 (±2.98)		11.43 (±2.00)		15.26 (±2.69)		15.08 (±3.35)		14.01 (±2.79)		13.79 (±1.83)		14.30 (±2.05)	
Living conditions	**Alone**	15.56 (±2.54)	0.62	11.39 (±2.20)	0.75	15.61 (±2.70)	0.52	14.78 (±3.24)	0.51	13.72 (±3.56)	0.71	13.89 (±1.84)	0.65	14.28 (±2.32)	0.89
	In family/ Friends/ Other	15.89 (±2.93)		11.56 (±1.91)		15.15 (±2.71)		15.34 (±3.34)		14.05 (±2.40)		13.67 (±1.76)		14.35 (±1.91)	
Employment	**Employed**	16.06 (±2.70)	0.41	11.87 (±1.92)	0.06	15.57 (±2.65)	0.18	15.63 (±3.34)	0.21	14.43 (±2.27)	0.08	13.76 (±1.47)	0.76	14.59 (±1.90)	0.17
	Unemployed	15.59 (±3.03)		11.16 (±1.95)		14.86 (±2.73)		14.82 (±3.26)		13.51 (±2.92)		13.65 (±2.06)		14.06 (±2.04)	
Income (in ZAR)	**0–2000**	15.17 (±3.13)	0.02#	11.24 (±2.01)	0.04#	14.56 (±2.91)	0.00#	14.66 (±3.46)	0.05#	13.37 (±2.84)	<0.001#	13.63 (±2.01)	0.77	13.90 (±2.15)	0.01#
	20,001–5000	16.65 (±1.99)		11.43 (±1.61)		15.70 (±1.86)		15.43 (±2.92)		13.83 (±1.96)		13.70 (±1.25)		14.52 (±1.31)	
	≥ 5001	16.81 (±2.40)		12.48 (±1.94)		16.62 (±2.29)		16.67 (±2.95)		15.90 (±1.60)		13.95 (±1.56)		15.38 (±1.71)	
Health status	**Poor**	14.05 (±2.17)	<0.00#	10.57 (±1.77)	0.01#	13.38 (±2.90)	0.00#	13.52 (±3.53)	0.01#	11.81 (±1.96)	<0.00#	13.19 (±2.13)	0.20	13.00 (±1.61)	<0.00#
	Good	16.29 (±2.84)		11.78 (±1.93)		15.71 (±2.45)		15.68 (±3.13)		14.55 (±2.49)		13.84 (±1.65)		14.68 (±1.93)	
Perception of illness	**Yes**	14.39 (±2.76)	0.02#	10.61 (±2.38)	0.07	13.72 (±2.44)	0.00#	12.22 (±2.13)	0.06	12.33 (±3.06)	0.01#	12.22 (±2.13)	0.00#	12.89 (±2.34)	0.00#
	No	16.14 (±2.79)		11.73 (±1.81)		15.55 (±2.66)		14.02 (±1.52)		14.34 (±2.40)		14.02 (±1.52)		14.65 (±1.76)	
Months on Treatment	**0–6 months**	16.47 (±2.26)	0.28	11.71 (±1.82)	0.53	15.82 (±1.94)	0.32	15.53 (±2.32)	0.96	14.29 (±2.61)	0.77	14.06 (±1.39)	0.62	14.71 (±1.49)	0.68
	7–24 months	15.11 (±3.51)		10.94 (±2.55)		14.56 (±3.12)		15.44 (±3.74)		14.28 (±3.51)		13.33 (±2.16)		14.06 (±2.73)	
	25–59 months	16.48 (±2.23)		11.80 (±1.65)		15.80 (±2.16)		15.08 (±2.90)		14.12 (±2.04)		13.56 (±1.82)		14.56 (±1.63)	
	≥60 months	15.51 (±3.05)		11.56 (±1.90)		14.95 (±3.01)		15.14 (±3.75)		13.67 (±2.57)		13.81 (±1.72)		14.19 (±2.00)	
Adherence-4 weeks	**Adherent**	16.00 (±3.12)	0.32	11.68 (±2.11)	0.22	15.32 (±3.08)	0.52	15.41 (±3.56)	0.40	14.14 (±2.86)	0.32	13.63 (±1.95)	0.46	14.39 (±2.22)	0.61
	Non-Adherent	15.47 (±2.15)		11.22 (±1.56)		15.03 (±1.59)		14.88 (±2.69)		13.66 (±2.02)		13.88 (±1.31)		14.22 (±1.31)	
Adherence-7 days	**Adherent**	15.96 (±3.16)	0.46	11.83 (±2.06)	0.01#	15.31 (±3.16)	0.56	15.59 (±3.56)	0.09	14.06 (±2.82)	0.68	13.74 (±1.93)	0.75	14.47 (±2.27)	0.22
	Non-Adherent	15.58 (±2.07)		10.91 (±1.56)		15.06 (±1.29)		14.52 (±2.62)		13.85 (±2.18)		13.64 (±1.41)		14.06 (±1.14)	

# $p < 0.05$ using *t*-test and one way ANOVA; SD: Standard Deviation; SRPB: Spirituality, religious and personal beliefs; OHQoL: Overall Health-related Quality of Life.

better HRQoL. Significant ($p \leq 0.05$) differences in mean scores were observed between the levels of income and health status in all HRQoL domains, except the spirituality, religious and personal beliefs (SRPB) domain. Patients' perception of their illness has shown a significant association with HRQoL in this study. Participants who considered themselves 'not ill' reported significantly ($p \leq 0.05$) higher mean scores in all the HRQoL domains, including overall HRQoL. Compared to non-adherent patients (≤95 %), adherent patients (≥95 %) showed improved HRQoL. However, significant ($p = 0.01$) differences in mean scores were observed only in the psychological domain.

The association between socio-demographic, health-related characteristics, and adherence to ART with HRQoL was further examined through multivariate linear regression analysis (Table 3). In this study, the level of education ($\beta = 1.18$; $p = 0.01$), income ($\beta = 0.72$; $p = 0.00$), perception of illness ($\beta = 1.75$; $p < 0.001$), and health status ($\beta = 1.68$; $p < 0.001$) were identified as the predictors of overall HRQoL.

4. Discussion

In this study, the participants reported a moderate HRQoL (14.32 ± 1.91) with lower scores being reported in the psychological domain, reflecting the complex interplay of psychological, and other mental health factors that influenced their overall well-being. Research indicates that HRQoL among PLWHA is significantly influenced by various psychosocial factors. Degroote et al. found that psychological factors often have a more profound impact on HRQoL than the physical aspects of HIV itself [21]. This suggests that while medical treatment is crucial, addressing psychological well-being is equally important for enhancing HRQoL. The authors believe that the presence of stigma may have also significantly affected HRQoL among PLWHA. Rueda et al. conducted a meta-analysis that demonstrated a clear relationship between HIV-related stigma and negative health outcomes, including lower HRQoL scores [22]. Stigma can lead to social isolation and mental health issues, which further deteriorate the HRQoL of PLWA. Addressing mental health issues through education and community support is essential for improving HRQoL in this population.

The study results also indicate that education level, income, health status, and perception of illness are significantly associated with HRQoL and are the predictors of HRQoL. The level of education is strongly associated with the HRQoL of PLWHA. Research consistently demonstrated that higher education levels are linked to improved HRQoL in various domains such as psychological, social, level of independence, and environmental aspects [23]. This result supports our findings, which showed that except for the SRPB domain, the degree of schooling shows a noteworthy association with all the domains of HRQoL. Higher education not only enhances PLWHA's knowledge of HIV treatment and healthcare [24] and may provide good understanding of the importance of strict adherence to ART. In addition, educated individuals have a clearer understanding of what is better and worse for their lives compared to those who are uneducated [13]. Education also plays a crucial role in acquiring economic resources, and the level of education directly influences the extent of economic income. Additionally, patients with higher education levels can usually secure stable employment, offering a reliable source of income, which helps to ensure better living conditions [25].

Level of income is another critical factor that was found to be associated with HRQoL of PLWHA in our study. Numerous studies have demonstrated the association between income and HRQoL in developed as well as developing countries [26,27]. A study conducted in Portugal identified a strong relationship between higher income and enhanced outcomes for PLWHA in several dimensions of HRQoL [28]. A similar study conducted in Indonesia identified a strong association between the level of income and HRQoL, stressing that higher income levels were linked to increased HRQoL in patients with HIV. Higher income may provide increased access to healthcare services, improve socioeconomic status and offer better health promotion, as evidenced by the better HRQoL with higher earnings (>ZAR 5000) across most domains reported by the study population [29,30].

Acceptance of illness is another factor associated with HRQoL of PLWHA in our study. Research has confirmed a strong association between well-being, therapeutic efficacy, HRQoL, and the level of acceptance towards illness [31–33]. Participants who reported their health as "good" and considered themselves healthy had higher HRQoL Patients who accept their disease are more likely to follow the treatment plan, present higher coping mechanisms, and are more mentally and physically stable [34,35]. Research suggests that mental health and HRQoL of PLWHA are significantly affected by the acceptance of their illness. Clinicians must advise PLWHA to accept their status to maintain mental stability and efficiently manage their care [32,33]. Moreover, improving the understanding and acceptance of illness among PLWHA can strengthen their overall well-being, adherence to treatment, and HRQoL.

Finally, in our study the participants who reported optimal adherence reported higher HRQoL in all the domains. However, significant differences in mean scores were observed in the psychological domain. Evidence suggests that patients who maintain high adherence to their medication regimen often report better psychological health, which in turn contributes to their overall HRQoL. Rivera-Picón et al. found that positive psychological factors, such as self-esteem and social support, are associated with improved adherence and overall HRQoL among PLWHA [36]. This highlights the importance of fostering a supportive environment that promotes psychological health as a means to enhance adherence.

Moreover, the interplay between psychological well-being and adherence is reciprocal. As noted by Nachega et al., improved adherence to ART can lead to better health outcomes, which in turn enhances psychological well-being [37]. This cyclical relationship suggests that interventions aimed at improving adherence should also incorporate mental health support to foster a more holistic approach to patient care. The integration of mental health services into HIV care has been shown to improve treatment adherence and reduce mortality rates among HIV-infected individuals [38].

5. Conclusions

Our study identified a strong association between several socio-demographic, health characteristics, adherence to ART and HRQoL. This study highlights the importance of regular assessment of HRQoL in PLWHA to understand their challenges and multifaceted approach in the provision of comprehensive care to improve various aspects of HRQoL. A combination of peer support, community-based interventions, stigma reduction, culturally tailored adherence programs, social support initiatives, psychosocial interventions, and education can significantly enhance HRQoL among PLWHA. Implementing these interventions in a coordinated manner can lead to improved health outcomes and a better HRQoL for this population.

5.1. Limitations

This cross-sectional investigation was carried out at a South African tertiary hospital with a somewhat smaller population of PLWHA. As a result, the findings of our study cannot be applied to all South Africans living with HIV. This study may not have definitively shown a correlation between socio-demographic variables, health characteristics, and HRQoL, potentially providing just associative data due to the restricted sample size.

The authors acknowledge the possibility of response bias in this study, as certain individuals may harbor prejudices or intent that could influence their responses, potentially leading to inaccurate or skewed results. Notwithstanding these drawbacks, the researchers are certain that the study's findings are solid and persuasive, and they provide a starting point for additional research using a bigger sample size to examine HRQoL.

Table 3
Predictors of HRQoL: Multivariate Regression Analysis.

Socio-demographic, health characteristics, and adherence to ART	Physical			Psychological			Level of Independence			Social Relationships			Environment			SRPB			OHQoL		
	β	R^2	95 % CI	β	R^2	95 % CI	β	R^2	95 % Cl	β	R^2	95 % Cl	β	R^2	95 % Cl	β	R^2	95 % Cl	β	R^2	95 % Cl
Gender	0.08	0.00	−1.03, 1.21	−0.02	0.00	−0.79, 0.74	0.01	0.00	−1.05, 1.07	0.03	0.00	−1.27, −1.27	0.01	0.00	−1.01, 1.05	0.13	0.00	−0.55, 0.83	0.03	0.00	−0.74, 0.81
Age	−0.07	0.00	−0.88, 0.73	0.40	0.02	−0.14, 0.95	−0.18	0.00	−0.94, 0.58	0.08	0.00	−0.85, 1.01	−0.66	0.03	−1.39, 0.06	0.05	0.00	−0.44, 0.55	−0.05	0.00	−0.61, 0.50
Education	1.84*	0.07	0.56, 3.12	0.66	0.02	−0.23, 1.56	1.70*	0.07	0.49, 2.91	1.31	0.02	−0.206, 2.83	2.02*	0.10	0.86, 3.17	0.27	0.00	−0.55, 1.09	1.18*	0.06	0.29, 2.07
Marital status	−0.52	0.00	−1.82, 0.75	−0.41	0.00	−1.30, 0.46	0.10	0.00	−1.11, 1.32	−0.65	0.00	−2.14, 0.84	0.09	0.00	−1.09, 1.27	0.33	0.00	−0.46, 1.13	−0.16	0.00	−1.05, 0.73
Living conditions	0.33	0.00	−1.13, 1.81	0.17	0.00	−0.83, 1.18	−0.45	0.00	−1.85, 0.93	0.56	0.00	−1.14, 2.27	0.32	0.00	−1.03, 1.68	−0.21	0.00	−1.13, 0.69	0.07	0.00	−0.95, 1.10
Employment	−0.46	0.00	−1.58, 0.65	−0.70	0.03	−1.46, 0.05	−0.71	0.01	−1.77, 0.33	−0.08	0.01	−2.10, 0.48	−0.91	0.03	−1.93, 0.10	−0.10	0.00	−0.80, 0.59	−0.53	0.01	−1.30, 0.24
Income	0.90*	0.06	0.22, 1.58	0.56*	0.05	0.09, 1.03	1.04*	0.09	1.04, 1.67	0.97*	0.05	0.18, 1.76	1.16*	0.12	0.55, 1.76	0.15	0.00	−0.28, 0.58	0.72*	0.08	0.72, 0.72
Health status	2.24*	0.10	0.92, 3.56	1.20*	0.06	0.28, 2.13	2.32*	0.12	1.09, 3.56	2.15*	0.06	0.59, 3.72	2.73*	0.17	1.57, 3.90	0.65	0.02	−0.20, 1.50	1.68*	0.11	0.77, 2.59
Perception of illness	1.75*	0.05	0.31, 3.19	1.11	0.04	0.12, 2.10	1.83*	0.06	0.47, 3.18	1.91*	0.04	0.23, 3.58	2.00*	0.08	0.70, 3.30	1.80*	0.15	0.95, 2.64	1.75*	0.11	0.79, 2.72
Months on Treatment	−0.17	0.00	−0.67, 0.32	0.045	0.00	−0.30, 0.39	−0.015	0.00	−0.63, 0.32	−0.13	0.00	−0.72, 0.44	−0.22	0.00	−0.68, 0.23	−0.00	0.00	−0.31, 0.30	−0.10	0.00	−0.45, 0.024
Adherence-4 weeks	−0.53	0.00	−1.74, 0.67	−0.45	0.01	−1.28, 0.36	−0.29	0.00	−1.43, 0.85	−0.53	0.00	−1.93, 0.87	−0.48	0.00	−1.59, 0.62	0.24	0.00	−0.51, 0.99	−0.17	0.00	−1.01, 0.66
Adherence-7 days	−0.38	0.00	−1.58, 0.82	−0.91*	0.04	−1.72, −0.11	−0.25	0.00	−1.39, 0.88	−1.07	0.02	−2.45, 0.31	−0.20	0.00	−1.31, 0.89	−0.10	0.00	−0.85, 0.64	−0.41	0.00	−1.24, 0.42

* $p \leq 0.05$: β: Standardised coefficient; R^2: Coefficient of determination; CI: Confidence interval; SRPB-Spirituality, religious and personal beliefs; OHQol: Overall Health-related Quality of Life.

CRediT authorship contribution statement

Govinda Rajan Gudala: Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Software, Writing – review & editing. **Neelaveni Padayachee:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Formal analysis, Conceptualization, Project administration, Visualization, Writing – original draft. **Rajesh Vikram Vagiri:** Writing – review & editing, Supervision, Methodology, Formal analysis, Data curation, Conceptualization, Software, Validation, Visualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dialog.2025.100207.

References

[1] Frescura Luisa, Godfrey-Faussett Peter, Ali Feizzadeh A, El-Sadr Wafaa, Syarif Omar, Peter D. Ghys, and on behalf of the 2025 testing treatment target working group. "achieving the 95 95 95 targets for all: a pathway to ending AIDS.". PloS One 2022;17(8):e0272405. https://doi.org/10.1371/journal.pone.0272405.

[2] Eshetu Habitu Birhan, Kebede Natnael, Bogale Eyob Ketema, Zewdie Amare, Kassie Tadele Derbew, Anagaw Tadele Fentabil, et al. Knowledge of prevention of mother-to-child transmission of HIV among reproductive age women in high HIV/AIDS prevalent countries: a multilevel analysis of recent demographic and health surveys. PloS One 2023;18(10):e0292885. https://doi.org/10.1371/journal.pone.0292885.

[3] Lima Viviane D, Anja Reuter P, Harrigan Richard, Lourenço Lillian, Chau William, Hull Mark, et al. Initiation of antiretroviral therapy at high CD4+ cell counts is associated with positive treatment outcomes. Aids 2015;29(14):1871–82. https://doi.org/10.1097/QAD.0000000000000790.

[4] Mcmahon James H, Medland Nicholas. 90-90-90: how do we get there? Lancet HIV 2014;1(1):e10–1. https://doi.org/10.1016/s2352-3018(14)70017-7.

[5] Nakagawa Fumiyo, Lodwick Rebecca K, Smith Colette J, Smith Ruth, Cambiano Valentina, Lundgren Jens D, et al. Projected life expectancy of people with HIV according to timing of diagnosis. Aids 2012;26(3):335–43. https://doi.org/10.1097/QAD.0b013e32834dcec9.

[6] Van Vu Tuong, Magis-Weinberg Lucía, Jansen Brenda RJ, van Atteveldt Nienke, Janssen Tieme WP, Lee Nikki C, et al. Motivation-achievement cycles in learning: a literature review and research agenda. Educ Psychol Rev 2022;34(1):39–71. https://doi.org/10.1007/s10648-021-09616-7.

[7] Mengistu Nebiyu, Hareru Habtamu Endashaw, Shumye Seid, Yimer Solomon, Sisay Daniel, Kaso Abdene Weya, et al. Health-related quality of life and its association with social support among people living with HIV/AIDS receiving antiretroviral therapy in Ethiopia: a systematic review and meta-analysis. Health Qual Life Outcomes 2022;20(1):77. https://doi.org/10.1186/s12955-022-01985-z.

[8] Whoqol Group. The World Health Organization quality of life assessment (WHOQOL): position paper from the World Health Organization. Soc Sci Med 1995;41(10):1403–9. https://doi.org/10.1016/0277-9536(95)00112-K.

[9] Naimi Ahmad Johari, Naderiravesh Nadereh, Bayat Zahra Safavi, Shakeri Nezhat, Matbouei Mahsa. Correlation between health literacy and health-related quality of life in patients with hypertension, in Tehran, Iran, 2015–2016. Electron Physician 2017;9(11):5712. https://doi.org/10.19082/5712.

[10] Vásquez Priscilla M, Durazo-Arvizu Ramon A, Marquez David X, Argos Maria, Lamar Melissa, Odoms-Young Angela, et al. Moderate-vigorous physical activity and health-related quality of life among Hispanic/Latino adults in the Hispanic community health study/study of Latinos (HCHS/SOL). J Patient-reported Outcomes 2019;3:1–9. https://doi.org/10.1186/s41687-019-0129-y.

[11] Zucoloto Miriane Lucindo, Maroco João, Campos Juliana Alvares Duarte Bonini. Impact of oral health on health-related quality of life: a cross-sectional study. BMC Oral Health 2016;16:1–6. https://doi.org/10.1186/s12903-016-0211-2.

[12] Sosnowski Roman, Kulpa Marta, Ziętalewicz Urszula, Wolski Jan Karol, Nowakowski Robert, Bakuła Robert, et al. Basic issues concerning health-related quality of life. Cent Eur J Urol 2017;70(2):206. https://doi.org/10.5173/ceju.2017.923.

[13] Mofolorunsho Kehinde Charles, Nwankwo Emmanuel Onwubiko, Babatunde Taiye. Socio-economic factors influencing the quality of life of people living with HIV/AIDS in Kogi, Nigeria. Nat Sci 2013;11(8):33–9. https://www.sciencepub.net/nature/ns1108/006_19149ns1108_33_39.pdf.

[14] Kugelman David N, Haglin Jack M, Carlock Kurtis D, Konda Sanjit R, Egol Kenneth A. The association between patient education level and economic status on outcomes following surgical management of (fracture) non-union. Injury 2019;50(2):344–50. https://doi.org/10.1016/j.injury.2018.12.013.

[15] Tegegne Awoke Seyoum. Quality of life and associated factors of HIV patients under treatment with first line regimens in public hospitals in Amhara region, north-West Ethiopia. Patient Prefer Adherence 2023:1347–59. https://doi.org/10.2147/PPA.S413192.

[16] Ghiasvand Hesam, Higgs Peter, Noroozi Mehdi, Harouni Gholamreza Ghaedamini, Hemmat Morteza, Ahounbar Elahe, et al. Social and demographical determinants of quality of life in people who live with HIV/AIDS infection: evidence from a meta-analysis. Biodemography Soc Biol 2020;65(1):57–72. https://doi.org/10.1080/19485565.2019.1587287.

[17] Moyle Graeme, Gatell Jose, Perno Carlo-Federico, Ratanasuwan Winai, Schechter Mauro, Tsoukas Christos. Potential for new antiretrovirals to address unmet needs in the management of HIV-1 infection. AIDS Patient Care STDS 2008;22(6):459–71. https://doi.org/10.1089/apc.2007.0136.

[18] Vagiri Rajesh Vikram, Meyer Johanna Catharina, Godman Brian, Gous Andries Gustav Stephanus. Relationship between adherence and health-related quality of life among HIV-patients in South Africa: findings and implications. J AIDS HIV Res 2018;10(8):121–32. https://doi.org/10.5897/JAHR2018.0478.

[19] Vagiri Rajesh V, Meyer Johanna C, Gous Andries GS. Satisfaction with aspects of health-related quality of life (HRQoL) amongst HIV positive patients attending a tertiary hospital clinic in South Africa: HIV and AIDS. Afr J Phys Health Educ Recreat Dance 2014;20(sup-1):22–31. https://doi.org/10.10520/EJC162294.

[20] O'Connell Kathryn Ann, Skevington Suzanne M. An international quality of life instrument to assess wellbeing in adults who are HIV-positive: a short form of the WHOQOL-HIV (31 items). AIDS Behav 2012;16:452–60. https://doi.org/10.1007/s10461-010-9863-0.

[21] Degroote Sophie, Vogelaers Dirk, Vandijck Dominique M. What determines health-related quality of life among people living with HIV: an updated review of the literature. Arch Public Health 2014;72:1–10. https://doi.org/10.1186/2049-3258-72-40.

[22] Rueda Sergio, Mitra Sanjana, Chen Shiyi, Gogolishvili David, Globerman Jason, Chambers Lori, et al. Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. BMJ Open 2016;6(7):e011453. https://doi.org/10.1136/bmjopen-2016-011453.

[23] Alemayehu Mekuriaw, Wubshet Mamo, Mesfin Nebiyu, Tamiru Aschalew, Gebayehu Abebaw. Health-related quality of life of HIV infected adults with and without Visceral Leishmaniasis in Northwest Ethiopia. Health Qual Life Outcomes 2017;15:1–10. https://doi.org/10.1186/s12955-017-0636-6.

[24] Yaya Issifou, Djalogue Lihanimpo, Patassi Akouda Akessiwè, Landoh Dadja Essoya, Assindo Ayélé, Nambiema Aboubakari, et al. Health-related quality of life among people living with HIV/AIDS in Togo: individuals and contextual effects. BMC Res Notes 2019;12:1–6. https://doi.org/10.1186/s13104-019-4171-x.

[25] Kugelman David N, Haglin Jack M, Carlock Kurtis D, Konda Sanjit R, Egol Kenneth A. The association between patient education level and economic status on outcomes following surgical management of (fracture) non-union. Injury 2019;50(2):344–50. https://doi.org/10.1016/j.injury.2018.12.013.

[26] Ghiasvand Hesam, Higgs Peter, Noroozi Mehdi, Harouni Gholamreza Ghaedamini, Hemmat Morteza, Ahounbar Elahe, et al. Social and demographical determinants of quality of life in people who live with HIV/AIDS infection: evidence from a meta-analysis. Biodemography Soc Biol 2020;65(1):57–72. https://doi.org/10.1080/19485565.2019.1587287.

[27] Osei-Yeboah James, Owiredu William KBA, Norgbe Gameli Kwame, Lokpo Sylvester Yao, Obirikorang Christian, Allotey Emmanuel Alote, et al. Quality of life of people living with HIV/AIDS in the Ho municipality, Ghana: a cross-sectional study. AIDS Res Treat 2017;2017(1):6806951. https://doi.org/10.1155/2017/6806951.

[28] Santos Luis Delfim, Martins Isabel, Brito Paula. Measuring subjective quality of life: a survey to Porto's residents. Appl Res Qual Life 2007;2:51–64. https://doi.org/10.1007/s11482-007-9029-z.

[29] Armini Alit, Ketut Ni, Nursalam Nursalam, Ikmala Laila Salma. "Analysis of factors influencing health-related quality of life in HIV/AIDS patients." HIV & AIDS Review. Int J HIV-Relat Probl 2023;22(4). https://doi.org/10.5114/hivar.2023.133078.

[30] Calixto Omar-Javier, Anaya Juan-Manuel. Socioeconomic status. The relationship with health and autoimmune diseases. Autoimmun Rev 2014;13(6):641–54. https://doi.org/10.1016/j.autrev.2013.12.002.

[31] Andrinopoulos Katherine, Clum Gretchen, Murphy Debra A, Harper Gary, Perez Lori, Jiahong Xu, et al. Health-related quality of life and psychosocial correlates among HIV-infected adolescent and young adult women in the US. AIDS Educ Prev 2011;23(4):367–81. https://doi.org/10.1521/aeap.2011.23.4.367.

[32] Liamputtong Pranee. Infant feeding beliefs and practices across cultures: An introduction. In: Infant feeding practices: A cross-cultural perspective; 2011. p. 1–20. https://doi.org/10.1007/978-1-4419-6873-9_1.

[33] Reynolds Grace L, Latimore Amanda D, Fisher Dennis G. Heterosexual anal sex among female drug users: US national compared to local Long Beach, California data. AIDS Behav 2008;12:796–805. https://doi.org/10.1007/s10461-007-9271-2.

[34] Staniszewska Anna, Religioni Urszula, Dąbrowska-Bender Marta. Acceptance of disease and lifestyle modification after diagnosis among young adults with epilepsy. Patient Prefer Adherence 2017:165–74. https://doi.org/10.2147/ppa.s126650.

[35] Saki Kourosh, Bahmani Mahmoud, Rafieian-Kopaei Mahmoud. The effect of most important medicinal plants on two important psychiatric disorders (anxiety and

depression)-a review. Asian Pac J Trop Med 2014;7:S34–42. https://doi.org/10.1016/S1995-7645(14)60201.

[36] Rivera-Picón Cristina, Benavente-Cuesta María Hinojal, Quevedo-Aguado María Paz, Rodríguez-Muñoz Pedro Manuel. The importance of positive psychological factors among people living with HIV: a comparative study. Behav Sci 2022;12(8):288. https://doi.org/10.3390/bs12080288.

[37] Nachega Jean B, Morroni Chelsea, Zuniga José M, Schechter Mauro, Rockstroh Jürgen, Solomon Suniti, et al. HIV treatment adherence, patient health literacy, and health care provider–patient communication: results from the 2010 AIDS treatment for life international survey. J Int Assoc Physicians AIDS Care 2012;11(2):128–33. https://doi.org/10.1177/1545109712437244.

[38] Krumme Alexis A, Kaigamba Felix, Binagwaho Agnes, Murray Megan B, Rich Michael L, Franke Molly F. Depression, adherence and attrition from care in HIV-infected adults receiving antiretroviral therapy. J Epidemiol Community Health 2015;69(3):284–9. https://doi.org/10.1136/jech-2014-204494.