Health-related quality of life in HIV/AIDS patients on antiretroviral therapy at a tertiary care facility in Zimbabwe

Mafirakureva, N.; Dzingirai, B.; Postma, Maarten; van Hulst, M.; Khoza, S.

Published in:
Aids care : Psychological and socio-Medical aspects of aids/hiv

DOI:
10.1080/09540121.2016.1173639

Publication date:
2016

AIDS Care

Psychological and Socio-medical Aspects of AIDS/HIV

ISSN: 0954-0121 (Print) 1360-0451 (Online) Journal homepage: http://www.tandfonline.com/loi/caic20

Health-related quality of life in HIV/AIDS patients on antiretroviral therapy at a tertiary care facility in Zimbabwe

N. Mafirakureva, B. Dzingirai, M.J. Postma, M. van Hulst & S. Khoza

To cite this article: N. Mafirakureva, B. Dzingirai, M.J. Postma, M. van Hulst & S. Khoza (2016) Health-related quality of life in HIV/AIDS patients on antiretroviral therapy at a tertiary care facility in Zimbabwe, AIDS Care, 28:7, 904-912, DOI: 10.1080/09540121.2016.1173639

To link to this article: http://dx.doi.org/10.1080/09540121.2016.1173639

Published online: 21 Apr 2016.

AIDS CARE, 2016
VOL. 28, NO. 7, 904–912
http://dx.doi.org/10.1080/09540121.2016.1173639

Routledge
Taylor & Francis Group

OPEN ACCESS

Health-related quality of life in HIV/AIDS patients on antiretroviral therapy at a tertiary care facility in Zimbabwe

N. Mafirakureva[a,b], B. Dzingirai[c], M.J. Postma[b,d], M. van Hulst[b,e] and S. Khoza[c]

[a]National Blood Service Zimbabwe, Harare, Zimbabwe; [b]Unit of Pharmaco-Epidemiology & Pharmaco-Economics (PE2), Department of Pharmacy, University of Groningen, Groningen, The Netherlands; [c]Department of Clinical Pharmacology, University of Zimbabwe, Harare, Zimbabwe; [d]Institute of Science in Healthy Aging & healthcaRE (SHARE), University Medical Center Groningen (UMCG), Groningen, The Netherlands; [e]Department of Clinical Pharmacy and Toxicology, Martini Hospital, Groningen, The Netherlands

ABSTRACT

Health-related quality of life (HRQoL) is a broad concept reflecting a patient's general subjective perception of the effect of an illness or intervention on physical, psychological and social aspects of their daily life. HRQoL among patients infected with HIV has become an important indicator of impact of disease and treatment outcomes. A cross-sectional survey was carried out at Chitungwiza Central Hospital, Zimbabwe, to assess HRQoL in patients with HIV/AIDS receiving antiretroviral therapy (ART), using two validated instruments. The HIV/AIDS-targeted quality of life (HAT-QoL) and EuroQoL Five-dimensions-Three-level (EQ-5D-3L) instruments were used to assess HRQoL. Internal consistency reliability and convergent validity of the two instruments were also evaluated. For construct validity, the relationships between HRQoL scores and socio-economic and HIV/AIDS-related characteristics were explored. The median scores for the HAT-QoL dimensions ranged from 33.3 (financial worries) to 100 (HIV mastery). A considerably low HAT-QoL dimension score of 50.0 was observed for sexual function. There were ceiling effects for all HAT-QoL dimension scores except for financial worries and disclosure worries. Floor effects were observed for financial worries and sexual function. The median of the EQ-5D-3L index and visual analogue scale (VAS) was 0.81 and 79.0, respectively. There were no floor or ceiling effects for both the EQ-5D-3L index and VAS. The overall scale Cronbach's alpha was 0.83 for HAT-QoL and 0.67 for EQ-5D-3L. HAT-QoL demonstrated good convergent validity with EQ-5D index (0.58) and VAS (0.40). A higher level of HRQoL was positively and significantly related to income, education and employment. The patients' self-reported HRQoL was generally satisfactory in all the HAT-QoL dimensions as well as the two components on the EQ-5D-3L instrument. The two instruments demonstrated good measurement properties in HIV/AIDS patients receiving ART and have potential for use, alongside biomarkers, in monitoring outcomes of interventions.

ARTICLE HISTORY
Received 2 July 2015
Accepted 29 March 2016

KEYWORDS
Health-related quality of life; HIV/AIDS; HAT-QoL; EQ-5d; Zimbabwe; antiretroviral therapy

Introduction

The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946). This all-encompassing definition implies the importance of capturing effect changes both in terms of life expectancy and quality of life (QoL), and led to the development of the concept of health-related quality of life (HRQoL). HRQoL is a multidimensional concept reflecting an individual's perception on how an illness or intervention affects the physical, psychological and social aspects of his or her health (European Medicines Agency, 2005; Polinder, Haagsma, van Klaveren, Steyerberg, & van Beeck, 2015; Revicki, 1989). HRQoL measures are becoming an integral part of patient follow-up, providing valuable feedback, from the patients' perspective, about the disease and associated interventions.

HRQoL assessment in HIV/AIDS takes into account the impact of the infection and antiretroviral therapy (ART) on an individual's physical, psychological and social well-being, as reported by the patient. HRQoL measures are important as indicators of the effectiveness of HIV/AIDS treatment and care programmes. Measurements of HRQoL can be incorporated into models that inform economic evaluation of HIV/AIDS treatment services, making them pivotal in resource allocation decisions (Feeny, 2000; Robberstad & Olsen, 2010). Such assessments can also be useful in identifying factors associated with HRQoL among people living with HIV, thereby informing public health decisions on specific

CONTACT N. Mafirakureva mafirakurevan@gmail.com

impact mitigation and support interventions that may be required to maximize HRQoL (Degroote, Vogelaers, & Vandijck, 2014; Mutabazi-Mwesigire, Katamba, Martin, Seeley, & Wu, 2015).

HIV remains a major public health problem in Zimbabwe, with an adult prevalence of 14.7% (UNAIDS, 2013) and is associated with an estimated 64,000 AIDS-related deaths annually (UN Joint Programme on HIV/AIDS (UNAIDS), 2014). The ART programme in Zimbabwe was formally started in April 2004 with the objective of reducing morbidity and mortality due to HIV and AIDS, and improving the QoL for people living with HIV (Apollo et al., 2010). Programme scale-up efforts resulted in increased access to ART. A few studies have assessed HRQoL as an outcome in patients living with HIV/AIDS in Zimbabwe (Patel et al., 2009; Sebit et al., 2000; Taylor, Dolezal, Tross, & Holmes, 2008, 2009). However, none of these studies used a generic and a disease-targeted instrument simultaneously. The simultaneous use of a generic and disease-targeted instrument for assessing QoL in a disease-specific population is highly recommended since this approach is thought to provide a comprehensive assessment and measurement of disease-specific QoL (Holmes & Shea, 1999; Patrick & Deyo, 1989). Although the 2010 WHO guidelines for ART recommended that countries reduce the use of stavudine (d4T) because of its well-recognized toxicity, the process of phasing it out has been slow in most treatment centres in Zimbabwe. An assessment of HRQoL in patients receiving ART was therefore necessary. The purpose of this study was to assess HRQoL in patients with HIV/AIDS receiving ART at a central hospital in Zimbabwe, using two validated instruments. In addition, measurement properties of the two instruments were assessed in order to ascertain if they were still feasible and valid methods of HRQoL assessments in the era of improved ART availability in Zimbabwe.

Methods

Participants and setting

A cross-sectional descriptive study was conducted at Chitungwiza Central Hospital, during the period July–October 2013. The hospital is one of the five major referral hospitals in Zimbabwe, located about 30 km South East of Harare. The Opportunistic Infections clinic provides ART and care to approximately 8000 HIV-positive patients. The sample size was estimated using Pocock's formula for single mean. Using EQ-5D scores reported in a study conducted in a similar population in South Africa (Gow, George, & Govender, 2013), a significance level of 5%, a population standard deviation (σ) of 20 and an interval around the mean (d) of 2.5, a sample size of 246 was estimated. Assuming a response rate of 70%, 350 participants were targeted. Patients with HIV/AIDS, aged 18–60 years and receiving ART were randomly selected and invited to participate during their clinic visits. During the study period, treatment guidelines recommended initiation of ART in all patients presenting with WHO stages 3 and 4 of HIV disease regardless of the CD4 count. In cases where CD4 count was available, initiation of ART in all adults and adolescents, including pregnant women, with CD4 cell counts of less than 350 cells/mm^3, was recommended.

Measures

HRQoL was measured using the HIV/AIDS-Targeted Quality of Life (HAT-QoL) and EuroQoL Five-dimensions-Three-level (EQ-5D-3L) instruments, which have previously been used and validated in Zimbabwean populations (Jelsma et al., 2001; Rabin & de Charro, 2001; Taylor, Dolezal, Tross, & Holmes, 2009). The Shona version of the HAT-QoL questionnaire was adapted from Taylor et al. (2009). The modification was the inclusion of the sexual function dimension. The Shona version of the EQ-5D-3L was obtained from the EuroQoL group (Rabin & de Charro, 2001). The EQ-5D-3L was used to measure HRQoL in two parts. The first part consisted of five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The second part was a visual analogue scale (VAS) ranging from 0 to 100, from which participants were asked to estimate their QoL score. A separate demographics questionnaire was used to gather information on socio-demographic and HIV/AIDS-related characteristics.

Procedures and outcomes

Three trained health-care workers (off-duty) gathered information using face-to-face interviews. The main outcome measure was HRQoL. The independent variables were the socio-demographic characteristics, obtained at the time of enrolment; and the clinical characteristics, obtained from the participants' medical charts recorded within the preceding three months from the date of their participation in the study.

Ethical approval

Ethical approval was obtained from the Joint Parirenyatwa Hospital and College of Health Sciences Ethical Committee (JREC 194/13), the Medical Research Council of Zimbabwe (MRCZ/B/564) and the Chitungwiza

Central Hospital institutional ethics committee. All participants provided written informed consent.

Statistical analysis

Data analysis was performed using Stata Version 13.0 (College Station, Texas). Descriptive analysis was used to summarize the socio-demographics and HIV-related characteristics, and HRQoL profiles of the participants. Reponses from the HAT-QoL instrument were transformed to numerical values for each dimension using the guide provided with the instrument (Holmes & Shea, 1998). The final dimension score was a linear scale, ranging 0–100, where 0 was the worst score possible and 100 was the best score possible. The health states on the EQ-5D-3L were transformed into an index value using the guideline provided by the developers of the instrument (Rabin & de Charro, 2001). The EQ-5D health states were converted to a single summary index for each participant using value sets for Zimbabwe (Jelsma, Hansen, De Weerdt, De Cock, & Kind, 2003).

Dimension-specific psychometric evaluations were completed, including corrected item-total correlations and internal consistency reliability coefficients and floor/ceiling effects. The internal consistency reliability was determined for each of the instruments using Cronbach's alpha, with a value of greater than or equal to 0.70 considered adequate (Cronbach, 1951; McCrae, Kurtz, Yamagata, & Terracciano, 2011; Tavakol & Dennick, 2011). Corrected item-total correlations were used to observe the reliability of individual items. For each item's total score, a correlation of 0.40 was considered acceptable. Floor/ceiling effects were considered to be present when the percentage of participants with the lowest (floor) or highest (ceiling) possible score was more than or equal to 20% (Holmes & Shea, 1998; Taylor et al., 2009).

Construct validity assessments were done using the socio-demographic and HIV-related characteristics. The variables were dichotomized, and subgroup median dimension scores were compared. Differences between median HRQoL scores of various patient groups were evaluated using the Mann–Whitney U-test. Convergent validity between the EQ-5D-3L index/VAS and the HAT-QoL dimensions was assessed using Spearman rank order coefficients (Spearman's ρ), including a comparison with the HAT-QoL summary score. The HAT-QoL summary score was calculated by averaging the dimension scores. Correlation coefficients less than or equal to 0.30 were considered negligible, 0.31–0.50 as low, 0.51–0.75 as moderate and above 0.75 as high (Mukaka, 2012). Unless, otherwise indicated, an *a priori* significance level (α) was set at 0.05 for all analyses.

Results

Socio-demographic and HIV/AIDS-related characteristics

A total of 257 out of the targeted 350 patients (73.4% response rate) consented and participated. Characteristics of the patients who declined to participate and reasons for non-participation could not be established. The majority of the participants were female (72.0%), with a mean age of 39.7 years (SD; 8.9). The majority of participants (42.8%) were in HIV stage III. The median CD4 count was 343 cells/mm^3 (range 8–1431). About half of the participants were on stavudine-based ART (49.1%), while 38.9% were on a tenofovir-based regimen and 12.0% were on a zidovudine-based regimen. The median time on ART was 24 months (range 1–144). The socio-demographic and HIV/AIDS-related characteristics of the participants of the study are summarized in Table 1.

HRQoL score descriptions and psychometric properties

The HAT-QoL dimension, EQ-5D index and VAS scores are summarized in Table 2. The median scores for the HAT-QoL dimensions ranged from 33.3 (financial worries) to 100 (HIV mastery). There were ceiling effects for all HAT-QoL dimensions except for financial and disclosure worries. Floor effects were observed for financial worries and sexual function. The Cronbach's alpha of all the HAT-QoL dimensions was 0.83. All Cronbach's alphas for the HAT-QoL dimensions were robust ($\geq$0.70). Only two items (disclosure worries: 0.38 and provider trust: 0.32) did not reach the recommended item-total correlation coefficient threshold of 0.40. The median scores for the EQ-5D-3L index and VAS were 0.81 and 79.0, respectively. There were no floor/ceiling effects for the two EQ-5D-3L components. Cronbach's alpha of five dimensions of the EQ-5D-3L was 0.67.

Construct validity

Statistically significant median score differences for HA-QoL dimensions, EQ-5D-3L index and VAS across participant subgroups are presented in Table 3. A complete profile for HRQoL of different participant groups and discriminative validity of the instruments is presented in Appendix 1. Statistically significant relationships were observed consistently between independent variables and three HAT-QoL dimensions (health worries, financial worries and sexual function). Male participants were less likely to have financial worries and more likely to have worse sexual function. Younger subjects were more likely to have worse sexual function, health and

Table 1. Socio-demographic and clinical characteristics of the study sample ($n = 257$).

Characteristic	Frequency (%)
Gender	
Male	72 (28.0)
Female	185 (72.0)
Age group (yr) (mean 39.7, SD 8.9)	
<25	6 (2.3)
25–54	235 (91.5)
>54	16 (6.2)
Marital status	
Single	23 (8.9)
Married	139 (54.1)
Divorced	32 (12.5)
Widowed	63 (24.5)
Level of education	
Primary	81 (31.5)
Secondary	169 (65.8)
Tertiary	7 (2.7)
Employment status	
Employed	31 (12.1)
Unemployed	226 (87.9)
Accommodation	
Owned	124 (48.3)
Rented	133 (51.7)
ART regimen	
d4t-based	87 (49.4)
AZT-based	21 (11.9)
TDF-based	68 (38.6)
Missing	81 (31.5)
WHO clinical staging	
I	43 (23.0)
II	64 (34.2)
III	80 (42.8)
Missing	70 (27.2)
Income (US$)	
<250	216 (84.1)
>250	41 (15.9)
CD4 count (cells/mm^3)	
<200	43 (23.4)
200–500	84 (45.6)
>500	57 (31.0)
Missing	73 (28.4)
Time on ART (months)	
<12	26 (14.8)
12–48	108 (61.4)
>48	42 (23.9)
Missing	81 (31.5)

disclosure worries, and less likely to have HIV mastery. Participants earning less than US$250 per month indicated worse overall function and were more likely to have health and financial worries. Statistically significant relationships were consistently observed between the EQ-5D-3L index and VAS scores, and level of education, employment status and income subgroups. Participants with primary level education, unemployed and a monthly income of less than US$250 were more likely to have poor QoL on the EQ-5D-3L index and VAS.

Convergent validity

Convergent validity of the HAT-QoL dimensions with EQ-5D-3L components was demonstrated and the data are presented in Table 4. All Spearman rank order coefficients for EQ-5D index and VAS comparisons with the HAT-QoL dimensions were significant ($p < .01$) except for the one between VAS and disclosure worries ($\rho = .12$; $p = .06$). Correlations for EQ-5D index comparisons with HAT-QoL dimensions were negligible with disclosure worries and provider trust; low with life satisfaction, financial worries, medication worries, HIV mastery and sexual function; and moderate with the overall function and health worries. Correlations for VAS comparisons with HAT-QoL dimensions were negligible with HIV mastery, disclosure worries, provider trust and sexual function; low with life satisfaction, health worries, financial worries and medication worries; and moderate with the overall function. The coefficient between EQ-5D index and VAS was 0.59 ($p < .001$). The coefficients for EQ-5D index and VAS comparisons with the HAT-QoL summary score were 0.58 and 0.40, respectively ($p < .001$).

Table 2. QoL score distributions and internal consistency reliability coefficients.

	HAT-QoL domain scores									EQ-5D-3L	
	OVFXN	LISAT	HEAWO	FINWO	MEDWO	HIVMA	DISWO	PROTR	SXFXN	EQIND	VAS
Range	0–100	0–100	0–100	0–100	0–100	0–100	0–100	0–100	0–100	0.23–0.9	20–100
Median	87.5	81.2	87.5	33.3	95	100	70	75	50	0.81	79
Mean	77.0	74.4	79.4	40.6	86.7	74.9	64.4	68.4	47.0	0.77	73.3
SD	24.8	28.8	25.2	32.9	19.9	37.8	30.1	32.4	40.2	0.15	18.9
Kurtosis	3.14	3.10	3.67	2.04	6.51	2.70	2.41	2.33	1.50	5.62	1.94
Skewness	−0.99	−1.01	−1.25	0.39	−1.91	−1.04	−0.67	−0.71	0.19	−1.76	−0.28
% floor[a]	1	4	1	22	0	8	7	8	30	0	0
% ceiling[a]	29	39	40	11	49	56	18	36	30	0	8
Reliability[b]	0.81	0.81	0.79	0.82	0.81	0.81	0.83	0.84	0.83	0.67	–
Domain-total correlation coefficient	0.65	0.58	0.78	0.51	0.60	0.61	0.38	0.32	0.45	–	–
Number of subjects	257	257	257	257	257	257	257	257	257	257	256

Notes: Dimensions for the HAT-QoL include the overall function (OVFXN), life satisfaction (LISAT), health worries (HEAWO), financial worries (FINWO), medication worries (MEDWO), HIV mastery (HIVMA), disclosure worries (DISWO), and provider trust (PROTR). QoL scores from the EQ-5D-3L include EQ-5D Index (EQIND) and visual analogue scale (VAS).

[a]The proportion of subjects scoring the bottom-most and top-most score for a dimension.

[b]Refers to internal consistency reliability as represented by Cronbach's alpha coefficients.

Table 3. Construct validity assessment of HRQoL tools using socio-demographic and clinical variables.

Characteristics	HAT-QoL domains									EQ-5D-3L scores	
	OVFXN	LISAT	HEAWO	FINWO	MEDWO	HIVMA	DISWO	PROTR	SXFXN	EQIND	VAS
Gender											
Male vs. Female	–[§]	–	–	16.7*	–	–	–	–	25**	–	–
Age											
<30 vs. >=30	–	–	−18.8*	–	–	−25*	−25**	–	−50*	–	–
Marital status											
Married vs. other (Single+ Widowed+ Divorced)	–	–	–	–	–	–	–	–	25*	0.046**	–
Level of education											
Primary vs. other (Secondary+ Tertiary)	–	–	–	−8.4**	–	–	–	–	−25*	−0.046**	−10**
Employment status											
Employed vs. Unemployed	–	21.9**	12.5*	–	–	–	–	–	–	0.067**	19*
ART regimen											
d4t-based vs. other (AZT-based+ TDF-based)	–	–	–	–	5**	–	–	−16.6*	–	–	–
Income (USD)											
<250 vs. >250)	−12.5**	−25**	−12.5**	−33.4**	–	0*	–	–	0*	−0.057**	−19**
Time on ART (months)											
<12 vs. >=12	–	–	–	–	–	–	–	–	–	0.067*	–

Notes: Dimensions for the HAT-QoL include the overall function (OVFXN), life satisfaction (LISAT), health worries (HEAWO), financial worries (FINWO), medication worries (MEDWO), HIV mastery (HIVMA), disclosure worries (DISWO) and provider trust (PROTR). QoL scores from the EQ-5D-3L include EQ-5D Index (EQIND) and visual analogue scale (VAS). AZT = zidovudine, d4T = stavudine, TDF = tenofovir disoproxil fumarate

Subgroup median score differences are presented. Median score differences were computed by subtracting the median score for the second subgroup in each parenthetical clause from the median score for the first subgroup (e.g. median score for females from that for males). A negative sign indicates worse function, more worries, less satisfaction, and so on, in the first subgroup in the parenthetical clause; a positive sign indicates better function, fewer worries, more satisfaction, and so on, by the first subgroup.

*Differences are significant at $p < .05$ but $> .01$.

**Differences are significant at $p < .01$.

[§]Cells with a "–" indicate that the difference in subgroup mean scores has a p-value $> .05$.

Discussion

To our knowledge, this is the first attempt to assess the HRQoL using a generic and an HIV-targeted instrument simultaneously in patients living with HIV/AIDS in Zimbabwe. Participants in this study reported high QoL, which may be a direct result of ART. The HRQoL scores for the EQ-5D-3L are similar to those reported in patients living with HIV receiving ART in other countries (Grossman, Sullivan, & Wu, 2003; Louwagie et al., 2007; Nglazi, West, Dave, Levitt, & Lambert, 2014). No similar study assessing HRQoL using the EQ-5D-3L in HIV patients receiving ART was found for Zimbabwe. The HAT-QoL dimension scores were considerably higher compared to previously reported values for people living with HIV/AIDS in Zimbabwe, where dimension mean scores were 40.2–79.3 (Taylor et al., 2008) in 2001 and 31.4–74.8 (Taylor et al., 2009) in 2002. The differences in time horizons during which data were collected may explain these differences. The ART programme in Zimbabwe resulted in the widespread availability of antiretroviral drugs which might explain the higher HRQoL in this study. The previous studies recruited patients as they presented for treatment for HIV-related opportunistic infections, with the majority meeting the WHO case definition for AIDS. In contrast, less than half of the patients in the current study were classified into the AIDS stage. The current study was performed in an urban setting whilst the two previous studies were carried out in a rural setting where patients relied on traditional medical practitioners to a greater extent.

HAT-QoL showed good internal reliability consistency in all the dimensions, further affirming the validity of the instrument in a Zimbabwean setting (Taylor et al., 2009). This is particularly important considering the socio-cultural sensitivities associated with QoL instruments.

The Cronbach's alpha for the EQ-5D-3L domains of 0.67 was slightly lower than the threshold value of 0.70. However, the item-test correlations (not shown) were higher than the threshold value of 0.40, thus rendering reliability satisfactory. The lack of floor/ceiling effects on EQ-5D index and VAS further demonstrates the validity of the EQ-5D-3L instrument in assessing the HRQoL in HIV-positive patients receiving ART. Further assessments may be required to confirm this finding, since the EQ-5D-3L has been associated with substantial floor/ceiling effects when used in the general population as well as in patients living with HIV (Badia, Schiaffino, Alonso, & Herdman, 1998; Bharmal & Thomas, 2006; Johnson & Pickard, 2000; Sakthong, Schommer, Gross, Prasithsirikul, & Sakulbumrungsil, 2009; Wang, Kindig, & Mullahy, 2005; Wu et al., 2002).

Significant relationships between HRQoL and participants' monthly income were consistently found across the majority of the HAT-QoL dimensions and the two components of the EQ-5D-3L. The positive correlation

Table 4. Spearman rank order correlation coefficients for EQ-5D index and VAS comparisons with the HAT-QoL dimensions.

	EQ-5D scales	
HAT-QoL dimensions	EQ-5D-3L index	EQ-VAS
Overall function	0.53***	0.51***
Life satisfaction	0.48***	0.34***
Health worries	0.56***	0.47***
Financial worries	0.47***	0.36***
Medication worries	0.41***	0.33***
HIV mastery	0.36***	0.21***
Disclosure worries	0.20**	–
Provider trust	−0.16**	−0.20**
Sexual function	0.33***	0.24***
HAT-QoL Summary Score	0.58***	0.40***

**$p < .01$.
***$p < .001$.

between income and HRQoL scores was also reported in other settings (Campsmith, Nakashima, & Davidson, 2003; Jelsma & Ferguson, 2004; Stangl, Wamai, Mermin, Awor, & Bunnell, 2007). This demonstrates that, even though services such as CD4 count test, viral load test and ART are provided for free in public health programmes, patients may still require financial resources to access other health-care services. Failure to access any of these services may have a negative impact on the QoL of patients. Consistent with other studies, education and employment, which are closely related to income, showed significant relationships with HRQoL (Jelsma & Ferguson, 2004; Louwagie et al., 2007; Nglazi et al., 2014). Gender, age and marital status also had significant relationships with HRQoL. Higher QoL scores observed in male participants may be related to the cultural norms and expectations within the Zimbabwean society about the roles and responsibilities that are deemed appropriate for men and women (Oparah, Soni, Arinze, & Chiazor, 2013).

The health status of participants as assessed by CD4 cell counts and WHO clinical stages was not significantly related to HRQoL. Similar assessments of the relationship between CD4 cell counts and HRQoL in Africa reported weak correlations (Igumbor, Stewart, & Holzemer, 2013), while other studies observed significant correlations (Bhargava & Booysen Fle, 2010; Nglazi et al., 2014; Venter, Gericke, & Bekker, 2009). The relatively small sample size in our study, and the large proportion of missing data (30%) in both the CD4 count and WHO stage variables, may have limited the power for detecting relationships between the clinical levels and HRQoL scores.

The current study draws major strength from the use of generic and HIV-targeted instruments, allowing for a comprehensive assessment of HRQoL. The Shona versions of the HAT-QoL and EQ-5D-3L instruments were culturally adopted and validated for the Zimbabwean population, making their use in this study appropriate. Furthermore, the availability of value sets for Zimbabwe allowed the derivation of the EQ-5D-3L index values weighted by tariffs from the same population. This study has several potential limitations that are important to consider for future research. Participants were selected from a single, urban facility, thus limiting the generalizability of findings. The extrapolation of the findings to other settings requires caution considering that HRQoL is sensitive to socio-cultural factors. The high HRQoL might be as a result of survivorship bias, where only patients with high QoL, who regularly come to the health-care facility for their follow-up visits and antiretroviral pick-ups, were included in the study. Patients with low HRQoL might have declined participation, stayed at home, became lost-to-follow up or died due to HIV/AIDS-related causes. Patients declining participation may have had advanced HIV/AIDS or had not mastered living with the disease, hence were not comfortable talking about their condition. The use of health-care workers as interviewers could have resulted in participants reporting higher HRQoL. The cross-sectional design of the study did not allow for assessment of HRQoL over time. Following up the participants over at least a year would have provided valuable data of the relationship of the change in clinical biomarkers and changes in HRQoL scores. In addition, causality could not be inferred between any of the independent variables described and HRQoL due to the cross-sectional design of the study.

Conclusions

The level of HRQoL observed in this study was generally high. Income, education and employment were positively and significantly associated with HRQoL. Interventions that improve the socio-economic situation in the country will enhance the QoL of HIV-infected patients receiving ART.

Acknowledgements

The views expressed in the manuscript do not reflect the views nor do they imply endorsement of the suggestion by the funders. NM and BD contributed to conception and design of the study, collected the data, drafted the manuscript and participated in analysis and interpretation. SK and MvH contributed to the conception and design of the study, participated in the review process of the manuscript for intellectual content and contributed to the analysis and interpretation. MJP participated in the review of the manuscript for intellectual content and contributed to analysis and interpretation.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the European Union Seventh Framework Programme (FP7/2007–2013) [grant agreement no. 266194]; Office of Global AIDS Coordinator and the US Department of Health and Human Services (National Institutes of Health (Fogarty International Centre) [grant number TW008881].

ORCID

N. Mafirakureva http://orcid.org/0000-0001-9775-6581

References

Apollo, T., Takarinda, K., Mugurungi, O., Chakanyuka, C., Simbini, T., & Harries, A. D. (2010). A report on the Zimbabwe antiretroviral therapy (ART) programme progress towards achieving MGD6 target 6B: Achievement and challenges. *Central African Journal of Medicine*, *56*(1–4), 12–14.

Badia, X., Schiaffino, A., Alonso, J., & Herdman, M. (1998). Using the EuroQoI 5-D in the Catalan general population: Feasibility and construct validity. *Quality of Life Research*, *7*(4), 311–322.

Bhargava, A., & Booysen Fle, R. (2010). Healthcare infrastructure and emotional support are predictors of CD4 cell counts and quality of life indices of patients on antiretroviral treatment in free state province, South Africa. *AIDS Care*, *22*(1), 1–9. doi:10.1080/09540120903012585

Bharmal, M., & Thomas 3rd, J. (2006). Comparing the EQ-5D and the SF-6D descriptive systems to assess their ceiling effects in the US general population. *Value in Health*, 9(4), 262–271. doi:10.1111/j.1524-4733.2006.00108.x

Campsmith, M. L., Nakashima, A. K., & Davidson, A. J. (2003). Self-reported health-related quality of life in persons with HIV infection: Results from a multi-site interview project. *Health and Quality of Life Outcomes*, *1*, 12.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. doi:10.1007/BF02310555

Degroote, S., Vogelaers, D., & Vandijck, D. M. (2014). What determines health-related quality of life among people living with HIV: An updated review of the literature. *Archives of Public Health*, *72*(1), 40. doi:10.1186/2049-3258-72-40

European Medicines Agency. (2005). *Reflection paper on the regulatory guidance for the use of health-related quality of life (HRQL) measures in the evaluation of medicinal products*. London. Retrieved from http://www.ispor.org/workpaper/emea-hrql-guidance.pdf

Feeny, D. (2000). A utility approach to the assessment of health-related quality of life. *Med Care*, *38*(9 Suppl.), Ii151–154.

Gow, J., George, G., & Govender, K. (2013). A comparison of quality of life between HIV positive and negative diamond miners in South Africa. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *10*(2), 89–95. doi:10.1080/17290376.2013.870066

Grossman, H. A., Sullivan, P. S., & Wu, A. W. (2003). Quality of life and HIV: Current assessment tools and future directions for clinical practice. *AIDS Read*, *13*(12), 583–590. 595–587.

Holmes, W. C., & Shea, J. A. (1998). A new HIV/AIDS-targeted quality of life (HAT-QoL) instrument: development, reliability, and validity. *Medical Care*, *36*(2), 138–154.

Holmes, W. C., & Shea, J. A. (1999). Two approaches to measuring quality of life in the HIV/AIDS population: HAT-QoL and MOS-HIV. *Quality of Life Research*, *8*(6), 515–527.

Igumbor, J., Stewart, A., & Holzemer, W. (2013). Comparison of the health-related quality of life, CD4 count and viral load of AIDS patients and people with HIV who have been on treatment for 12 months in rural South Africa. *Sahara j*, *10*(1), 25–31. doi:10.1080/17290376.2013.807070

Jelsma, J., & Ferguson, G. (2004). The determinants of self-reported health-related quality of life in a culturally and socially diverse South African community. *Bull World Health Organ*, *82*(3), 206–212.

Jelsma, J., Hansen, K., De Weerdt, W., De Cock, P., & Kind, P. (2003). How do Zimbabweans value health states? *Population Health Metrics*, *1*(1), 11. doi:10.1186/1478-7954-1-11

Jelsma, J., Mhundwa, K., De Weerdt, W., De Cock, P., Chimera, J., & Chivaura, V. (2001). The reliability of the Shona version of the EQ-5D. *Central African Journal of Medicine*, *47*(1), 8–13.

Johnson, J. A., & Pickard, A. S. (2000). Comparison of the EQ-5D and SF-12 health surveys in a general population survey in Alberta, Canada. *Medical Care*, *38*(1), 115–121.

Louwagie, G. M., Bachmann, M. O., Meyer, K., Booysen Fle, R., Fairall, L. R., & Heunis, C. (2007). Highly active antiretroviral treatment and health related quality of life in South African adults with human immunodeficiency virus infection: A cross-sectional analytical study. *BMC Public Health*, *7*, 244. doi:10.1186/1471-2458-7-244

McCrae, R. R., Kurtz, J. E., Yamagata, S., & Terracciano, A. (2011). Internal consistency, retest reliability, and their implications for personality scale validity. *Personality and Social Psychology Review*, *15*(1), 28–50. doi:10.1177/1088868310366253

Mukaka, M. M. (2012). Statistics corner: A guide to appropriate use of correlation coefficient in medical research. *Malawi Medical Journal*, *24*(3), 69–71.

Mutabazi-Mwesigire, D., Katamba, A., Martin, F., Seeley, J., & Wu, A. W. (2015). Factors that affect quality of life among people living with HIV attending an urban clinic in Uganda: A cohort study. *PLoS One*, *10*(6), e0126810. doi:10.1371/journal.pone.0126810

Nglazi, M. D., West, S. J., Dave, J. A., Levitt, N. S., & Lambert, E. V. (2014). Quality of life in individuals living with HIV/AIDS attending a public sector antiretroviral service in Cape Town, South Africa. *BMC Public Health*, *14*, 676. doi:10.1186/1471-2458-14-676

Oparah, A. C., Soni, J. S., Arinze, H. I., & Chiazor, I. E. (2013). Patient-reported quality of life during antiretroviral therapy in a Nigerian hospital. *Value in Health Regional Issues*, *2*(2), 254–258. doi:10.1016/j.vhri.2013.07.004

Patel, R., Kassaye, S., Gore-Felton, C., Wyshak, G., Kadzirange, G., Woelk, G., & Katzenstein, D. (2009). Quality of life, psychosocial health, and antiretroviral therapy among HIV-positive women in Zimbabwe. *AIDS Care*, *21*(12), 1517–1527. doi:10.1080/09540120902923055

Patrick, D. L., & Deyo, R. A. (1989). Generic and disease-specific measures in assessing health status and quality of life. *Medical Care*, *27*(3 Suppl.), S217–232.

Polinder, S., Haagsma, J. A., van Klaveren, D., Steyerberg, E. W., & van Beeck, E. F. (2015). Health-related quality of life after TBI: A systematic review of study design, instruments, measurement properties, and outcome. *Population Health Metrics*, *13*(1), 1–12. doi:10.1186/s12963-015-0037-1

Rabin, R., & de Charro, F. (2001). EQ-5D: A measure of health status from the EuroQol Group. *Annals of Medicine*, *33*(5), 337–343.

Revicki, D. A. (1989). Health-related quality of life in the evaluation of medical therapy for chronic illness. *Journal of Family Practice*, *29*(4), 377–380.

Robberstad, B., & Olsen, J. A. (2010). The health related quality of life of people living with HIV/AIDS in sub-Saharan Africa – a literature review and focus group study. *Cost Effectiveness and Resource Allocation*, *8*, 5. doi:10.1186/1478-7547-8-5

Sakthong, P., Schommer, J. C., Gross, C. R., Prasithsirikul, W., & Sakulbumrungsil, R. (2009). Health utilities in patients with HIV/AIDS in Thailand. *Value in Health*, *12*(2), 377–384. doi:10.1111/j.1524-4733.2008.00440.x

Sebit, M. B., Chandiwana, S. K., Latif, A. S., Gomo, E., Acuda, S. W., Makoni, F., & Vushe, J. (2000). Quality of life evaluation in patients with HIV-I infection: The impact of traditional medicine in Zimbabwe. *Central African Journal of Medicine*, *46*(8), 208–213.

Stangl, A. L., Wamai, N., Mermin, J., Awor, A. C., & Bunnell, R. E. (2007). Trends and predictors of quality of life among HIV-infected adults taking highly active antiretroviral therapy in rural Uganda. *AIDS Care*, *19*(5), 626–636. doi:10.1080/09540120701203915

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. doi:10.5116/ijme.4dfb.8dfd

Taylor, T. N., Dolezal, C., Tross, S., & Holmes, W. C. (2008). Comparison of HIV/AIDS-specific quality of life change in Zimbabwean patients at western medicine versus traditional African medicine care sites. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *49*(5), 552–556. doi:10.1097/QAI.0b013e31818d5be0

Taylor, T. N., Dolezal, C., Tross, S., & Holmes, W. C. (2009). Reliability and validity of two HIV/AIDS-specific quality of life instruments adapted for use in HIV-positive Zimbabweans. *AIDS Care*, *21*(5), 598–607. doi:10.1080/09540120802302574

UNAIDS. (2013). *GLOBAL REPORT. UNAIDS report on the global AIDS epidemic* 2013.

UN Joint Programme on HIV/AIDS (UNAIDS). (2014). *The Gap Report*. Retrieved from http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf

Venter, E., Gericke, G. J., & Bekker, P. J. (2009). Nutritional status, quality of life and CD4 cell count of adults living with HIV/AIDS in the Ga-Rankuwa area (South Africa). *South African Journal of Clinical Nutrition*, *22*(3), 124–129.

Wang, H., Kindig, D. A., & Mullahy, J. (2005). Variation in Chinese population health related quality of life: Results from a EuroQol study in Beijing, China. *Quality of Life Research*, *14*(1), 119–132.

WHO. (1946). *Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April* 1948. Retrieved from http://www.who.int/about/definition/en/print.html

Wu, A. W., Jacobson, K. L., Frick, K. D., Clark, R., Revicki, D. A., Freedberg, K. A., & Feinberg, J. (2002). Validity and responsiveness of the EuroQol as a measure of health-related quality of life in people enrolled in an AIDS clinical trial. *Quality of Life Research*, *11*(3), 273–282.

Appendix 1. Construct validity assessment of HRQoL tools using socio-demographic and clinical variables.

	HAT-QoL domain median scores									EQ-5D-3L Median Scores	
Variables	OVFXN	LISAT	HEAWO	FINWO	MEDWO	HIVMA	DISWO	PROTR	SXFXN	EQIND	VAS
Gender											
Male	87.5	87.3	87.5	50.0*	95	100	75	79.2	50**	0.83	77
Female	87.5	81.5	87.5	33.3	100	100	70	75	25	0.79	79
Age											
<25	93.8	87.5	87.5	70.8	95	100	60	87.5	0	0.76	65
25–54	87.5	81.2	87.5	33.3	95	100	70	75	50	0.83	79
>54	79.2	100	90.6	37.5	92.5	100	77.5	91.7	75	0.79	64.5
Marital status											
Single	70.8	75	93.8	50	95	75	70	83.3	0	0.79	70
Married	87.5	87.5	87.5	33.3	100	100	70	75	50	0.83	80
Widowed	83.3	81.2	93.8	41.7	95	100	80	33.3	25	0.79	70
Divorced	85.4	75	84.4	25	90	56.3	75	70.8	25	0.79	70
Level of education											
Primary	79.2*	81.3	87.5	33.3*	95	100	75	83.3	25*	0.79**	70**
Secondary	91.7	87.5	87.5	41.7	100	100	70	75	50	0.83	79.5
Tertiary	100	87.5	100	50	100	100	90	50	75	0.85	99
Employment status											
Employed	91.7	100*	100*	50	100	87.5	80	75	50	0.79**	89
Unemployed	83.3	78.1	87.5	33.3	95	100	70	75	50	0.85	70
Accommodation											
Owned	87.5	87.5	90.6	41.7	95	100	75	75	50	0.81	77
Rented	83.3	75	87.5	33.3	100	100	70	83.3	50	0.81	79
ART regimen											
d4t-based	87.5	87.5	87.5	50	90**	100	70	75*	50	0.78	72
AZT-based	91.7	75	87.5	25	100	100	70	75	50	0.83	80
TDF-based	83.3	87.5	100	45.8	100	100	75	58.3	50	0.83	79
Missing	83.3	75	87.5	33.3	95	87.5	70	83.3	50	0.79	70
WHO clinical staging											
I	91.7	87.5	93.8	41.5	95	100	65	83.3	25	0.83	80
II	83.3	87.5	87.5	33.3	95	100	80	83.3	50	0.80	70
III	87.5	81.3	93.8	50	97.5	100	75	66.7	50	0.83	80
Missing	83.3	75	87.5	33.3	100	93.8	70	83.3	50	0.79	70
Income											
<250	83.3**	75**	87.5**	33.3**	95	100*	70	75	50*	0.79**	70**
>250	95.8	100	100	66.7	100	100	80	66.7	50	0.84	89
CD4 count											
<200	91.7	87.5	100	50	100	100	75	66.7	25	0.83	80
200–500	83.3	81.3	87.5	33.3	97.5	100	67.5	75	50	0.79	70
>500	83.3	87.5	93.8	50	95	100	75	66.7	50	0.83	80
Missing	87.5	75	87.5	33.3	100	100	70	83.3	50	0.79	72.5
Time on ART											
<12	87.5	84.4	96.9	50	92.5	87.5	70	79.2	37.5	0.84*	74.5
12–48	89.6	87.5	87.5	41.7	95	100	70	70.8	50	0.83	79
>48	83.3	75	87.5	33.3	100	100	75	75	50	0.79	77

Notes: Dimensions for the HAT-QoL include the overall function (OVFXN), life satisfaction (LISAT), health worries (HEAWO), financial worries (FINWO), medication worries (MEDWO), HIV mastery (HIVMA), disclosure worries (DISWO), and provider trust (PROTR). QoL scores from the EQ-5D-3L include EQ-5D Index (EQIND) and visual analogue scale (VAS).

*$p < .05$.

**$p < .01$.