Research Article

Impact of Non-Communicable Diseases on The Quality of Life of HIV Patients on Antiretroviral Therapy in Fako Division

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Abstract

Background: Non-Communicable Diseases (NCDs) have reached epidemic proportion among people living with HIV (PLHIV) and this could have a negative bearing on the quality of life and survival of these patients.

Aim: The aim of this study was to determine the impact of NCDs on the perceived quality of life (QoL) of HIV patients on antiretroviral therapy (ART) in Fako Division, South West Region of Cameroon.

Methodology: A cross-sectional survey conducted in the months of June to August 2021. The WHOQoL Bref instrument was used to measure the quality of life of these patients. A total of 1440 HIV patients were sample from 5 HTCs selected purposely (high number of patients receiving treatment in these Centers). A serial or consecutive sampling technique was used to recruit participants in the HTCs. All the 4 domains of QoL (Physical, Psychological, social and environmental) were assessed. Data was entered in SPSS 25 and analyzed using stata 13. Multivariable logistic regression was used to identify independent determinants. Statistical significance was set at $p < 0.05$.

Results: The mean age of the participants was 45.6 (SD = 7.3) years. Overall, only 45.4% [95% CI: 42.3-47.9] of HIV patients had a good quality of life. The environmental (30.4%) and psychological (32.3%) domains of quality of life were lowest. Female gender (AOR 1.36; 95% CI 1.03-1.74), tertiary education (AOR 4.69; 95% CI 2.78-7.69), being employed (AOR 2.30; 95% CI 1.21-3.64), being married (AOR 1.67; 95% CI 1.23-2.19), baseline WHO HIV stages III and IV (AOR 0.56; 95% CI 0.29-0.89) and duration of HIV patient on ART for more than 10 years (AOR 0.34; 95% CI 0.25-0.47) were significantly associated to good quality of life among HIV patients on ART. Adult HIV patients with NCD co-morbidity were 0.50 times less likely to have a good quality of life compared to their counterparts without a NCD [AOR 0.54; 95% CI 0.32-0.89].

Conclusion: The quality of life of HIV patients on ART was significantly reduced by NCD co-morbidities.

Recommendation: HTCs in Fako should routinely and actively screen and manage NCDs improve on the QoL of HIV patients on ART.

Introduction

The burden of non-communicable diseases (NCD) and their modifiable risk factors is on the rise in Sub-Saharan Africa (SSA). Among people living with HIV (PLHIV), epidemiological studies have revealed a trend of increasing prevalence of four major risk factors of NCDs; hypertension, hyperglycemia, dyslipidemia and obesity [1-3]. With the increasing availability of antiretroviral therapy (ART), the ageing HIV population is susceptible to traditional risk factors for NCDs. Furthermore, both the HIV virus and prolonged ART use have been associated with dyslipidemia, insulin resistance, and atherosclerosis, interacting with traditional risk factors to increase the risk of NCDs among PLHIV [3, 4]. The increased NCDs risk among PLWH has the potential to threaten the success of ART use, causing morbidity, poor quality of life and premature mortality. In Cameroon, the universal test and treat approach was instituted in 2016. This novel approach requires placing all persons testing positive for HIV on ART irrespective of their immunological and clinical statuses. Since the institution of this novel strategy in Cameroon, very few studies have investigated the epidemiology of NCDs among PLHIV in the context of the universal test and treat strategy. Approximately more than 35 million deaths are caused by non-communicable diseases (NCDs) on an annual basis. Morbidity and mortality due to NCDs contribute significant threat globally on health and economy of individuals, societies and health systems [5, 6]. The four main NCDs which are being targeted for control globally are cardiovascular diseases (CVDs), chronic respiratory diseases, cancers and diabetes and the selected NCD risk factors also targeted for control are tobacco use, harmful alcohol use, salt intake, obesity, raised blood pressure, raised blood glucose and diabetes, and physical inactivity [6]. Coupled to the rapid urbanization observed in Fako Division, the double crises (socio-political and COVID-19 pandemics) could increase the prevalence of NCDs through either inaccessibility to health facilities and/or stressors. The lock-downs imposed by these two crises have led to increase in sedentary life, psychological stress and inadequate exercise with a long term consequence of spikes in NCDs such as hypertension and diabetes [7]. These double crises have considerably disrupted the health system through reduction in access to health facilities and reduction in staff and essential medication for patients suffering from NCDs. There is consistent evidence across the globe that the COVID-19 pandemic has considerably disrupted NCDs services. This

disruption has been particularly problematic for people living with chronic conditions and requiring long term care. Triage and telemedicine have been used to address this disruption in NCD services across the world.

The prevalence of HIV in Cameroon was 3.9% in 2015 [8]. The World Health Organization (WHO) estimates for deaths attributed to Non-Communicable Diseases (NCD) in Cameroon was 35.0% in 2018 [9]. The prevalence of HIV is 3.6% and that of hypertension is 31.1% in the South West Region (SWR) of Cameroon [2, 8]. The prevalence of hypertension (38.0%) and dyslipidemia (51.0%) in HIV patients on ART have reached epidemic levels in Fako Division, SWR of Cameroon [2, 3]. Fako Division as well as the other fast urbanizing divisions in Cameroon is experiencing a double burden of HIV and NCDs. Although evidence from high-income countries is definitive as to the emerging importance of NCDs in PLHIV, there are far fewer data and research advances regarding such conditions in low- and middle-income countries (LMICs). Hypertension and diabetes have reached epidemic levels and are the leading causes of chronic kidney and cardiovascular diseases among adult HIV patients on ART [2, 3]. This has considerably reduced the survival and quality of life of HIV patients on ART. There is paucity of data on the impact of NCD on the quality of life of PLHIV in LMICs. It is thus important to measure the quality of life of HIV patients suffering from NCDs co-morbidity.

Materials and Methods

Ethical and administrative consideration

For administrative approval, the study protocol was read and approved by South West Regional Delegation of Public Health and heads of the health facilities hosting the HTCs. Ethical clearance was obtained from the Faculty of Health Science Institutional Review Board, University of Buea, Cameroon.

Study design

This was a cross-sectional survey that took place in the months of June to August 2021.
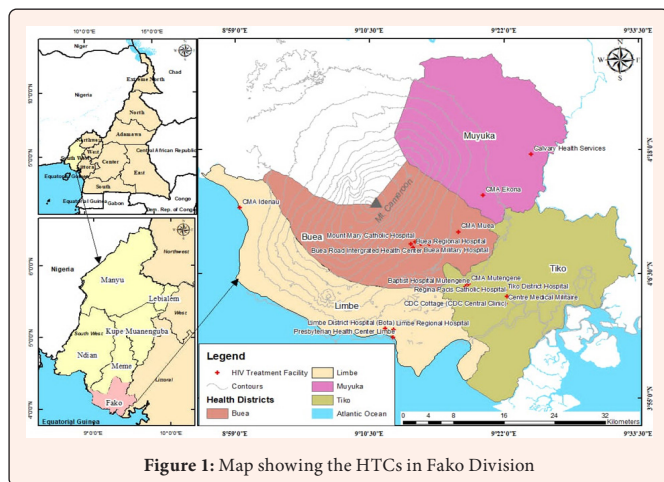
Study area and setting

Figure 1: Map showing the HTCs in Fako Division

The study was carried out in in 5 purposively (HTCs receiving the highest number of patients) in Fako Division (Figure 1). These hospitals are specialized HIV treatment centres that provide free anti-retroviral therapy in addition to HIV counseling and testing services. According to the RTG of the Regional Delegation of Public Health for the South West Region report for 2020, a total of 18,000 HIV patients were receiving treatment in Fako Division [10]. Patients report every 1, 3 and 6 months for antiretroviral therapy refill depending on the availability of drugs. The number of HIV patients on ART has seen a hick because most patients have been transferred-in from the highly hit conflict areas to Fako Division which is relatively safer. The patients who attend the facility are of different socio-economic statuses. Information on NCDs is not collected in routine care at the facility during patient visits. Hypertension is sometimes screened for at every clinic visit, diabetes mellitus II, asthma, cardiomyopathy and osteoporosis are usually screened for when a patient complains of certain symptoms during the routine follow up visits. Renal impairment is screened for among patients

upon being started on tenofovir based regimen. However, some NCDs are screened for as a result of participation in research projects that require screening for certain ailments / medical conditions.

Study population

The study population consisted of HIV patients aged 18 years and above receiving ART in the selected treatment centers in Fako Division.

Inclusion criteria

- Only HIV patients on ART were included.
- Only patients aged 18 years and above.

Exclusion criteria

- Participants with mental and physical disabilities,
- Patients who were debilitated and bed ridden as well as
- Pregnant women were excluded.

Sample size

The single population proportion formula by Fischer for cross-sectional studies was used for the WHO STEP approach [11]. To adjust for the design effect of the sample design, we multiplied the sample size by the design effect. To adjust for anticipated non-response, we divided by the anticipated response rate. Hence, Z-score=1.96; Proportion=38% [2]; marginal error=0.05; Design effect=1.5 and non-response rate=10%.

$$n = \frac{Z^2 * p * (1-p)}{e^2} * 1.5 \frac{Z^2 * p * (1-p)}{e^2} * 1.5$$

$$n = \frac{(1.96)^2 * 0.38 * 0.62}{(0.05)^2} * 1.5 \frac{(1.96)^2 * 0.38 * 0.62}{(0.05)^2} * 1.5$$

n = 545

To adjust for anticipated non-response, we added 10% of the sample. Thus a minimum total of 600 participants were anticipated and a total of 1440 clients were sampled using probability proportionate to size (PPS) as shown in table 1 below.

Table 1: Proportionate samples for each HTC

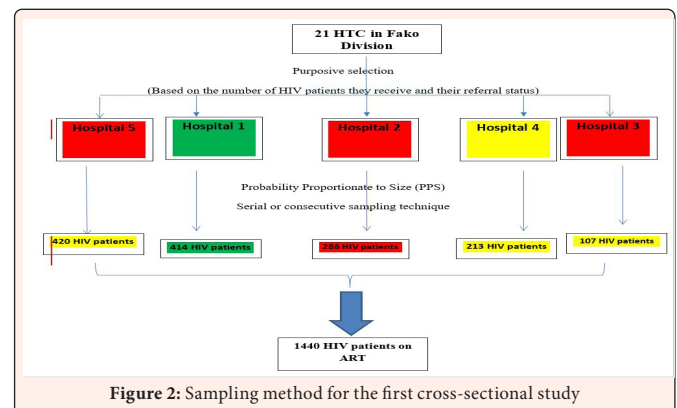| HIV treatment centre	Total number of patients	Number of patients to be sampled
Hospital – 1	3972	414
Hospital – 2	2738	286
Hospital – 3	1026	107
Hospital – 4	2042	213
Hospital – 5	4028	420
Total	13,806	1440

Sampling method

Figure 2: Sampling method for the first cross-sectional study

A two-stage sampling method was used. In the first stage, a purposeful sampling technique was used to select 5 HIV treatment centers in Fako Division. These treatment centers receive the largest number of clients and relatively secured in the current socio-political context. In the second stage, 1440 HIV patients on ART were recruited from the 5 selected treatment centers based on probability proportionate to size (Figure 2). A serial or consecutive sampling technique was used to recruit participants from the treatment centers until the sample size is reached.

Study variables

Outcomes of interest: WHO quality of life of HIV patients on ART. It was treated as continuous variables.

Independent variable: NCDs (Hypertension, osteoporosis, diabetes mellitus, renal impairment, asthma, cardiomyopathy and multi-morbidity were the outcomes of interest).

Other variables: Demographic factors: age, sex, marital status, level of education, occupation.

Other health related factors: WHO HIV stage, duration on ART.

Life style factors: smoking, alcohol use.

Data collection tools

The principal investigator of this research, in consultation with his academic supervisors, developed the questionnaires for data collection. The instrument used for data collection on quality of life developed by the WHO. The WHO Quality of Life Bref (WHOQoL BREF) is the WHO recommended tool for determining the quality of life. The WHOQoL BREF has 26 questions and is divided into 4 domains; physical health, psychological, social relationship and the environment.

Data collection procedure

Research experienced personnel with bachelors in nursing and midwifery, already working within the HIV treatment centers were recruited and trained as research assistants. They were responsible for the data extraction and administration of the questionnaire. Patients presenting to the study facility for clinical review and/or drug re-supply, were consented into the study. Relevant information was obtained from them through the questionnaire that was administered by the nurses. The questionnaire was used to capture information on the quality of life of the participants.

Data management

All study data was checked for accuracy, completeness and consistency at the end of each day by the principal investigator, and any identified errors were corrected in real time. Hard copies of the questionnaires were stored in a water proof box file and electronic data bases were kept in password protected computers. An external hard drive was used to back up the data. Double data entry was done using Epi info version 7.

Data analysis

All data analysis was done using STATA version 13.0 (STATA, College Station, Texas, USA). All continuous variables were summarized using means and standard deviations or medians and inter-quartile ranges, while categorical variables were summarized using proportions or percentages. Prevalence was reported with 95% confidence intervals. The QoL scores were calculated and converted following the guidelines laid by WHOQoL Group [12]. Having a QoL score greater than the mean score was considered as good QoL. Chi-square test was used to compare the proportion of participants with good QoL. Multivariable logistic regression model was used to identify the independent predictors of good quality of life among HIV patients with NCDs.

Results

Socio-demographic Characteristics of Participants

Table 2 describes the socio-demographic characteristics of 1440 consecutively sampled adult HIV patients on ART in HTCs in Fako Division. The mean age of the participants was 45.6 (SD = 7.3) years. Of 1440 participants sampled, 1023 (71.0%) were females, 753 (52.4%) were either married or cohabiting and 156 (10.9%) had no formal education. One-fifth of the participants were unemployed. Majority (89.2%) of the participants were Christians. There was a bipolarization of WHO HIV staging at initiation with 36.6% (stage I) and 26.9% (stage IV). Of the 1440 participants sampled, only 51 (4.7%) were on ART with a protease inhibitor. The mean duration of these HIV patients on ART was 7.3 (SD=2.3). Forty percent of the participants were initiated on ART during the universal test and treat era. One third of the participants had a family history of hypertension.

Table 2: Socio-demographic Characteristics of Participants

Variable	Frequency	Percentage (%)
Age (Years)	Mean (SD)	45.6 (7.3)
21 – 30	87	6
31 – 50	903	62.7
51+	450	31.3
Gender		
Male	417	29
Female	1023	71
Marital status		
Single	414	28.8
Married/Cohabiting	753	52.4
Divorced/Separated	219	15.2
Widow(er)	51	3.6
Level of education		
No formal education	156	10.9
Primary	567	39.5
Secondary	540	37.7
Tertiary	171	11.9
Employment status		
Employed	1140	79.2
Unemployed	300	20.8
Religion		
Christian	1284	89.2
Muslim	33	2.3
Others	123	8.5
WHO clinical stage		
I	527	36.6
II	175	12.1
III	351	24.4
IV	387	26.9
ART type		
ART with PI	51	4.7
ART with no PI	1032	95.3
Duration on ART	Mean (SD)	7.3 (2.3)
1 – 5	570	40
6 – 10	516	36.2
11+	339	23.8
UTT period		
No	855	60
Yes	570	40
Family history of hypertension		
No	687	64.1
Yes	384	35.9

ART=Antiretroviral therapy, UTT=Universal test and treat, PI=Protease inhibitor, SD=Standard deviation

Overall Quality of Life of adult HIV patients on ART

The mean quality of life score of adult HIV patients on ART in Fako Division were 60.0 (SD=9.3), 63.2 (SD=9.2), 69.5 (SD=10.7), 58.1 (SD=7.6) and 62.7 (SD=10.2) for the physical, psychological, social, environmental domains and overall quality of life respectively on 100. Of 654 (45.4%) had an overall good quality of life. The environmental (30.4%) and psychological (32.3%) domains of quality of life were lowest (Figure 3).
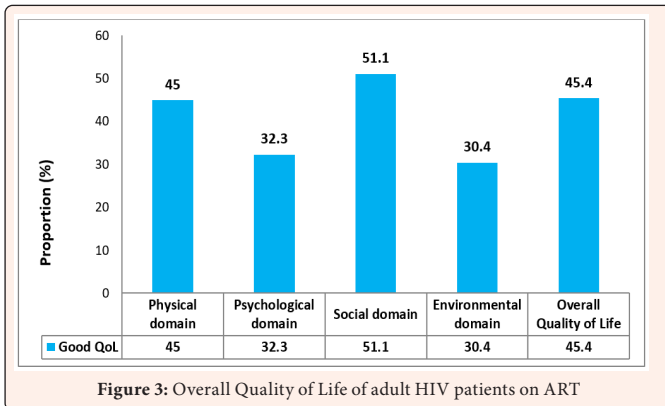
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Figure 3: Overall Quality of Life of adult HIV patients on ART

Impact of NCDs on the Quality of life of adult HIV patients on ART in Fako Division

The quality of life of HIV patients with NCD co-morbidity was significantly lower in all the 4 domains when compared to their counterparts with only HIV. Overall the proportion of participants with a good perceived quality of life was significantly (p < 0.001) lower in HIV patients with a NCD co-morbidity (20.2%) compared to those without a NCD co-morbidity (54.6%) as shown in (Table 2 and figure 4).

Table 2: Impact of NCDs on the Quality of life of adult HIV patients on ART

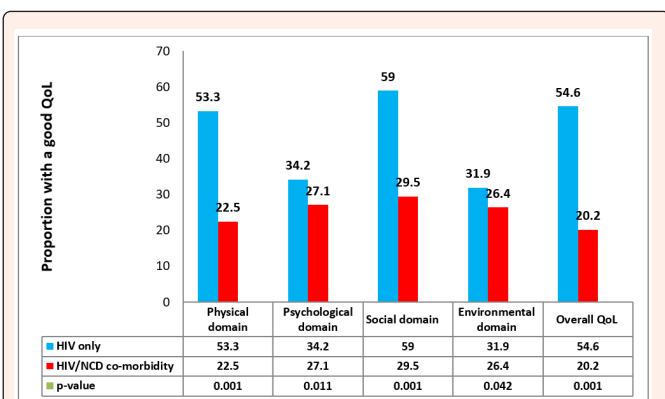| QoL domains	Good QoL, n (%)			
	HIV only (n=1053)	HIV/NCD co-morbidity (n=387)	χ 2	p-value
Physical domain	561 (53.3)	87 (22.5)	108.438	<0.001
Psychological domain	360 (34.2)	105 (27.1)	6.445	0.011
Social domain	621 (59.0)	114 (29.5)	98.666	<0.001
Environmental domain	336 (31.9)	102 (26.4)	4.122	0.042
Overall QoL	575 (54.6)	78 (20.2)	135.523	<0.001

Figure 4: Impact of NCDs on the Quality of life of adult HIV patients on ART

Determinant of good quality of life among HIV patient on ART

After adjusting for confounders in the multivariable analysis, the characteristics that demonstrated a significant and strong relationship with good quality of life among HIV patients on ART in Fako were female gender (AOR 1.36; 95% CI 1.03-1.74), tertiary education (AOR 4.69; 95% CI 2.78-7.69), being employed (AOR 2.30; 95% CI 1.21-3.64), being married (AOR 1.67; 95% CI 1.23-2.19), baseline WHO HIV stages III and IV (AOR 0.56; 95% CI 0.29-0.89) and duration of HIV patient on ART for more than 10 years (AOR 0.34; 95% CI 0.25-0.47) as shown in table 3. Adult HIV patients with NCD co-morbidities were significantly less likely to have a good quality of life compared

to their counterparts without NCD (AOR 0.54; 95% CI 0.32-0.89). Only hypertension had a significant impact on the quality of life of adult HIV patients on ART (AOR 0.18; 95% CI 0.10-0.31).

Table 3: Determinant of good quality of life among HIV patient on ART

Variables	Overall Good Quality of life, n (%)	
	UOR (95%CI)	AOR (95%CI)
NCD co-morbidity		
No	1	1
Yes	0.21 (0.16-0.27)*	0.54 (0.32-0.89)*
Hypertension		
No	1	1
Yes	0.15 (0.07-0.17)*	0.18 (0.10-0.31)*
Diabetes mellitus		
No	1	1
Yes	0.25 (0.12-0.45)*	0.89 (0.45-1.98)
Renal impairment		
No	1	1
Yes	0.14 (0.04-0.48)*	0.33 (0.08-1.25)
Gender		
Male	1	1
Female	1.19 (0.96-1.56)	1.36 (1.03-1.74)*
Educational level		
No formal education	1	1
Primary	2.10 (1.23-3.54)*	2.16 (1.36-3.65)*
Secondary	1.97 (1.33-3.08)*	1.99 (1.23-3.09)*
Tertiary	4.52 (2.56-7.34)*	4.69 (2.78-7.69)*
Employment status		
Unemployed	1	1
Employed	2.31 (1.36-3.98)*	2.30 (1.21-3.64)*
Marital status		
Single	1	1
Married	1.58 (1.09-2.69)*	1.67 (1.23-2.19)*
Divorced	0.80 (0.56-1.98)	0.78 (0.41-1.07)
WHO HIV stage		
I-II	1	1
III-IV	0.60 (0.23-0.84)*	0.56 (0.29-0.89)*
Duration on ART		
0 – 5	1	1
6 – 10	0.80 (0.62-1.12)	0.78 (0.57-1.08)
11+	0.39 (0.25-0.49)*	0.34 (0.25-0.47)*

UOR: Unadjusted Odd Ratio, **AOR:** Adjusted Odd Ratio; **CI:** Confidence Interval; * = significant variables at p< 0.05, **PIs:** Protease inhibitors

Discussion

The present stud showed that the overall quality of life of HIV patients on ART in Fako Division was average with a mean score of 62.7 on a scale of 100. Overall, only

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45.4% of the patients had a good quality of life. Compared to the other domains of quality of life, the psychological (32.3%) and environmental (30.4%) domains recorded the lowest quality among the PLHIV. The findings are supported by studies carried out in India, where the psychological and social domains of quality of life were the lowest among old patients suffering from NCDs (Hypertension and diabetes) [13, 14]. This is a reflection of a society where the stigmatization of HIV patients is still common. The environmental (work and income) shows that these patients' productivity is greatly undermined by their condition. Our study revealed that adult HIV patients with NCD co-morbidities were significantly less likely to have a good quality of life compared to their counterparts without NCD (AOR 0.54; 95% CI 0.32-0.89). Only hypertension had a significant impact on the quality of life of adult HIV patients on ART (AOR 0.18; 95% CI 0.10-0.31). These results are in line with a study among the general population in India, which showed that the perceived quality of life of NCDs (mostly diabetes and hypertension) patients was significantly lower than in their counterparts with no NCD [14]. In our study, only hypertension had a significant effect on QoL of HIV patients on ART. This could be explained by the fact that it had the highest prevalence and the other NCDs burdens were undermined. Apart from NCDs, factors like socio-economic, baseline WHO HIV clinical stage and duration on ART also significantly influenced the quality of life of HIV patients on ART in Fako Division. This finding was supported by the results of a study to assess the quality of life in hemodialysis patients using the WHOQoL BREF questionnaire revealed that educational status and family income were associated with their QoL [15].

Conclusion

Adult HIV patients on ART in Fako Division had a worst quality of life in the psychological and environmental domains. HIV patients with NCD co-morbidity were less likely to have an overall good quality of life (in all the 4 domains) compared to the counterparts with no NCD. Other factors such as socio-economic, WHO HIV clinical stage and duration on ART significantly influenced the quality of life of HIV patients on ART in Fako Division.

Recommendation

The Ministry of Public Health through the UPECs should reinforce strategies to prevent and manage NCDs (through early screening, diagnosis and treatment) so as to improve of the already compromised quality of life of adult HIV patients on ART. Other interventions targeting the improvement of the socio-economic status of these patients could have a positive bearing on their QoL.

Strengths and Limitations

The sample size of 1440 is a representative one with a power of detecting possible statistically significant changes. Perceived quality of life was self-reported and hence prone to recall and self-desirability or social desirability biases. This bias was limited by adhering to the rules of privacy in research involving human. The study was a cross-sectional study in which explanatory and outcome variables are collected at the same time. This makes it difficult to establish causality in this study design.

Perspectives

We recommend further studies to explore the impact of NCDs on other indices of morbidity and mortality like the disease adjusted life years (DALYs) and mortality among HIV patients on ART.

Abbreviations

AIDS: Acquired Immuno-deficiency Syndrome; ART: Anti-retroviral therapy; COVID-19: Coronavirus Disease 2019; CVDs: cardiovascular diseases; HTCs: HIV Treatment Centers; HIV: Human immunodeficiency virus; LMIC: Low and middle-income countries; NCD: Non-communicable disease; PLWH: People living with HIV; PPS: Probability Proportionate to size; QoL: Quality of life; SWR: South West Region; SSA: Sub-Saharan Africa; UTT; Universal Test and Treat; WHO: World Health Organization

Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Authors' Contributions

TAY, ALN, NFP and EOG designed the study. TAY, NEN, WF and KEN did the fieldwork. TAY and TN did the analysis. TAY wrote the first draft, and all authors approved the final version.

Competing Interests

The authors declare that they have no competing interests.

Consent for Publication

This manuscript does not contain any individual's data. Consent for publication was obtained from the PhD thesis supervisors.

Ethics Approval and Consent to Participate

This study was approved for exemption by the Faculty of Health Sciences of the Institutional Review Board at University of Buea.

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