Scientific Research Publishing

Advances in Infectious Diseases, 2025, 15(3), 537-553
https://www.scirp.org/journal/aid
ISSN Online: 2164-2656
ISSN Print: 2164-2648

The Effectiveness of the HIV Test-and-Treat Strategy in the South West Region of Cameroon: Results of a Cross-Sectional Study

Tankoh Marceline Fegen[1*], Loveline Lum Niba[1], Tendongfor Nicholas[2]

[1]Department of Public Health, Faculty of Health Sciences, University of Bamenda, Bamenda, Cameroon
[2]Department of Public Health and Hygiene, Faculty of Health Sciences,
University of Buea, Buea, Cameroon
Email: *tankohf@gmail.com, lumnyanga@gmail.com, tendongfor@gmail.com

How to cite this paper: Fegen, T.M., Niba, L.L. and Nicholas, T. (2025) The Effectiveness of the HIV Test-and-Treat Strategy in the South West Region of Cameroon: Results of a Cross-Sectional Study. *Advances in Infectious Diseases*, **15**, 537-553.
https://doi.org/10.4236/aid.2025.153040

Received: July 28, 2025
Accepted: September 5, 2025
Published: September 8, 2025

Abstract

Background: Over the past two decades, global efforts to combat HIV/AIDS have led to significant advancements in the expansion of Antiretroviral Therapy (ART) access using the "test-and-treat" approach endorsed by WHO in 2016. Cameroon has implemented the test-and-treat. Despite these efforts, significant challenges affect access to ART and outcomes, threatening progress toward epidemic control. This study set out to evaluate the implementation fidelity of the test-and-treat strategy in the South West Region of Cameroon. **Methods:** A hospital-based cross-sectional study was conducted in eleven health facilities across eight districts in the South West Region of Cameroon. This involved 504 people living with HIV/AIDS (PLHIV) (aged 15 - 59 years who had been on ART for at least six months) selected through a multi-stage sampling technique. Data collection was done using a structured questionnaire and data extraction form. Data were analyzed using SPSS version 26.0. Associations between adherence, viral suppression, and determinants were analyzed using chi-square tests. In addition, logistic regression was used to identify the independent factors associated with treatment outcomes. **Results:** Of the 504 participants, the mean age was 39.7 years, with females constituting 71.3%. Only 22.4% of newly diagnosed patients were initiated on ART on the same day, while more than 67% were initiated within a period of six months, indicating suboptimal implementation of immediate treatment. Good ART adherence was 56.8% using the Visual Analogue Scale (VAS) and 79.8% by self-reporting. Results showed that viral suppression was achieved in 87.7% of the study participants. Bivariate analysis indicated that older age (OR = 1.45, 95% CI: 1.02 - 2.07, $p < 0.05$), absence of mandatory pre-treatment tests (OR = 2.38, 95% CI: 1.219 - 4.662, $p < 0.05$), and ease of accessing free services (OR

= 3.12, 95% CI: 1.45 - 6.70, p < 0.05) positively influenced adherence and viral suppression. Conversely, misconceptions that ART is temporary (OR = 0.52, 95% CI: 0.30 - 0.89, p > 0.05), concerns about stigma (OR = 0.60, 95% CI: 0.36 - 0.99, p > 0.05), and systemic delays (OR = 0.45, 95% CI: 0.23 - 0.89, p > 0.05) impeded optimal treatment outcomes. Multivariate analysis revealed that absence of mandatory pre-treatment tests (AOR = 2.15, 95% CI: 1.10 - 4.20, p < 0.05), payment of higher amounts (AOR = 0.02, 95% CI: 0.001 - 0.233, p < 0.05), and good adherence levels (AOR = 3.75, 95% CI: 2.10 - 6.70, p < 0.05) were independent factors associated with treatment outcomes. **Conclusions:** The test-and-treat strategy is promising. Despite high viral suppression rates, delays in ART initiation, poor adherence, misconceptions about lifelong treatment, and systemic setbacks highlight critical gaps that impede the effective implementation of the test-and-treat strategy and better treatment outcomes. Strengthening health system capacity, addressing social barriers, and enhancing patient education are vital to improving ART uptake, adherence, and viral suppression, as we strive to meet the 95-95-95 targets and achieve epidemic control.

Keywords

HIV/AIDS, Test-and-Treat, Art Initiation, Adherence, Viral Suppression

1. Introduction

Over the past two decades, significant progress has been made in the global response to HIV/AIDS, driven by innovations such as expanding access to Antiretroviral Therapy (ART), enhancing prevention efforts, and promoting behavioral change strategies [1]. The Joint United Nations Programme on HIV/AIDS (UNAIDS) established the 95-95-95 targets with the objective that by 2030, 95% of all people living with HIV (PLHIV) will be diagnosed, 95% of those diagnosed will be on ART, and 95% of those on ART will achieve viral suppression [1]. Achieving these ambitious goals is pivotal for controlling the HIV epidemic.

The World Health Organization (WHO) endorsed the "test-and-treat" strategy in 2016, recommending immediate ART initiation upon HIV diagnosis, regardless of CD4 count [2]. This approach has shown promise in reducing HIV transmission, improving health outcomes, and streamlining service delivery [2] [3]. Many countries, including Cameroon, incorporated this strategy into national guidelines in 2016 to accelerate progress towards epidemic control [4]. Cameroon, with an estimated HIV prevalence of approximately 3.7% among adults aged 15 - 49 [4], adopted the test-and-treat policy to rapidly expand ART coverage, especially in high-burden regions like the South West. Despite policy adoption, challenges such as health system limitations, socio-cultural barriers, and issues related to adherence threaten to impede progress [5] [6]. For instance, delays in ART initiation, inadequate infrastructure, stockouts of medicines, stigma, and misinformation have

been reported [3] [5] [7]. Recent studies, such as Bekolo *et al.* (2023), have highlighted the implementation challenges of universal test-and-treat (UTT) strategies across West and Central Africa, emphasizing issues related to health system capacity, stigma, and adherence [5].

Adherence to ART remains a cornerstone for achieving viral suppression, as suboptimal adherence increases the risks of virologic failure, drug resistance, and ongoing HIV transmission [3]. Understanding adherence patterns and their determinants within the context of the test-and-treat strategy is crucial for developing effective interventions. Recent studies, such as Bekolo *et al.* (2023), highlight how the uptake of UTT policies influences clinical outcomes, including CD4, viral load, testing rates, and opportunistic infections. Incorporating these insights underscores the importance of evaluating ART initiation, adherence levels, and the various individual, sociocultural, and health system factors that influence adherence in the Southwest Region (SWR) of Cameroon. This study aims to assess these parameters and treatment outcomes among PLHIV, providing evidence to inform targeted interventions, optimize HIV service delivery, and advance progress toward the 95-95-95 targets.

2. Materials and Methods

2.1. Study Site, Design, and Study Participants

The South West Region of Cameroon has approximately 4 million residents, predominantly Bantu ethnic groups. HIV prevalence is around 2.4%, slightly lower for a region than the national average of 2.9% [1]. The region faces challenges related to healthcare access and HIV prevention efforts. The region's socio-cultural diversity, variable health infrastructure, and HIV burden provide a comprehensive context for evaluating policy implementation.

This was a hospital-based cross-sectional study carried out from June 2023 to March 2024 involving 504 PLHIV aged 15 to 59 years receiving treatment in one of the eleven HIV care and treatment centers in the SWR of Cameroon and who had been on ART for at least 6 months with a viral load result. Participants were recruited using a multi-stage sampling technique based on the WHO thirty-sampling technique [7].

In the first stage, eight districts were selected through simple random sampling from the region's total districts, ensuring diverse geographic and demographic representation. Subsequently, a list of 15 health facilities within these districts was stratified by type (public and private/confessional). From these, 11 facilities were randomly selected to optimize resource use while maintaining representativeness. The transition from 15 identified facilities to 11 final facilities was based on logistical considerations, facility capacity, and the availability of eligible participants. Finally, at the facility level, individual participants were then randomly selected. However, we excluded PLHIV who were critically ill and those without a first viral load result after 6 months on ART.

The sample size was calculated using the Cochran formula [8], with a preva-

lence (p) of 12.9% (adherence level among adolescents in Cameroon, Mbuwir *et al.*, 2021). The formula used for the sample size calculation is:

$$n = Z^2 p\,(1 - p)/d^2$$

where:

- Z = 1.96 (for 95% confidence level)
- p = 0.129
- d = 0.05 (desired precision)

Plugging in values:

$N = (1.96)^2\ 0.129\ (1 - 0.129)/0.052 \approx 172$

Adjusting for a 10% non-response rate:

Adjusted = $172 + (0.10 \times 172) \approx 189$

2.2. Ethical Considerations

Approval to carry out this study was obtained from the Institutional Review Board (IRB) of the University of Bamenda (Ref No 2022/0779H/Uba/IRB). Administrative clearance was obtained from the Regional Delegation of Public Health for the South West Region, facilitated by the regional delegation office for research (Ref No R11/MINSANTE/SWR/RDPH/PS/988/81). District health services and hospital clearances were obtained from all the districts and health facilities involved in the study. Written informed consent was obtained from all the adult patients, assent from adolescents 15 - 19 years, as well as parental consent for these adolescents, respectively, before any data collection procedure started.

2.3. Data Collection

2.3.1. Questionnaire and Data Extraction Form

Data for this study was collected using a self-administered structured questionnaire and a data extraction form, which was piloted before the study to ascertain the validity and reliability of the tools and the procedures. The pretest was conducted in 3 health facilities (non-study sites) in Buea, Tiko, and Limbe health districts among 45 clients. It identified potential issues such as poor flexibility, scope, and functionality of tools, refined questions and data elements, and improved data collection methods and processes (improved training to foster understanding and operational outcomes). The questionnaire was made up of 43 questions and consisted of the following sections: 1) Sociodemographic characteristics; 2) Clinical characteristics of the study population; 3) Adherence, which was measured using the Visual Analog Scale (VAS) because it provides a simple, sensitive, and quantitative way to measure adherence; 4) Treatment outcome (viral load suppressed or unsuppressed, etc.). The VAS adherence cutoff for "good" adherence was defined as ≥90%, consistent with existing literature [9] [10]. Self-reported adherence was considered "good" if participants reported ≥95% adherence. The data extraction form consisted of 14 questions and captured data including participants' HIV test/initiation dates, ART details, cotrimoxazole and isoniazid uptake, viral load results, retention, as well as user fees information, complementing the question-

naire.

2.3.2. Techniques to Minimize Bias/Errors

A simple random sampling technique was used to recruit participants who reflect the broader population to ensure that all eligible participants had an equal chance of being selected, reducing selection bias. Ethical guidelines were strictly followed to ensure voluntary participation, informed consent, assent, and to avoid conflicts of interest. Confidentiality was maintained. All Research Assistants (RAs) were trained, and a well-detailed protocol was installed to ensure they adhered to it and to ensure a reduction in differences relating to data collection or treatment implementation. All RAs were well supervised to ensure that the study protocols were correctly implemented and to minimize data collection errors. We also conducted a pilot study to test and refine procedures, ensuring that full-scale studies are as error-free as possible. Summarily, standardized procedures were followed to reduce information bias.

2.3.3. Data Analysis

Data were entered into Kobo Collect, downloaded as an Excel spreadsheet, cleaned, and analyzed in SPSS version 26.0. The overall response rate was 95.2%, with a total of 504 valid entries included in the final analysis. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables such as demographic characteristics, adherence levels, and treatment outcomes. Bivariate associations between variables: age, pre-treatment tests, access to free services, misconceptions, stigma, systemic delays, and treatment outcomes were determined using the chi-square test. To identify independent determinants of treatment success, multivariate logistic regression analysis was performed, estimating Adjusted Odds Ratios (AORs) with 95% Confidence Intervals (CIs). A p-value of less than 0.05 was considered statistically significant. Chi-square tests examined associations, and multivariate logistic regression identified factors independently associated with adherence and viral suppression. Variables were included in the multivariate model based on their significance in bivariate analyses at $p < 0.05$, deemed clinically relevant (such as age, gender, adherence levels, and health system factors). All relevant variables such as age, sex, marital status, education, income, stigma, confidentiality concerns, pre-treatment testing, and payment for services were explicitly listed and evaluated in the model.

3. Results

3.1. Participants

Our study included 504 participants (mean age 39 ± 12.7 years) from 11 health facilities, with the Limbe Regional Hospital having the highest number of participants (23.3%). We found that 71.3% of our study participants were female, 6.6% had no formal education, and 42.1% were married, as seen in **Table 1**.

Table 1. Demographic characteristics of study participants (n = 504).

Variable	Categories	Frequency	Percentage (%)
Age group	<20	38	7.5
	20 - 30	85	16.8
	>30	381	78.9
Sex	Female	350	71.3
	Male	141	28.7
Level of education	No school	33	6.6
	Primary	238	47.9
	Secondary	202	40.6
	Tertiary	24	4.8
Religion	Christianity	450	89.3
	Islam	35	6.9
	Traditional	9	1.8
	Others	10	2
Marital status	Single	157	32.1
	Married	206	42.1
	Divorced/separated	42	8.6
	Widow(er)	84	17.2

3.2. Clinical Profile of Study Participants

We found that 52.9% of the participants had known their HIV status 0 - 5 years ago. A greater proportion, 350 (69.4%), of the participants were on TLD as the ART regimen, followed by 120 (23.8%). Co-trimoxazole prophylaxis was administered to 68.3%. Also, 51.6% of the participants were on isoniazid. Retention at 12 months was 86.3%.

3.3. Implementation of the Test-and-Treat Model: ART Initiation Timing

Only 100 (22.4%) of newly diagnosed patients were initiated on ART on the same day. The majority, 340 (67.1%), initiated ART within six months (**Figure 1**).

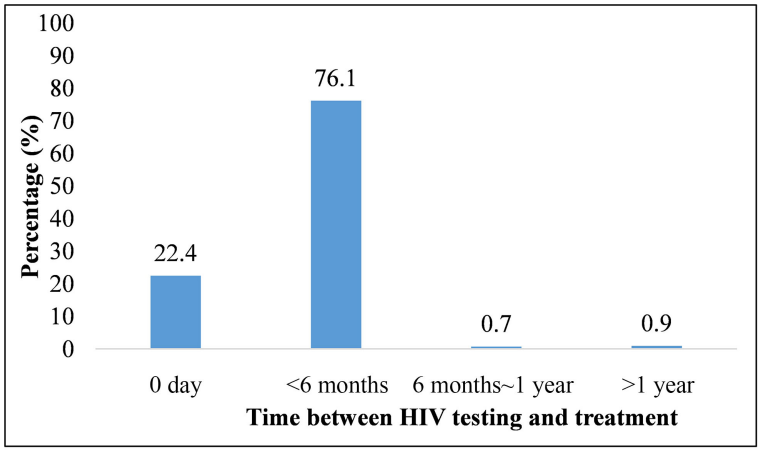

Figure 1. Implementation levels of the test and treat model.

Moreover, 235 (47.9%) of the HIV patients knew their HIV status 1 - 5 years from the day of data collection, while 18 (3.7%) knew their HIV status <1 year from the time of data collection. One hundred and thirty-four (26.6%) of the HIV patients were initiated on ART by a counsellor, while 6 (1.2%) said they were initiated by other health personnel. A greater proportion, 306 (61.6%) of the HIV patients, were asked to do a compulsory test as a prerequisite to start HIV medication, and 173 (34.6%) were asked to bring a close friend or relative to sign/to support them before the start of HIV medications.

3.4. Adherence Levels and Influencing Factors

With regards to the number of missed medications in the last month**,** 199 (85.8%) of the HIV patients had missed taking ART dose 1 - 4 times while 12 (5.2%) had missed ART dose more than 15 times. Regarding the self-reported adherence to ART, 426 (79.8%) of the HIV patients had good adherence while 107 (20.2%) had poor adherence. (**Figure 2**)

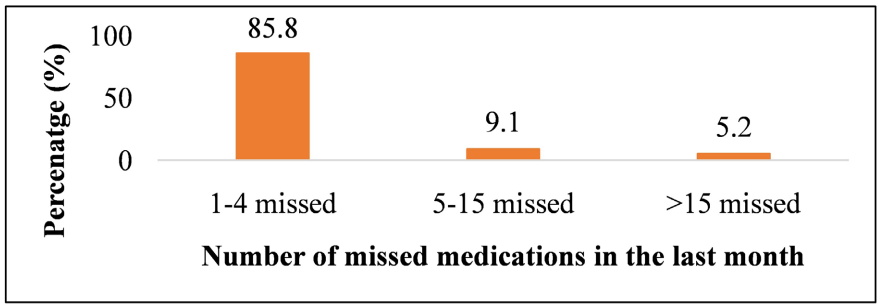

Figure 2. Number of missed medications in the last month among persons living with HIV.

3.5. Self-Reported Adherence and Missed Doses

As per the adherence to ART measured by the visual analogue scale, 285 (56.8%) of the HIV patients had good adherence, while 55 (11%) had poor adherence (**Figure 3**).

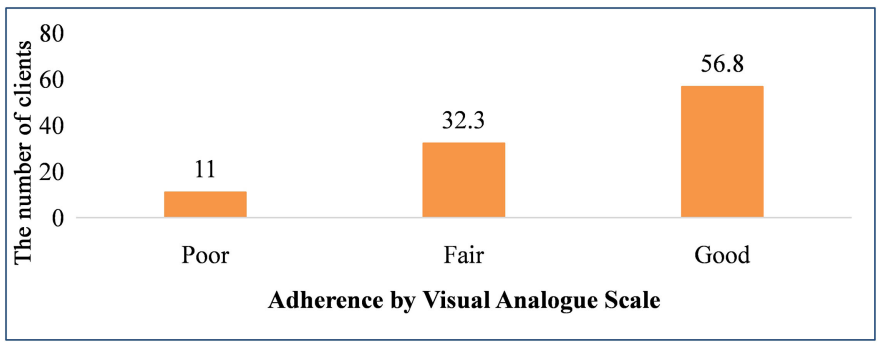

Figure 3. Adherence by visual analogue scale.

While 81.5% considered themselves adherent, only 56.8% had adherence levels >90% based on VAS. About 85.8% missed 1 - 4 doses in the past month.

With regard to the adherence measured by viral load suppression among persons living with HIV, 87.7% had suppressed viral load, while the viral load of 59 (12.3%) was unsuppressed. Adherence levels are significantly associated with viral suppression ($p < 0.001$).

3.6. Factors Associated with Adherence and Viral Suppression

Our study revealed a significant association ($\chi^2 = 8.51$, $p = 0.038$) between marital status and adherence using the VAS, with 35.73% of those who were married having good adherence using the VAS compared to 3.29% of those who were single and had poor adherence using the VAS. However, we did not find any association between age, gender, level of education, and religion with adherence using the VAS. Table 2 shows the association between some selected factors and adherence using the VAS.

Table 2. Association between demographic characteristics and adherence measured by visual analogue scale N = 504.

Variable	Categories	n	Adherence VAS		Chi-square	P-value
			Good n (%)	Poor n (%)		
Age group	<20	23	21 (4.60)	2 (0.4)	6.32	0.201
	20 - 30	85	76 (15.57)	9 (1.7)		
	>30	396	353 (70.604)	43 (8.5)		
Sex	Female	348	309 (63.19)	39 (7.98)	0.002	0.964
	Male	141	125 (25.56)	16 (3.27)		
Level of education	No school	33	3 (6.2)	2 (0.40)	2.55	0.464
	Primary	236	207 (41.82)	29 (5.86)		
	Secondary	202	183 (36.97)	19 (3.84)		
	Tertiary	24	20 (4.04)	4 (0.81)		
Religion	Christianity	448	402 (80.08)	46 (9.16)	2.43	0.307
	Islam	35	29 (5.78)	6 (1.20)		
	Traditional	9	8 (1.59)	1 (0.20)		
	Others	10	8 (1.59)	2 (0.40)		
Marital status	Divorced/separated	42	41 (8.42)	1 (0.21)	8.51	0.038
	Married	204	174 (35.73)	30 (6.16)		
	Single	157	141 (28.95)	16 (3.29)		
	Widow (er)	84	79 (16.22)	5 (1.03)		

VAS = Visual Analogue Scale.

Table 3 demonstrates the association between demographic characteristics and self-reported adherence. Age group ($\chi^2 = 14.29$, $p = 0.011$) and religion ($\chi^2 = 15.11$, $p = 0.002$) were significantly associated with self-reported adherence.

Table 3. Association between demographic characteristics and self-reported adherence.

Variable	Categories	n	Adherence SR		Chi-square	P-value
			Good n (%)	Poor n (%)		
Age group	<20	23	13 (2.66)	10 (2.04)	14.29	**0.011**
	20 - 30	85	65 (13.29)	20 (4.09)		
	>30	396	126 (24.74)	29 (5.93)		
Sex	Female	350	292 (59.47)	58 (11.81)	3.76	0.053
	Male	141	107 (21.79)	34 (6.92)		
Level of education	No school	33	27 (5.43)	6 (1.21)	0.57	0.880
	Primary	238	197 (39.64)	41 (8.25)		
	Secondary	202	162 (32.60)	40 (8.05)		
	Tertiary	24	19 (3.82)	5 (1.01)		
Religion	Christianity	450	368 (73.02)	82 (16.27)	15.11	**0.002**
	Islam	35	33 (6.55)	2 (0.40)		
	Traditional	9	4 (0.79)	0.99		
	Others	10	6 (1.19)	4 (0.79)		
Marital status	Single	157	120 (24.54)	37 (7.57)	4.87	0.182
	Married	206	172 (35.17)	34 (6.95)		
	Divorced/separated	42	34 (6.95)	8 (1.64)		
	Widow (er)	84	73 (14.93)	11 (2.55)		

Table 4 illustrates the association between health system factors and adherence by visual analogue scale. There was a significant association between amounts paid for HIV services ($\chi^2 = 15.73$, $p = 0.001$), taking HIV medication and related services for free is easy for you ($\chi^2 = 4.13$, $p = 0.042$), worried that staff at the health facility may not keep the information they discuss private ($\chi^2 = 9.19$, $p = 0.012$), and adherence measured by visual analogue scale.

Table 4. Association between health system factors and adherence measured by visual analogue scale.

Variable	**Categories**	**n**	**VAS Binary**		**Chi-square**	**P-value**
			Good n (%)	**Poor n (%)**		
Asked to take a compulsory test as a prerequisite to starting HIV medication.	No	189	169 (34.14)	20 (4.04)	0.09	0.768
	Yes	306	271 (54.75)	35 (7.07)		
Asked to bring a close friend or relative to sign before you start HIV medications.	No	326	295 (59.24)	31 (6.22)	2.26	0.132
	Yes	172	148 (29.72)	24 (4.82)		
Doubt the information you receive from the health facility regarding the medications you are taking.	Not often	105	94 (18.99)	11 (2.22)	2.88	0.218
	Rarely	347	312 (63.03)	35 (7.07)		
	Very often	43	35 (7.07)	8 (1.62)		

Continued

Pay for medications and other services in the care and treatment center.	No	476	425 (86.03)	51 (10.32)	2.32	0.129
	Yes	18	14 (2.83)	4 (0.81)		
Amount paid for HIV services	<5000	22	20 (30.77)	2 (3.08)	15.73	**0.001**
	5000 - 10000	37	30 (46.15)	7 (10.77)		
	>10000	6	1 (1.54)	5 (7.69)		
Taking HIV medication and related services for free is easy for you.	No	60	58 (11.65)	2 (0.40)	4.13	**0.042**
	Yes	438	385 (77.31)	53 (10.64)		
Worry that staff at the health facility may not keep the information you discuss private.	Not often	123	106 (21.29)	17 (3.41)	9.19	**0.012**
	Rarely	337	308 (61.85)	29 (5.82)		
	Very often	38	29 (5.82)	9 (1.81)		
Health facility staff do everything they can for your health.	No	36	35 (7.10)	1 (0.20)	2.75	0.071
	Yes	457	403 (81.74)	54 (10.95)		

While further buttressing health system factors independently associated with adherence measured by the visual analogue scale as shown in Table 5, our research indicated that HIV patients who paid more for HIV services were 0.02 times less likely to have good adherence to ART compared to those who paid <5000 frs (AOR = 0.015, p = 0.003, CI = 0.001 - 0.233). There was a significant association between taking HIV medication and related services for free and self-reported adherence ($\chi^2 = 6.65$, p = 0.010) (Table 4).

Table 5. Association between health system factors and self-reported adherence.

Variable	Categories	n	Adherence SR		Chi-square	P-value
			Good n (%)	Poor n (%)		
Asked to take a compulsory test as a prerequisite to starting HIV medication.	No	191	149 (29.98)	42 (8.45)	3.52	0.061
	Yes	306	259 (52.11)	47 (9.46)		
Asked to bring a close friend or relative to sign before you start HIV medications.	No	327	268 (53.60)	59 (11.80)	0.02	0.900
	Yes	173	141 (28.20)	32 (6.40)		
Doubt the information you receive from the health facility regarding the medications you are taking.	Not often	105	87 (17.51)	18 (3.62)	0.31	0.855
	Rarely	349	287 (57.75)	62 (12.47)		
	Very often	43	34 (6.84)	9 (1.81)		
Taking HIV medication and related services for free is easy for you.	No	60	42 (8.4)	18 (3.6)	6.65	0.010
	Yes	440	368 (73.6)	72 (14.4)		
Paid for medications and other services in the care and treatment centre.	No	478	392 (79.03)	86 (17.34)	1.11	0.220
	Yes	18	13 (2.62)	5 (1.01)		
Amount paid for HIV services	<5000	22	20 (30.77)	2 (3.08)	2.21	0.311
	5000 - 10000	37	30 (46.15)	7 (10.77)		
	>10000	6	4 (6.15)	2 (3.08)		

Continued

Worry that staff at the health facility may not keep the information discussed private.	Not often	123	104 (20.80)	19 (3.80)		
	Rarely	339	271 (54.20)	68 (13.60)	2.03	0.362
	Very often	38	33 (6.60)	5 (1.00)		
Health facility staff do everything they can for your health.	No	36	25 (5.05)	11 (2.22)		
	Yes	459	378 (76.36)	81 (16.36)	3.68	0.055

With regard to the association between demographic factors and viral load suppression, religion was significantly associated with viral load suppression (χ^2 = 25.289, $p < 0.001$) as shown in Table 6.

Table 6. Association between demographic factors and viral load suppression.

Variable	Categories	n	Viral Load Suppression		Chi-square	P-value
			Sup n (%)	Unsup n (%)		
Age group	<20	23	20 (4.29)	3 (0.64)		
	20 - 29	78	68 (14.59)	10 (2.15)	1.244	0.841
	>30	403	359 (56.2)	14 (3.00)		
Sex	Female	336	293 (62.61)	43 (9.19)	0.039	0.843
	Male	132	116 (24.79)	16 (3.42)		
Level of education	No school	33	30 (6.33)	3 (0.63)		
	Primary	229	198 (41.77)	31 (6.54)	3.763	0.296
	Secondary	191	171 (36.08)	20 (4.22)		
	Tertiary	21	16 (3.38)	5 (1.05)		
Religion	Christianity	429	383 (79.63)	46 (9.56)		
	Islam	34	30 (6.24)	4 (0.83)	25.289	**<0.001**
	Traditional	9	5 (1.04)	4 (0.83)		
	Others	9	4 (0.83)	5 (1.04)		
Marital status	Single	147	131 (27.99)	16 (3.42)		
	Married	199	175 (37.39)	24 (5.13)	5.246	0.155
	Divorced/separated	41	38 (8.12)	3 (0.64)		
	Widow (er)	81	65 (13.89)	16 (3.42)		

Sup = Supressed, Unsup = Unsupressed.

Also, it emerged that there was a significant association between the patient being asked to do a compulsory test as a prerequisite to starting HIV medication (χ^2 = 7.83, $p = 0.005$), doubting the information obtained from the health facility regarding the medications they are taking (χ^2 = 23.02, $p < 0.001$), worrying that staff at the health facility may not keep the information discussed private (χ^2 =

36.45, $p < 0.001$), and viral load suppression.

It became apparent that HIV patients who were not asked to do a compulsory test as a prerequisite to starting HIV medication were 2.38 times more likely to have good adherence to ART compared to those who were asked to do a compulsory test (AOR = 2.384, $p = 0.011$, CI = 1.219 - 4.662). Most patients (87.7%) had suppressed viral loads, with sustained suppression during follow-up. A minority (12.3%) experienced virologic failure, and 71.2% believed they would eventually stop ART. Only 39.7% aimed for HIV-free status, reflecting limited understanding of ART's lifelong necessity. Feelings of shame (48.5%) and worthlessness (19%) were prevalent.

Barriers included stigma, financial costs, religion, confidentiality concerns, and health system inefficiencies. Facilitators involved disclosure, peer support, community engagement, patient education, use of integrated direct service delivery models, and confidentiality assurances.

4. Discussion

This study highlights several important gaps and challenges in the implementation of the test-and-treat strategy within the South West Region of Cameroon. The notably low proportion (22.4%) of newly diagnosed patients initiating ART on the same day underscores delays in immediate treatment initiation, which can undermine the benefits of early ART, such as rapid viral suppression and reduced transmission [3] [4]. These delays have resulted in 76.1% of persons initiating within 6 months and a few cases being initiated after a year from test dates. The fact that more than two-thirds (67.1%) of patients commenced treatment within six months indicates that systemic and patient-related barriers still impede prompt initiation [6]. Such delays can compromise the advantages of early ART, including rapid viral suppression and decreased transmission risk [2].

Adherence remains a critical determinant of treatment success. Although self-reported adherence was relatively high, with 79.8% indicating good adherence, the adherence levels measured by the Visual Analogue Scale (VAS) revealed that only 56.8% of patients maintained adherence above 90%. Furthermore, a significant association between adherence and viral suppression was observed, emphasizing the importance of consistent medication intake for achieving optimal clinical outcomes [5] [11]. The high viral suppression rate (87.7%) during follow-up confirms that adherence directly influences virological success [12].

While adherence levels were relatively high, they remain influenced by socio-economic factors (income level, financial stability, employment status, and level of education), psychosocial (mental health condition, social support, cultural beliefs, stress, and stigma) challenges, and health system limitations such as poor provider-patient communication, lack of trust in the system, stockout of commodities, and long wait times. Older patients demonstrated better adherence. The demonstrated better adherence in older patients is consistent with existing evidence suggesting increased health literacy and stability among this age group [12]

[13]. Conversely, younger individuals faced barriers such as stigma and treatment fatigue, underscoring the need for tailored, youth-friendly interventions to enhance adherence [14].

The study also identified marital status as significantly associated with adherence, with married individuals more likely to adhere well compared to singles or widows [13]. No significant associations were found between adherence and other demographic variables such as gender, education level, or religion (**Table 2** and **Table 3**).

The strong association between adherence and viral suppression reaffirms that consistent medication intake is essential for optimal treatment outcomes [3]. Addressing social determinants, particularly stigma and concerns about confidentiality, is also very crucial. The misconception among many patients that ART can be discontinued emphasizes the importance of ongoing education to reinforce the understanding that lifelong adherence is necessary for sustained viral suppression [15].

Health system factors played a pivotal role in influencing adherence. Patients who paid more for HIV services were less adherent, whereas those receiving free services showed better adherence levels [7]. Concerns about confidentiality and privacy at health facilities also negatively impacted adherence, highlighting the need to strengthen health system policies that ensure privacy and stigma reduction [16] [17]. Additionally, patients who were not asked to perform mandatory tests before starting ART were more likely to adhere well, suggesting that overly burdensome pre-treatment procedures may hinder initiation and adherence [18]. The association between paid services and adherence underscores the potential impact of financial barriers on treatment outcomes [15]. The COVID-19 pandemic further highlighted the need for resilient health systems and innovative approaches such as multi-month dispensing and community ART groups, which can reduce access barriers and ensure continuity of care [19].

Moreover, the study found that patients who doubted the information received from health facilities were significantly less likely to achieve viral suppression. Food insecurity also emerged as a significant barrier to adherence, with patients experiencing food shortages showing lower adherence levels, which consequently affected viral suppression rates [19].

Regarding viral load suppression, religion emerged as a significant factor, with variations observed across different faith groups. Patients who were not asked to undertake compulsory tests before treatment initiation were more likely to achieve viral suppression and adhere to ART, indicating that reducing procedural barriers may facilitate better treatment outcomes [7].

As recorded, delays in ART initiation, socioeconomic barriers, psychosocial challenges, and health system limitations collectively hinder optimal HIV care. Addressing these issues through targeted interventions, such as decentralizing services, improving confidentiality, reducing costs, and enhancing patient education, will be essential to improving adherence, timely initiation, and viral suppression

in this setting. Strengthening the health system's capacity to deliver patient-centered care and fostering community engagement can further support the successful implementation of the test-and-treat strategy [2] [3].

In summary, our study confirms that delays in ART initiation, suboptimal adherence, and misconceptions about lifelong treatment persist despite policy shifts. Addressing these barriers requires strengthening health system capacity, community engagement, and targeted education initiatives.

5. Strengths and Limitations of the Study

The study's strengths include its diverse and adequate sample size, encompassing participants from various demographic backgrounds such as age, gender, education, and religion, which enhances the representativeness of the findings. It employs a comprehensive approach by assessing multiple socio-demographic factors to understand their influence on adherence. The use of the Visual Analog Scale (VAS) offers a standardized, quantitative measure of adherence levels, enabling precise comparisons among participants. Additionally, appropriate statistical analyses, such as chi-square tests with p-values, ensure reliable evaluation of associations between variables and adherence. These strengths contribute to the validity, reliability, and practical applicability of the findings, making the study a valuable resource for informing healthcare strategies aimed at improving patient adherence through tailored approaches based on identified demographic factors.

Limitations of this study include its cross-sectional design, which restricts causal interpretations, and reliance on self-reported data, which may be subject to bias. Nonetheless, the findings provide valuable insights for policymakers and program managers aiming to optimize HIV care delivery and improve treatment outcomes in the region.

6. Conclusion and Recommendation

While the universal test-and-treat strategy shows promise, this study highlights significant challenges in implementing it in the South West Region of Cameroon. A low proportion of newly diagnosed patients initiated ART on the same day, with a high proportion starting within the first two weeks to six months and others after a year or more, reflecting systemic delays that weaken early treatment benefits. While adherence was relatively good, a substantial number of patients achieved viral suppression, though factors such as age, stigma, and misconceptions impacted outcomes. Notably, a large majority of patients believed they might stop treatment, underscoring misconceptions about lifelong ART. Based on these findings, we recommend enhancing the HIV service delivery cascade, policy implementation, reducing costs associated with HIV services, and improving patient education as vital steps. Additionally, addressing social and systemic barriers can improve ART uptake and viral suppression, supporting progress toward HIV epidemic control in the region. Specific strategies include establishing more peer support groups, safeguarding confidentiality, and providing counseling to foster

trust, disclosure, and adherence. Collaborating with other social services to mitigate poverty and food insecurity is also essential in improving adherence.

Declarations

This study was approved by the Ethics Committee of the University of Bamenda and given approval No: 2022/0779H/Uba/IRB. Administrative clearance was granted by the South West Regional Delegation of Public Health Ref. No: R11/MINSANTE/SWR/RDPH/PS/988/81. The respondents were adequately informed about all the relevant aspects of the study using the participant's information sheet. The respondents were further informed that participation in the study was entirely voluntary and their consent and assent were sought and obtained. They were also informed that they had the right to do the interview, to abstain from participation, and to terminate their participation at any time, whenever they wanted to. Participants were assured of confidentiality, and data collection tools were coded to avoid participant identification. Consent for publication was not applicable.

Data Access

The dataset that supports the findings of this study is accessible from the corresponding author upon reasonable request.

Authors Contribution

Tankoh Marceline Fegen conceptualized and designed the study, conducted the research, and drafted the manuscript. Niba Loveline Lum participated in the remodeling of the study, data analysis, review of the manuscript, and co-supervised the study. Tendongfor Nicholas provided overall supervision, a critical review of the manuscript, and contributed to the study design and interpretation. All authors read and approved the final version of the manuscript.

Acknowledgements

We would like to express our sincere gratitude to everyone who contributed to the success of this study, especially the participants for their cooperation and willingness to take part in this study.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] UNAIDS (2021) Global AIDS update 2021. UNAIDS.

[2] WHO (2016) Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a Public Health Approach. WHO.

[3] Wubetu, Y., Tsegaye, B. and Boti, N. (2021) Challenges and Opportunities in Implementing Test-and-Treat Approach in Ethiopia. *BMC Infectious Diseases*, **21**, Article

112.

[4] Ministry of Public Health Cameroon (2019) National HIV/AIDS Response Report 2019. MoPH.

[5] Bekolo, C.E., Ndeso, S.A., Gougue, C.P., Moifo, L.L., Mangala, N., Tchendjou, P., *et al.* (2023) The Effect of the Universal Test and Treat Policy Uptake on CD4 Count Testing and Incidence of Opportunistic Infections among People Living with HIV Infection in Cameroon: A Retrospective Analysis of Routine Data. *Dialogues in Health*, **2**, Article 100120. https://doi.org/10.1016/j.dialog.2023.100120

[6] Bantie, B., Kassaw Yirga, G., Abate, M.W., Amare, A.T., Nigat, A.B., Tigabu, A., *et al.* (2022) Delayed ART Initiation in "Test and Treat Era" and Its Associated Factors among Adults Receiving Antiretroviral Therapy at Public Health Institutions in Northwest Ethiopia: A Multicenter Cross-Sectional Study. *PLOS ONE*, **17**, e0271127. https://doi.org/10.1371/journal.pone.0271127

[7] WHO (2018) Service Delivery Approaches to HIV Testing and Counselling: A Review. WHO.

[8] Cochran, W.G. (1977) Sampling Techniques. 3rd Edition, John Wiley & Sons.

[9] Mbuwir, C.B., Torpey, K., Ganle, J. and Ankomah, A. (2021) Measuring Adherence to ARVs among HIV-Positive Adolescents in Cameroon: A Comparative Assessment of Self-Report and Medication Possession Ratio Methods. *Pan African Medical Journal*, **40**, Article 148.

[10] Mehra, N., Tunje, A., Hallström, I.K. and Jerene, D. (2021) Effectiveness of Mobile Phone Text Message Reminder Interventions to Improve Adherence to Antiretroviral Therapy among Adolescents Living with HIV: A Systematic Review and Meta-analysis. *PLOS ONE*, **16**, e0254890. https://doi.org/10.1371/journal.pone.0254890

[11] Wadunde, I., Tuhebwe, D., Ediau, M., Okure, G., Mpimbaza, A. and Wanyenze, R.K. (2018) Factors Associated with Adherence to Antiretroviral Therapy among HIV Infected Children in Kabale District, Uganda: A Cross Sectional Study. *BMC Research Notes*, **11**, Article No. 466. https://doi.org/10.1186/s13104-018-3575-3

[12] Mahajan, A.P., Kinsler, J.J., Cunningham, W.E., James, S., Makam, L., Manchanda, R., *et al.* (2016) Does the Centers for Disease Control and Prevention's Recommendation of Opt-Out HIV Screening Impact the Effect of Stigma on HIV Test Acceptance? *AIDS and Behavior*, **20**, 107-114. https://doi.org/10.1007/s10461-015-1222-8

[13] Kahle, E.M., Rosenberg, N.E. and Cummings, W. (2014) Factors Associated with Adherence to Antiretroviral Therapy in Sub-Saharan Africa. *AIDS and Behavior*, **18**, 2039-2054.

[14] UNAIDS (2022) Global AIDS Update 2022. UNAIDS.

[15] Ministry of Public Health Cameroon (2018) National HIV Testing and Counseling Guidelines.

[16] WHO (2020) Maintaining Essential Health Services during COVID-19. WHO.

[17] WHO (2015) Guideline on When to Start Antiretroviral Therapy and on Pre-Exposure Prophylaxis for HIV. WHO.

[18] WHO (2021) COVID-19 and HIV: Resilient Health Systems for Sustainable HIV Responses. WHO.

[19] Weiser, S.D., Sheira, L.A., Palar, K., Kushel, M., Wilson, T.E., Adedimeji, A., *et al.* (2020) Mechanisms from Food Insecurity to Worse HIV Treatment Outcomes in US Women Living with HIV. *AIDS Patient Care and STDs*, **34**, 425-435. https://doi.org/10.1089/apc.2020.0009

Acronyms

HIV—Human Immunodeficiency Virus
AIDS—Acquired Immunodeficiency Syndrome
PLHIV—People Living with HIV
VAS—Visual Analog Scale
ART—Antiretroviral Therapy
WHO—World Health Organization
UNAIDS—Joint United Nations Programme on HIV/AIDS