A RETROSPECTIVE MEDICAL RECORD REVIEWON THE OUTCOME OF ENHANCED ADHRENECE COUNSELING AMONG UNSUPPRESSED HIV CLIENTS IN BENUE STATE, NIGERIA

ABSTRACT

Background:According to the WHO estimation, up to 70 % of patients with an initial high viral load will achieve viral load suppression following an adherence intervention. In Benue State, very limited studies have been done that show viral load suppression following enhanced adherence counselling (EAC). This study assesses viral suppression after enhanced adherence counselling and its predictors among unsuppressed HIV seropositive people in the State,the time to commence EAC after the unsuppressed VL result, and to estimate the time to repeat the viral load test after EAC.

Method:This was aretrospective review of electronic medical records of all HIV-infected people with a viral load greater than 1000 copies/ml after six months on HAART as of December 2022, in Benue State. Patients with VL ≥ 1000 copies/ml were expected to receive EAC and have a repeat VL after three months of good adherence. Six months following the documented unsuppressed result, we determined: the viral load suppression rate after EAC, the time to commencement of EAC, the time to repeat the viral load test after EAC, and the predictors of viral load suppression among clients with unsuppressed viral load.

Result:Of the 234,185 People Living with HIV (PLHIV) on ART between December 2022 and July 2023, up to210, 514 (89.9%) did viral load testing and 9194 (3.9%) had VL >1000 copies/ml. Of these 9,194unsuppressed PLHIV, EAC uptake was 90.3% (n=8,307), EAC completion rate was 62.5% (n=5,220), and viral suppression rate following EAC was 93.8% (4897/5220). PLHIV who have been on treatment for less than five yearswere more likely to achieve viral load suppression.

***Conclusion*:** The study demonstrated a post-EAC viral load re-suppression rate of 93.8%, indicating significant effectiveness. Nonetheless, notable deficiencies were observed in both EAC enrollment and completion. It is imperative to identify and address the underlying reasons for these gaps to fully optimize the benefits of Enhanced Adherence Counseling (EAC)

Keywords: People living with HIV, Enhanced adherence counselling, viral load suppression

1.0 INTRODUCTION

Nigeria currently ranks fourth in the world regarding the HIV burden.[1] Nigeria has a generalized HIV epidemic with the highest HIV burden in the West and Central African sub-region.[1]The country has an estimated 1.8 million people living with HIV (PLHIV), as per the 2019 Spectrum estimate.[1] However, only 81% of PLHIV on treatment were virally suppressed.[2]Benue State has the second highest prevalence and burden of HIV in Nigeria with an HIV prevalence of 4.8% givingan estimated burden of 184,745 people living with HIV.[2]

The Joint United Nations Program on HIV/AIDS (UNAIDS) targets for 2025 aim for 95% of those living with HIV to know their status, 95% of those who know their status to be on treatment, and 95% of those on treatment to be virally suppressed- popularly referred to as the 95-95-95 target.[3] Monitoring people on ART is essential to ensure successful treatment, identify adherence challenges, and diagnose treatment failure.[4,5] The World Health Organization (WHO) recommended as the gold standard, the use of viral load testing to evaluate patient's responses to ART.[4]

The FederalMinistry of Health of Nigeria (FMOH) recommended that all HIV/AIDS clients commencing ART undergo viral load testing six months after initiating therapy,followed by

subsequent tests every six months for pediatric and adolescent patients, and annually for adults.[5] If the VL is ≥ 1000 copies/ml, the patient should receive enhanced adherence counselling (EAC) and have a repeat VL only after three months of good adherence.[5] Unsuppressed viral load is inimical to the epidemiologic control of HIV/AIDS as it aids transmission, and has been associated with increased morbidity due to opportunistic infections (OIs) thus resulting in a rise in mortality. [6,7]Poor adherence is a common reason for treatment failure [8–10]and as such, the WHO recommends enhanced adherence counselling sessions for 3–6 months for people with high viral load.

Enhanced adherence counselling (EAC) involves a structured assessment of the current level of adherence, exploration of specific barriers contributing to poor adherence, identification of potential solutions to address barriers and jointdevelopment of an individualized adherence interventional plan. [5] According to the WHO estimation, up to 70 % of patients with an initial high viral load (greater than 1000 copies/ml) will achieve viral load suppressionfollowing an adherence intervention.[4] Enhanced adherence counsellingis effective in achieving viral load resuppression in virally unsuppressed clients and thus prevents treatment failure and the need for an antiretroviral switch.[11,12]

A retrospective cross-sectional study to evaluate the virologic suppression rate among patients on ART for ≥ 6 months in five hospitals in Haiti, obtained a viral load suppression rate of 25.1% following intensified adherence counseling.[13] The study identified that patients with poor adherence, males, and those having been on ART for 24- 35 months were all significantly less likely to achieve virologic suppression. Comparatively, a descriptive study of patients on antiretroviral therapy in Swazilandobtained a viral load suppression rate after EAC of 54%.[14] The study identified that children, adolescents, and those with advanced disease were most likely to have high viral loads and least likely to achieve viral suppression at retesting. However, an institutional-based retrospective study among people

living with HIV in Zimbabwe obtained a viral load suppression rate of 31.2% among 489 enrolled in EAC which is similar to the study in Haiti.[15] The viral load suppression rate was low despite 83% of the patients attending three EAC sessions. The study ascribed the low rate to several gaps: only85.9% of the total clients on Antiretroviral Therapy (ART) underwent routine viral load testing. Among clients with high viral loads, only 75.7% were enrolled in EAC, and merely 84.9% of those enrolled for EAC underwent repeat viral load testing.A retrospective follow-up study among 346 HIV-positive adults enrolled in EAC in a high caseload facility in the West Gojjam zone, Ethiopia, obtained a viral load suppression rate of 51.73%.[16] The study identified that the average time to commence EAC and to complete EAC following a high viral load result is 8 weeks and 13 weeks respectively. Gender, educational status, residence, baseline CD4 count, first viral load count, and baseline adherence level were significantly associated with viral load suppression.

A similar study among 235 randomly selected HIV seropositive people in public hospitals in the North Wollo Zone of Ethiopia obtained a viral load suppression rate of 66.4%.[17] The study found that being female; CD4 count $\geq$ 350 cells/mm^3 and absence of recurrent opportunistic infections were independent predictors of viral load suppression after enhanced adherence counselling.

In Nigeria, very limited studies have been done that show viral load suppression following EAC.[12,18]A retrospective review of the electronic medical record of people living with HIV across 22 comprehensive health facilities in Akwa Ibom, Nigeria, obtained a viral load suppression rate after EAC of 73.8% from 3088 patients enrolled in EAC.[19]In this study, 94.8% (3088/3257) of the unsuppressed clients were enrolled in EAC of whom 53.1% (1728/3257) started EAC within one month of the documented unsuppressed results and

81.5% (2517/3088) completed their EAC sessions. Overall, 75.9% (2344/3088) of the patients enrolled in EAC received post-EAC VL tests within 6 months from the documented results.[12]

The study identified that a major gap in the EAC cascade was the low completion of EAC. Furthermore, individuals who had been on antiretroviral therapy for less than 12 months and those who completed EAC within 3 months demonstrated a reduced likelihood of persistent viremia.

A descriptive cross-sectional study conducted among patients receiving highly active antiretroviral therapy (HAART) at the Infectious Disease Institute, College of Medicine, University of Ibadan, found a viral load suppression rate of 51.0% following EAC among 400 unsuppressed patients.[18] The study identified that adolescents and young adults have a greater risk of virologic failure as they face multiple social, psychological, and adherence challenges that increase their susceptibility to achieve viral suppression.

No research has been done in Benue state that assessed viral load suppression following EAC and its predictors among unsuppressed HIV seropositive people. The findings of this research will help the Federal Ministry of Health of Nigeria and other stakeholders assess the progress in the implementation of the national guidelines on EAC and improve the patient's health outcomes.This study aims to determine the viral load suppression rate after enhanced adherence counselling and its predictors among unsuppressed HIV seropositive people in Benue state, the time to commence EAC after the unsuppressed VL result, and to estimate the time to repeat the viral load test after EAC.

2.0 METHODOLOGY

2.1. STUDY SETTING

Benue State lies within the lower river Benue Trough in Nigeria's North-central region. The state has 23 local government areas (LGAs).[20]It shares boundaries with five other States: Nassarawa to the north, Taraba to the east, Cross-River to the south, Enugu to the southwest, and Kogi to the west. The State shares a common boundary with the Republic of Cameroon on the southeast. Benue State has an estimated population of 4,253,641 people [21] and occupies a landmass of 33,955 square kilometres.[20]

AIDS Public Health Initiative, supported by the US President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention (CDC) supportsthe government of Nigeria to address HIV/AIDS and other diseases of public health importance. In Benue State, APIN supports the provision of HIV/AIDS services to over 264 health facilities across 23 local government areas (LGAs).

2.2. STUDY POPULATION

All HIV-infected people who have a viral load greater than 1000 copies/ml after 6 monthsof antiretroviral therapy in December 2022in Benue state, Nigeria.

2.3. ELIGIBILITY CRITERIA

2.3.1 INCLUSION CRITERIA

Allfiles ofHIV-infected people with a viral load greater than 1000 copies/ml who had to repeat viral load results after completing enhanced adherence counselling sessions in Benue state, Nigeria.

2.3.2. EXCLUSION CRITERIA

All filesHIV-infected people who were on antiretroviral therapy for less than 6 months and those who did not start EAC sessions.

Files of patients with missing ART information.

Filesof patients who did not complete EAC.

Files of patients with erroneous viral load data or conflicting information.

2.4STUDY DESIGN

Cross-sectional descriptive study.

2.5DATA COLLECTION

A total sampling of electronic medical records of all those with VL ≥ 1000cp/ml who were active and receiving ART from theNational Data Repository (NDR) andLaboratory Information Management System (LIMS), was obtained.The NDR is a web-based, client-level electronic medical record system for managing ART program data in Nigeria while the LIMS is a software that is used to effectively manage laboratory and patient test samples and associated data.Across all treatment health facilities in Benue State, baseline data collected upon client entry into ART care and treatment, as well as follow-up client data from HIV service delivery including the ART clinic, pharmacy, and laboratory, are routinely recorded on paper and entered into NDR/LIMS. Service data from each client encountered are entered in NDR/LIMS daily.

Relevant individual patient sociodemographic and clinic data were abstracted from the patient ART care card/ folder and EAC registers. Sociodemographic characteristics consisted of sex and age. The clinical characteristics analyzed included the duration of ART (calculated as the difference between the ART start date and the date of the last clinic visit), EAC enrolment,and time to EAC completion as “within three months” and “after three months” based on the national ART treatment guidelines.[5]

2.6DATA MANAGEMENT

Data were cleaned and consistency checks were done severally to ensure accuracy and completeness. The data were analyzed using Statistical Package for Social Science version 20.0 for Windows (SPSS Inc., Chicago, Illinois). Descriptive statistics and frequencies were used to describe the characteristics of the study participants. Multivariable logistic regression analysis was employed to determine factors associated with EAC enrolment, EAC completion, and persistent VL unsuppression (post-EAC VL >1000 copies/mL). Adjusted odds ratios and 95% CIs were reported. The statistically significant differences for quantitative data were evaluated by chi-squared statistics with significant association (P>0.05).

3.0 RESULTS

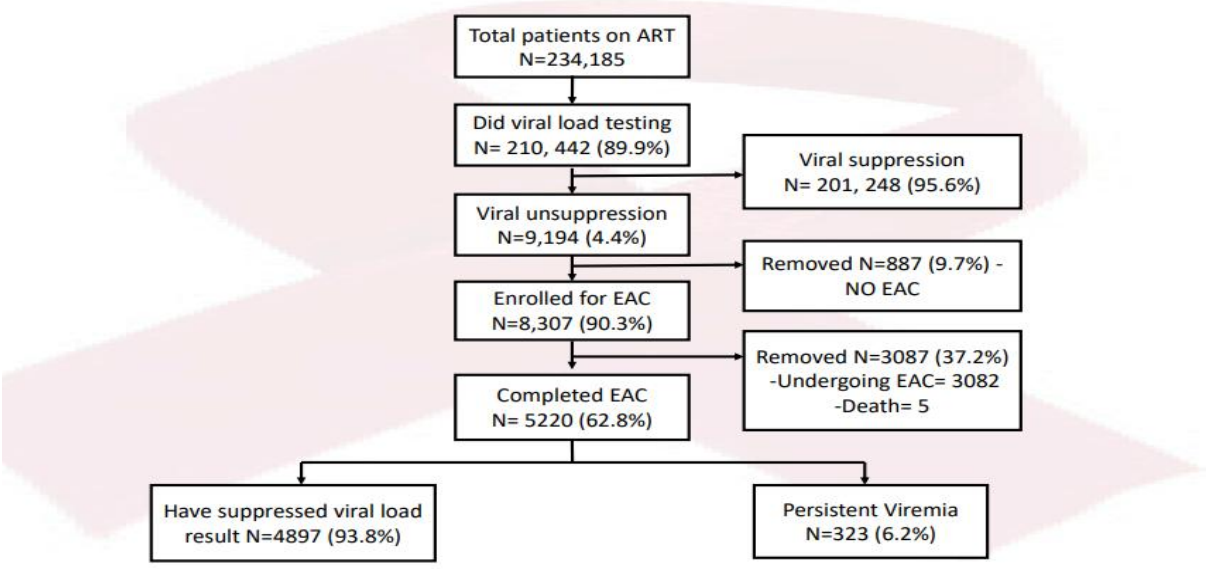

Figure 1.Baseline characteristics of study participants

Baseline characteristics of study participants: A total of 234,185 PLHIV were receiving ART care in Benue State as of December 2022, of whom6,203 (67.5%) are females. Of the total PLHIV on ART, 210,442 (89.9%) had undergone viral load testing and of those tested, 9,194 (3.9%) had unsuppressed viral load at the start of the study. The mean age of the study participants was 34.6 (±34.55SD). The majority of participants, 4,861 (52.9%), received treatment in health facilities serving less than 1000 people on Antiretroviral Therapy (ART). Additionally, 5,753 (62.6%) had been treated for less than 5 years, and 5,223 (56.8%)commenced EAC within 1 month.At baseline, most, 8168 (77.1%) participants were staged in WHO clinical stage 1, and 2472 (26.9%) had a CD4 count above 200 cells/µl. (Table 1).

Outcomes for patients with unsuppressed viral load

EAC enrolment

Of the 9,194 (3.9%) with unsuppressed viral load, 8,307 (90.3%) were enrolled for EAC Figure 1. EAC enrolment was 90.7% among males and 96.3% among the age group 0- 9 years. EAC enrolment across the facilities was 91.6% in facilities with more than 1000

people on ART and 91.5% among clients that have been on ART for over 5 years. EAC enrolment was 90.4% among participants who were WHO clinical stage 1. Inmultivariable analysis to determine factors associated with EAC enrolment, those above 20 years were more likely to be enrolled in EAC (20-29years, aOR= 4.46; 95%CI, 1.05-18.85; *P*= .04; 30-39 years, aOR=5.22; 95% CI, 1.26-21.65; *P*= 0.02; 40-50 years, aOR=5.27; 95%CI, 1.27-21.85; *P*= 0.02; >50 years, aOR=4.37, 95% CI,1.03-18.53; *P*= 0.04). EAC enrolment was also more likely in those from the low-volume facilities (aOR=1.36; 95%CI, 1.05-1.76; *P*= 0.02) than those from the high-volume facilities. (Table 2)

EAC Completion

Of those enrolled for EAC, 5220 (62.8%) completed their EAC sessions during the review period, 3082 (37.1%) were still undergoing EAC and five (0.1%) died. EAC completion differedacross age, facility status, WHO status, and sex categories.In multivariable analysis to determine factors associated with completion of EAC, individuals agedabove 20 years were more likely to complete EAC (20-29years, aOR= 0.19; 95%CI, 0.11-0.32; *P*≤0.001; 30-39 years, aOR=0.28; 95% CI, 0.14-0.38; *P*≤0.001; 40-50 years, aOR=0.26; 95%CI, 0.15-0.42; *P*≤0.001; >50 years, aOR=0.17, 95% CI,0.10-0.29; *P*≤0.001).EAC completion was also more likely in those who have been on ART for more than five years (aOR=1.26; 95%CI, 1.02-1.57; *P*= 0.04). (Table 3)

Post EAC VL Characteristics

A repeat viral load test was done for all those who completed EAC. Among them,4897 (93.8%) had suppressed viral load.

In the multivariate analysis to determine factors associated with VL suppression following EAC (Table 4), those who have been on ART for five years or more were less likely to be

virally suppressed following EAC (aOR=0.84; 95% CI, 0.53-1.35; *P*=0.03) than those who have been on ART for less than 5 years.

Table 1. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE PATIENTS

Variables	**Frequency N= 9,194**	**Percentage (%)**
Sex		
Male	2991	32.5
Female	6203	67.5
Age (years)		
0-9	401	4.4
10-19	1016	11.0
20-29	1624	17.7
30-39	2890	31.4
40-50	2196	23.9
>50	1067	11.6
Facility Status		
High volume	4333	47.1
Low volume	4861	52.9
Duration on ART (years)		
<5	4790	52.1
≥5	4404	47.9
WHO Stage		
1	8168	88.9
2	675	7.3
3	326	3.5
4	25	0.3
Baseline CD4 count (cells/mm^3)		
<200	527	5.7
≥200	2506	27.3
Missing	6161	67.0
Commencement of EAC (months)		
<1	5225	56.8
≥1	3082	33.5
No EAC	888	9.7

Table 2. Relationship between baseline characteristics and enrolment into EAC among study participants.

Variables	**EAC**	**Total**	**Test**	***P*-**	**OR**	***P* value**	**AOR**	***P***

	Enrolled for EAC N=8307 (90.3%)	Not Enrolled for EAC N=887 (9.7%)							
Sex									
Male	2715 (90.7%)	276 (9.3%)	2991 (32.5%)	0.90	0.344	Reference			
Female	5592 (90.1%)	611 (9.9%)	6203 (67.5%)			0.93 (0.80-1.08)	0.34	1.03(0.81-1.33)	0.78
Age (years)									
0-9	386 (96.3%)	15 (3.7%)	401 (4.4%)	40.45	≤0.001	Reference			
10-19	955 (94.0%)	61 (6.0%)	1016 (11.1%)			1.64(0.92-2.93)	0.10	2.65(0.61-11.50)	0.19
20-29	1436 (88.4%)	188 (11.6%)	1624(17.7%)			3.37(1.97-5.77)	≤0.001	4.46(1.05-18.85)	0.04*
30	2592 (89.7%)	298 (10.3%)	2890 (31.4%)			2.96(1.74-5.02)	≤0.001	5.22(1.26-21.65)	0.02*
40-50	1974 (89.9%)	222 (10.1%)	2196 (23.9%)			2.89(1.70-4.94)	≤0.001	5.27(1.27-21.85)	0.02*
>50	964 (90.4%)	103 (9.6%)	1067 (11.6%)			2.75(1.58-4.79)	≤0.001	4.37(1.03-18.53)	0.04*
Facility Status									
High volume	3968 (91.6%)	365 (8.4%)	4333 (47.1%)	14.08	≤0.001	Reference			
Low volume	4339 (89.2%)	522 (10.8%)	4861 (52.9%)			1.31(1.14-1.51)	≤0.001	1.36(1.05-1.76)	0.02*
Duration on ART (years)									
<5	4294 (89.7%)	496 (10.3%)	4790 (52.1%)	5.74	0.017	Reference			
≥5	4013 (91.1%)	391 (8.9%)	4404 (47.9%)			1.19 (1.03-1.36)	0.017	0.85(0.64-1.12)	0.26
WHO Stage									
1	7387 (90.4%)	781 (9.6%)	8168 (88.8%)	1.83	0.61	Reference			
2	605 (89.6%)	70 (10.4%)	675 (7.3%)			1.09 (0.85-1.42)	0.49	0.87(0.59-1.29)	0.50
3	291 (89.3%)	35 (10.7%)	326 (3.5%)			1.14(0.80-1.63)	0.48	1.02(0.562-1.67)	0.95
4	24 (96.0%)	1 (4.0%)	25(0.3%)			0.40(0.05-2.92)	0.36	0.62(0,08-4.80)	0.65
Baseline CD4 count (cells/mm^3)									
<200	461 (87.5%)	66 (12.5%)	527 (17.4%)	9.53	0.009	Reference			
≥200	2243 (89.5%)	263 (10.5%)	2506 (82.6%)			0.82(0.62-1.09)	0.17	0.87(0.65-1.17)	0.38
Missing	5603 (90.9%)	558 (9.1%)	6161 (67.0%)						
Commencement of EAC (months)									
<1	5225 (100.0%)	0 (0.0%)	5223 (56.8%)	**					
≥1	3082 (100.0%)	0 (0.0%)	3082 (33.5%)						
No EAC	0 (0.0%)	0 (0.0%)	887 (9.7%)						

****Test statistics not done**

Table 3: Relationship between baseline characteristics and completion of EAC among study participants

Variables	Completion of EAC	Total	Test	*P*-	OR	*P* value	AOR	*P*

	EAC Completed N=5,220 (62.8%)	EAC Not completed N= 3087 (37.2%)	N= 8,307 (%)	Statistics	value	(95%CI)		(95%CI)	value
Sex									
Male	1673 (61.6%)	1042 (38.4%)	2715 (32.7%)	2.56	0.109	Reference			
Female	3547 (63.4%)	2045 (36.6%)	5592 (67.3%)			1.08(0.98-1.18)	0.11	0.91(0.76-1.08)	0.28
Age (years)									
0-9	167 (43.3%)	219 (56.7%)	386 (4.6%)	231.54	≤0.001	Reference			
10-19	430 (45.0%)	525 (55.0%))	955 (11.5%)			1.07(0.85-1.36)	0.56	0.65(0.38-1.10)	0.11
20-29	959 (66.8%)	477 (33.2%)	1436(17.3%)			2.64(2.10-3.32)	≤0.001	0.19(0.11-0.32)	≤0.001*
30-39	1730 (66.7%)	862 (33.3%)	2592 (31.2%)			2.63(2.11-3.27)	≤0.001	0.28(0.14-0.38)	≤0.001*
40-50	1289 (65.3%)	685 (34.7%)	1974 (23.8%)			2.47(1.98-3.08)	≤0.001	026(0.15-0.42)	≤0.001*
>50	645 (66.9%)	319 (33.1%)	964 (11.6%)			2.65(2.08-3.38)	≤0.001	0.17(0.10-0.29)	≤0.001*
Facility Status									
High volume	2479 (62.5%)	1489 (37.5%)	3968 (47.8%)	0.43	0.512	Reference			
Low volume	2741 (63.2%)	1598 (36.8%)	4339 (52.2%)			1.03(0.94-1.13)	0.51	0.88(0.73-1.07)	0.21
Duration on ART (years)									
<5	2793 (65.0%)	1501 (35.0%)	4294 (51.7%)	18.52	≤0.001	Reference			
≥5	2427 (60.5%)	1586 (39.5%)	4013 (48.7%)			1.22(1.11-1.33)	≤0.001	1.26(1.02-1.57)	0.04*
WHO Stage									
1	4638 (62.8%)	2749 (37.2%)	7387 (88.9%)	4.17	0.244	Reference			
2	395 (65.3%)	210 (34.7%)	605 (7.3%)			1.11(0.94-1.33)	0.22	0.87(0.67-1.14)	0.32
3	175 (60.1%)	116 (39.1%)	291 (3.5%)			0.89(0.70-1.14)	0.36	1.28(0.91-1.81)	0.15
4	12 (50.0%)	12 (50.0%)	24 (0.3%)			0.59(0.27-1.30)	0.20	1.93(0.61-6.05)	0.26
Baseline CD4 count (cells/mm^3)									
<200	298 (64.6%)	163 (35.4%)	461 (5.6%)	3.75	0.153	Reference			
≥200	1441 (64.2%)	802 (35.8%)	2243 (27.0%)			1.029(0.83-1.26)	0.87	0.89(0.72-1.11)	0.31
Missing	3481 (62.1%)	2122 (37.9%)	5603 (67.5%)						
Commencement of EAC (months)									
<1	5219 (99.9%)	5 (0.1%)	5224 (62.9%)						
≥1	1 (0.03%)	3082 (99.97%)	3083 (37.1%)						
No EAC									

Table 4. Relationship between baseline characteristics and viral load re-suppression among study participants.

Variables	Viral Load Suppression		Total N=5220	Test Statistics	*P* value	OR (95%CI)	*P* value	AOR (95%CI)	*P* value
	Suppressed N=4897(93.8%)	Unsuppressed N=323(3.9%)							
Sex									
Male	1550 (92.7%)	123 (7.3%)	1673 (32.0%)	5.75	0.016	Reference			
Female	3347 (94.4%)	200 (5.6%)	3547 (68.0%)			1.33(1.05-1.68)	0.02	1.22(0.83-1.80)	0.31
Age (years)									
0-9	153 (91.6%)	14 (8.4%)	167 (3.2%)	72.20	≤0.001	Reference			
10-19	364 (84.7%)	66 (15.3%)	430 (8.2%)			1.98(1.08-3.64)	0.03	3.76(0.48-29.60)	0.21
20-29	912 (95.1%)	47 (4.9%)	959 (18.4%)			0.56(0.30-1.05)	0.07	1.49(0.19-11.93)	0.71
30-39	1632 (94.3%	98 (5.7%)	1730 (33.1%)			0.66(0.37-1.18)	0.16	1.96(0.25-15.02)	0.52
40-50	1218 (94.5%)	71 (5.5%)	1289 (24.5%)			0.64(0.35-1.16)	0.14	1.81(0.24-13.98)	0.57
>50	618 (95.8%)	27 (4.2%)	645 (12.4%)			0.48(0.24-0.93)	0.03	1.69(0.21-13.34)	0.62
Facility Status									
High volume	2295(92.6%)	184 (7.4%)	2479 (47.5%)	12.40	≤0.001	Reference			
Low volume	2602 (94.9%)	139 (5.1%)	2741 (52.5%)			0.67(0.53-0.84)	≤0.001	0.72(0.46-1.14)	0.16
Duration on ART (years)									
<5	2645 (94.7%)	148 (5.3%)	2793 (53.5%)	8.16	0.004	Reference			
≥5	2252 (92.8%)	175 (7.2%)	2427 (46.5%)			1.40(1.11-1.74)	0.004	0.84(0.53-0.79)	0.03*
WHO Stage									
1	4358(94.0%)	280 (6.0%)	4638 (88.9%)	15.97	0.001	Reference			
2	367(92.9%)	28 (7.1%)	395 (7.7%)			1.19(0.79-1.78)	0.40	1.31(0.77-2.23)	0.33
3	164(93.7%)	11 (6.3%)	175 (3.4%)			1.04(0.56-1.95)	0.89	1.38(0.64-2.95)	0.41
4	8(66.7%)	4 (33.3%)	12 (0.23%)			7.78(2.33-26.00))	≤0.001	6.58(1.16-37.21)	0.45
Baseline CD4 count (cells/mm^3)									
<200	273(91.6%)	25 (8.4%)	298 (5.7%)	56.84	0.033	Reference			
>200	1338(92.9%)	103 (7.1%)	1441 (27.6%)			0.84(0.53-1.33)	0.46	0.83(0.53-1.35)	0.48
Missing	3286(94.4%)	195 (5.6%)	3481 (66.7%)						
Commencement of EAC (months)									
<1	4897 (93.8%)	323 (6.2%)	5220 (100%)						
≥1	0 (0.0%)	0 (0.0%)	(0.0%)						
No EAC									

4.0. DISCUSSION

In this study, 89.9% of PLHIV on ART in Benue State underwent viral load tests, with only 4.4% of those tested showing high viral loads, a lower proportion compared to similar

studies.[15]This achievement can be attributed to various strategies implemented in the state by APIN to promote treatment continuity. These strategies included ensuring that ART treatment and services are freely available to everyone in the state witha focus on treatment readiness and employing a multidisciplinary approach to treatment retention.[22]Case management was introduced to ensure close follow-up within the first 3 months of ART initiation, a crucial period for long-term treatment adherence.[22]Additionally, preemptive measures were taken to reduce missed clinic appointments, such as patient education, and structured appointment systems such as family-centered care when multiple members of a family are infected with HIV. Other measures include appointment reminders and the scale-up of differentiated service delivery models.[22–24]Improved identification and tracking of missed appointments, along with peer support and adherence counselling, were also integral components. Leveraging technology for client-centric care delivery further enhanced treatment outcomes.[22]

Among those with high viral load, 90.3% were enrolled in EAC, and 62.8% completed EAC according to national guidelines.[5]HIV self-stigma significantly influences the engagement of PLHIV in care in Benue State. Many PLHIVs in the state seek care in facilities located far from their communities to avoid potential stigma from community members if their HIV status becomes known. This results in long travel distances to health facilities, which is often financially burdensome. Additionally, increased insecurity in Benue State has led to the displacement of many PLHIV from their communities, further hindering their access to HIV and other health services.

Among individuals who completed EAC, 93.8% achieved a viral load of fewer than 1000 copies/ml. This rate exceeds both the WHO target of 70% [4]and values reported in other studies.[13,15,17–19]However, it falls slightly below the UNAIDS 95-95-95 target for viral load suppression, which aims for 95% of individuals to achieve viral suppression.[3] The

high post-EAC viral load suppression rate in this study compared to other studies reflects the huge investment by APIN in the continuous training of adherence counsellors to educate PLHIV on the importance of adherence to ART. In addition, APINencourages in-person EAC in addition to phone EAC, this is particularly significant given that many clients have to travel long distances to reach the health facilities. Studies have shown that long travel distances and lack of money for travelling to health institutions affect ART adherence and follow-up visits within the recommended time.[25,26] The result from this study further highlights the role of enhanced adherence counselling in achieving viral load resuppression in virally unsuppressed clients and thus prevents antiretroviral drug switch.[11,12]

In this study, the analysis showed a delay in commencing clients on EAC and a delay in completing EAC within the recommended time.Over 33% of PLHIV with VL >1000 copies/ml did not initiate EAC until after one month and only 62.8% of PLHIV who were enrolled in EAC completed EAC within the recommended time. This delay may lead to delayed identification of ART resistance and delayed switch to the alternative line of ART regimen. Failure to switch to the appropriate regimen for PLHIV with resistance due to the delay increases the risk of sexual transmission of ART-resistant strains as well as the potential failure of other lines of ART.[27–31]In Nigeria there are limited and weak resources for HIV drug resistance assay to cater for the number of PLHIV who require the test.[32] HIV drug resistance in the country is limited to PLHIV with suspected treatment failure on second-line ART for a potential switch to third-line ART.[5] None of the participants in this study benefited from HIV drug resistance.

In Benue State, fear of stigma and discrimination has a significant influence on the health-seeking behaviour of PLHIV and this is consistent with findings from previous studies.[33–36]Due to this fear, many PLHIV travel long distances far from where they reside to receive ART, in addition, a lack of means of reaching them such as via telephone and ill-defined

physical address, results in delay in enrolment in EAC. Within many health facilities delay also results from the failure of adherence counsellors to receive VL results >1000 copies/ml as soon as they are available from the laboratory. To achieve optimal treatment outcomes it is important to address the factors associated with timely EAC enrolment and completion.

Duration on ART was significantly associated with viral load suppression following EAC. Patients who have taken ART for five years or more were less likely to have viral suppression compared to those who have taken ART drugs fora shorter duration. This is similar to findings reported in other studies.[15,33]The study among PLHIV in public hospitals in the North Wollo Zone of Ethiopia, identified that patients who have taken ART for about 13–59 months were less likely to have viral suppression compared to those who have taken ART drug for less than 12 months. This could be associated with the build-up of multiple drug-resistant mutations and treatment fatigue.

The major strength of this study was the usage of routine electronic medical recordsover one year, with information collected on all PLHIV who were on ART and had viral load >1000 copies/ml in Benue State.

The major limitation of our study is that our study methodology involved a review of records, and hence our analysis and interpretation of the data are limited to only those variables that are routinely collected from patients/caregivers and captured in the patient records. Some of the important variables like the education status of the patient, the distance of the patient's residence to the ART centres, the patient's clinical condition, and so on, could have played a major role in initial viral load testing, enrolment for EAC, repeat viral load testing and viral suppression, were not available. Thus, we were unable to account for the influence of these factors in our analysis.

5.0 CONCLUSION

In this study, 93.8% of patients achieved viral load suppression (< 1000 copies/ml) following Enhanced Adherence Counseling (EAC). The findings also revealed that a longer duration of ART is significantly associated with viral load suppression post-EAC. However, the study identified substantial gaps in the EAC cascade, particularly in enrollment and completion rates, which hinder the effectiveness of EAC in achieving optimal viral load suppression. Addressing these gaps is crucial for improving HIV treatment outcomes. Further research is recommended to explore the underlying reasons for these gaps and inform targeted interventions by healthcare providers and HIV program managers in Benue State.

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V. Orih: Formal analysis**;**Data curation; Investigation; Writing – review & editing.

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E. Ejimkaraonye: Data review; Software;Resources.

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G. Anefu: Supervision

J. Zugu; Resources

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ETHICAL APPROVAL AND CONSENT

The Research Ethics Committee (REC) of the Benue State Ministry of Health approved this study. (Approval Ref #: MOH/STA/204/1/279). As the study would require no direct contact with the human participants and would utilize de-identified program data, the ethics gave a waiver from obtaining written consent from the study participants. All data collected in this study were kept confidential and only the study investigators had access to the individual patient data.

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