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Reaching Viral Suppression Among People With HIV With Suspected Treatment Failure who Received Enhanced Adherence Counseling in Southern Nigeria: A Retrospective Analysis

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Background. This study assessed viral load (VL) testing and viral suppression following enhanced adherence counseling (EAC) among people with HIV (PWH) with suspected treatment failure and identified factors associated with persistent viremia.

Methods. We conducted a retrospective review of electronic medical records of PWH aged 15 years or older who had received antiretroviral therapy (ART) for at least 6 months as of December 2020 and had a high viral load (HVL; ≥1000 copies/mL) across 22 comprehensive HIV treatment facilities in Akwa Ibom State, Nigeria. Patients with HVL were expected to receive 3 EAC sessions delivered in person or virtually and repeat VL testing upon completion of EAC and after documented good adherence. At 6 months post–EAC enrollment, we reviewed the data to determine client uptake of 1 or more EAC sessions, completion of 3 EAC sessions, a repeat viral load (VL) test conducted post-EAC, and persistent viremia with a VL of ≥1000 copies/mL. Selected sociodemographic and clinical variables were analyzed to identify factors associated with persistent viremia using SPSS, version 26.

Results. Of the 3257 unsuppressed PWH, EAC uptake was 94.8% (n = 3088), EAC completion was 81.5% (2517/3088), post-EAC VL testing uptake was 75.9% (2344/3088), and viral resuppression was 73.8% (2280/3088). In multivariable analysis, those on ART for <12 months ($P \leq .001$) and those who completed EAC within 3 months ($P = .045$) were less likely to have persistent viremia.

Conclusions. An HVL resuppression rate of 74% was achieved, but EAC completion was low. Identification of the challenges faced by PWH with a higher risk of persistent viremia is recommended to optimize the potential benefit of EAC.

Keywords. unsuppressed viral load; intensive adherence counseling; persistent viremia; people with HIV.

The goal of antiretroviral therapy (ART) for HIV infection is to achieve and maintain virologic suppression, thereby preventing disease progression and transmission. In 2014, the Joint United Nations Programme on HIV/AIDS (UNAIDS) announced the 95-95-95 goals for ending the AIDS epidemic by 2030—95% of all people with HIV (PWH) are diagnosed, 95% of those diagnosed are on ART, and 95% of those on ART are virally suppressed [1]. Since then, countries have made tremendous progress toward reaching and even surpassing these targets. As of 2020, among all PWH at the global level, 84% knew their status, 73% (56%–88%) were accessing treatment, and 66% (53%–79%) were virally suppressed [2, 3]. However, despite advances in ART coverage, challenges in achieving viral suppression remain.

Nigeria has the fourth largest HIV epidemic in the world, with ~1.8 million PWH in 2020 [4]. An estimated 107 112 new HIV infections—about 38% of all new infections in the West and Central African regions—were in Nigeria, and 49 000 people died of AIDS-related causes [4]. In the same year, the national viral suppression rate was only 72%, a low rate attributed to poor adherence to and retention on treatment, drug toxicity and resistance, and coinfections [4, 5]. In Akwa Ibom State, Nigeria, the HIV prevalence rate of 5.5% and estimated 178 000 PWH make achieving epidemic control in the state key to achieving epidemic control in the country. Yet, only about 120 000 individuals had initiated life-saving ART as of March 2020 [6]. Even among those on ART, published reports have highlighted suboptimal virologic outcomes in the state [7].

The World Health Organization's (WHO's) 2016 consolidated antiretroviral guidelines define virologic suppression for a public health approach as HIV RNA of <1000 copies/mL [2]. According to the WHO, virologic failure among patients on

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ART for at least 6 months is defined as a viral load (VL) of ≥1000 copies/mL (2 consecutive VL measurements within a 3-month period) with adherence support provided between the 2 measurements [8]. The WHO recommends providing enhanced adherence counseling (EAC) for people on ART who have a high viral load (HVL) before diagnosing treatment failure [8]. Studies have shown that enhanced adherence counseling for virally unsuppressed clients results in resuppression and prevents unnecessary switching of antiretroviral drugs [9, 10].

The Strengthening Integrated Delivery of HIV/AIDS Services (SIDHAS) project funded by the United States Agency for International Development (USAID) and the US President's Emergency Plan for AIDS Relief (PEPFAR) supports the government of Nigeria to increase ART coverage. In Akwa Ibom, SIDHAS supports the provision of HIV services in 102 health facilities across 21 local government areas (LGAs)—6 of which border the Atlantic Ocean. Because of the state's location and resources—large fishing settlements, 2 major seaports, an airport, and a thriving oil and gas industry—its inhabitants are highly migratory, especially in the coastal areas and border towns. In addition, accessing care is very challenging because many riverine and coastal communities are scattered across the state and most villages are separated by marshes, ravines, creeks, and swamps, rendering the cost of transportation to health facilities high and increasing the risk of treatment interruption and suboptimal clinical and virological outcomes.

More than 94 000 children and adults are on ART treatment through the project, which has achieved 87% VL coverage and a suppression rate of 95% [11].

Since the national standard of care for PWH with HVL was adopted in Akwa Ibom State in 2016, implementation has not been evaluated. We assessed clients' EAC uptake, consisting of the proportion who had attended 1 or more EAC sessions, completion of at least 3 months of EAC sessions, post-EAC viral load (VL) testing uptake, and viral resuppression with a VL of ≤1000 copies/mL, as well as potential factors that could be associated with persistent viremia among clients on ART in the state.

METHODS

Study Setting

The study was conducted in Akwa Ibom State in Southern Nigeria. The state has 31 local government areas (LGAs) and is bordered on the east by Cross River State, on the west by Rivers State and Abia State, and to the south by the Atlantic Ocean.

Study Design/Population

This was a retrospective cohort study of people with HIV aged 15 years or older who had been on a first-line ART regimen for at least 6 months, were on ART in December 2020, and had a VL of ≥1000 copies/mL at the time. They had to have been on ART for 6 months before their initial HVL event. All clients were receiving services from 1 of the 22 SIDHAS-supported comprehensive HIV treatment clinics in Akwa Ibom State.

SIDHAS implements VL monitoring services in line with the standard of care set forth in the Nigerian national HIV/AIDS treatment guidelines. VL testing is provided to adults and children who have been on ART for at least 6 months. The management of clients with an HVL in this setting involves adherence support, treatment of opportunistic infections, reassessment of VL after 3 months, and switch to a second-line regimen among those with persistent HVL after adherence is assured [12].

The counseling sessions are conducted either face to face with the ART adherence counselor or via tele-EAC. Tele-EAC involved provision of multimonth antiretroviral refills with prescheduled adherence support every month through phone calls and weekly drug adherence reminder messages using trained adherence counselors [13], prioritizing client such as those living far from the health facility who are likely to interrupt treatment or to be lost to follow-up. During each EAC session, adherence to ART is emphasized to ensure that clients take at least 95% of their prescribed doses during the period of review. Before each counseling session, the client is assessed for adherence retrospectively based on 4-day recall. Clients who report missed doses are asked to share reasons for missing their medications, and these reasons then form the basis of the counseling session.

A repeat VL test is performed on those determined to be adherent upon completion of the 3 EAC sessions, usually on same day as their third EAC session. If their VL is <1000 copies/mL, the client is considered resuppressed and continues on their current ART regimen. The VL test is then repeated after 1 year. However, if the repeat VL result is ≥1000 copies/mL despite good adherence, the client is switched to the second-line ART regimen, consisting of a protease inhibitor–based regimen (ritonavir-boosted lopinavir plus 2 nucleoside reverse-transcriptase inhibitors [NRTIs]). The NRTI backbone selected for the second-line regimen is dependent on the client's regimen history (ie, the NRTI backbone used in the first-line regimen) [12].

Data Management and Analysis

We used de-identified data from the Lafiya Management Information System LAMIS. LAMIS is a web-based, client-level electronic medical record system for managing ART program data in Nigeria [13]; the database has been used in Nigeria since 2007. Across all comprehensive ART treatment health facilities in Akwa Ibom 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 LAMIS. Service data from each client encounter are entered in LAMIS on a daily basis; then data quality checks are conducted and uploaded weekly to a secure central server.

For this study, we abstracted data on sociodemographic and clinical variables at 2 time points: immediately before the HVL event and at the post-EAC outcome determination in June 2021. Sociodemographic characteristics consisted of sex, age, educational status, and whether the client resided within or outside of the ART facility's catchment area. The clinical characteristics analyzed included duration on ART, calculated as the difference between the ART start date and the date of the first documented HVL result. Duration on ART was categorized as "≤12 months," the definition of stability on ART as "greater than 12 months," and time to EAC completion as "within 3 months" and "after 3 months" based on the national ART treatment guidelines [12]. Multimonth drug dispensing was defined as medication refill frequency ≥3 months.

In addition, ART clinics were categorized according to number of clients receiving ART, with low–medium facilities having <1500 clients and large-volume facilities serving ≥1500 clients.

All data obtained were cleaned to remove inconsistencies (eg, date variables) and validated using the hardcopy forms. Quality checks were also done to remove invalid entries, data elements where >5% was missing, or duplicates before analysis. The data were then analyzed using IBM Statistical Package for the Social Sciences (SPSS), version 26. Data were presented as frequencies and corresponding percentages where appropriate.

The primary outcome measure for the study was viral load suppression, defined as proportion of the enrolled PWH cohort with a repeat VL ≤1000 copies/mL post-EAC.

Other measures included:

(a) *EAC uptake*: Proportion of the PWH cohort that attended at least 1 EAC session

$$\textit{EAC uptake} = \frac{\textit{Number who attended at least one EAC session}}{\textit{PLHIV with initial high viral load}}$$

(b) *EAC completion rate*: Proportion that completed EAC sessions

$$\textit{EAC completion rate} = \frac{\textit{Number who completed 3 EAC sessions}}{\textit{Number who attended at least one EAC session}}$$

(c) *Post-EAC VL testing uptake*: Proportion of HVL clients who had a repeat VL test and received their results after at least 3 months of good adherence

$$\textit{Post} - \textit{EAC VL testing uptake} = \frac{\textit{Number with post} - \textit{EAC VL test results}}{\textit{Number who attended at least one EAC session}}$$

Secondary outcomes were the sociodemographic and clinical factors associated with EAC uptake and completion and post-EAC VL suppression.

Multivariable logistic regression analysis was employed to determine factors associated with EAC uptake and completion and persistent viremia (post-EAC VL >1000 copies/mL). Adjusted odds ratios and 95% CIs were reported. A *P* value of <.05 was considered statistically significant.

Ethical Approval

Ethical approval for retrospective collection of routine program data and dissemination of the study results was obtained from the Protection of Human Subjects Committee at FHI 360 (project number 1779029-1), which gave the study a non–human subjects research determination. Client-informed consent was thus not required, as only routine, deidentified, operational monitoring data were collected and analyzed.

Patient Consent

The study does not include factors necessitating patient consent.

RESULTS

Characteristics of Patients With HVL

A total of 3595 PWH had a detectable VL during the period under review, 3257 of whom were age 15 or older and were included in the study cohort. Figure 1 shows the clients' entry into the cohort to exit.

Among the cohort of 3257 PWH, the median age (interquartile range) was 34 (27–41) years, 66.6% (2170) were female, and 58.6% (1813) had secondary education (Table 1). The majority (93.2% [2990]) reported living within the catchment areas of the ART facilities. Two-thirds (2070) had been on ART for 12 months or less, while 72.5% (2362) had received treatment in health facilities with high client volume and 51.6% (1681) were on a multimonth drug dispensing schedule (Table 1).

Outcomes for Patients With HVL

EAC Uptake

Overall, 94.8% (3088/3257) of PWH with HVL commenced EAC (of whom 53.1% [1728/3257] started within 1 month of a documented HVL result). Figure 1 shows dropoffs across the EAC cascade.

EAC uptake was up to 99.5% among males and 96.2% among PWH with secondary education. Across high client volume facilities, EAC uptake was 95.5%, and EAC uptake was 98.9% among PWH on a multimonth drug dispensing schedule. In multivariable analysis to determine demographic and other factors associated with EAC uptake, those with secondary education (adjusted odds ratio [aOR], 1.79; 95% CI, 1.17–2.52; $P \leq .001$) were more likely to use EAC (Table 2) than those without a secondary education. EAC uptake was 10 times higher among those on a multimonth drug dispensing schedule, compared

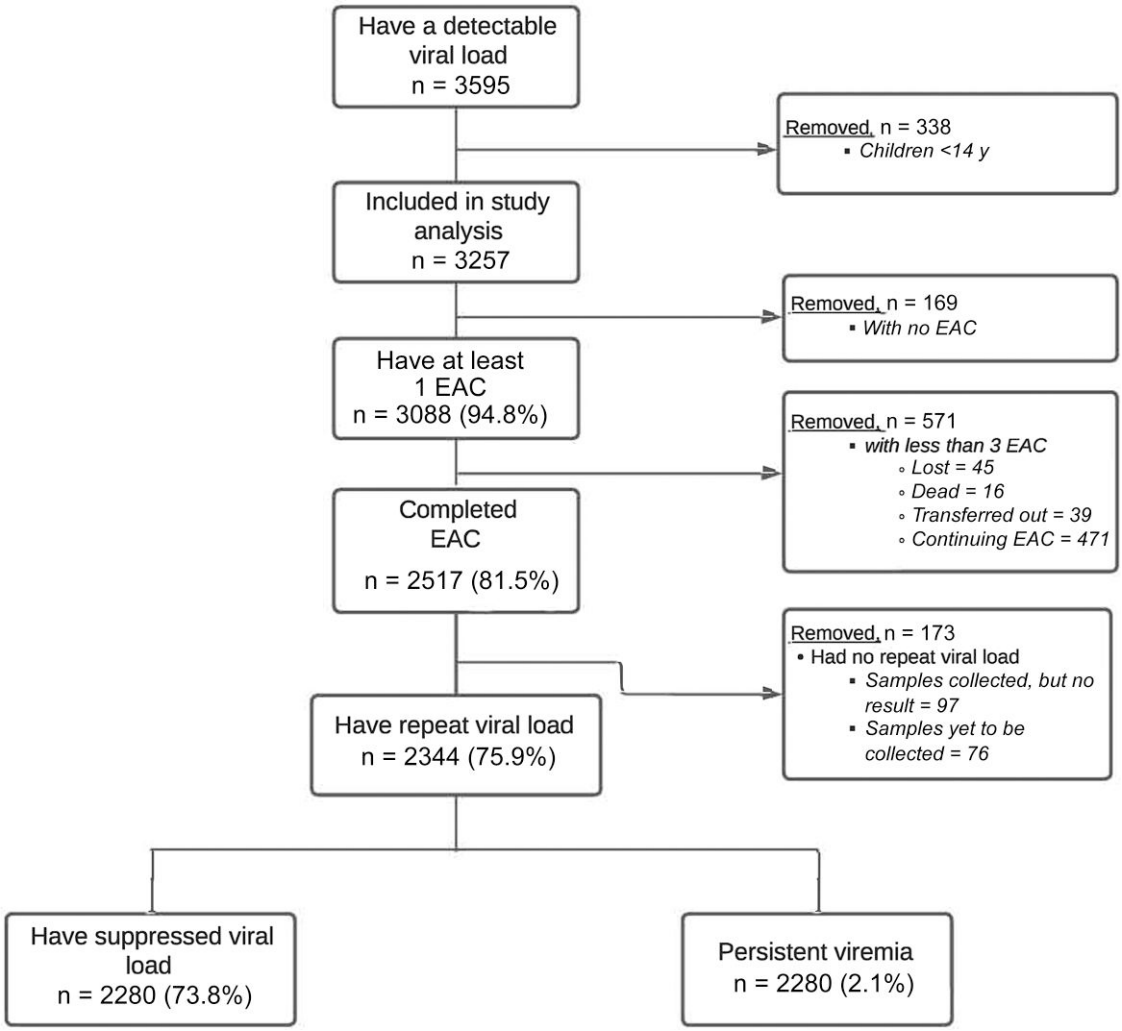

Figure 1. Flow diagram showing entry and exit during management of people with HIV on ART with high viral load ≥1000 copies/mL, Akwa Ibom, Nigeria, January 2021–June 2021. Abbreviations: ART, antiretroviral therapy; EAC, enhanced adherence counseling.

with those on monthly dispensing (aOR, 10.72; 95% CI, 6.23–18.44; $P \leq .001$).

EAC Completion

Despite the dropoff, the majority of the cohort enrolled in EAC (81.5%; 2517/3088) completed their EAC sessions. Reasons for not completing EAC included having been transferred to other facilities (1.3%; 39 clients), death (0.5%; 16 clients), and loss to follow-up (1.4%; 45 clients). A total of 471 (15.3%) clients were still receiving EAC after the review period (Figure 1). EAC completion minimally differed across the sex, educational level, and ART duration categories (Table 3).

In multivariable analysis, PWH residing within the ART facility catchment area were 1.5 times more likely to complete EAC (aOR, 1.48; 95% CI, 1.03–2.11; $P = 0.033$) than those residing outside the ART facility catchment area. Other factors associated with EAC completion included receiving care at high–client volume health facilities (aOR, 1.58; 95% CI, 1.29–1.94; $P \leq .001$), early EAC commencement within 1 month of HVL (aOR, 3.30; 95% CI, 2.69–4.04; $P \leq .001$), and being on a multimonth drug dispensing schedule (aOR, 2.30; 95% CI, 1.87–2.0; $P \leq .001$) (as shown in Table 3).

Post-EAC VL Test Uptake and Viral Suppression

Overall, 75.9% (2344/3088) of the PWH cohort received EAC and had a post-EAC VL test within the study review period (Figure 1). The majority, 73.8% (2280/3088), of our cohort achieved a VL of <1000 copies/mL and were considered to be suppressed. Sixty-four clients had a VL of >1000/mL and were considered to have persistent viremia.

In the multivariate analysis to determine factors associated with persistent viremia (Table 4), the likelihood of persistent viremia was lower among the PWH cohort on ART for 12 months or less (aOR, 0.42; 95% CI, 0.24–0.74; $P \leq .001$)

Table 1. Characteristics of Patients With HVL in Akwa Ibom State

Variables	Categories	n = 3257 No. (%) or Median (IQR)
Sex	Male	1087 (33.7)
	Female	2170 (66.6)
Age	15 –24 y	508 (16.1)
	25–29 y	515 (15.8)
	30–34 y	646 (19.8)
	35–39 y	523 (16.1)
	40+ y	1065 (32.7)
	Age, y	34 (27–41)
Highest educational level	No secondary school education	1282 (41.4)
	Have secondary school education	1813 (58.6)
	Missing	162
Residential category	Within ART facility catchment area	2990 (93.2)
	Outside ART facility catchment area	219 (6.8)
	Missing	48
Duration on ART	≤12 mo	2070 (63.6)
	>12 mo	1187 (36.4)
Facility category	Low–medium client load	895 (27.5)
	High client load	2362 (72.5)
Multimonth drug dispensing schedule	No	1576 (48.4)
	Yes	1681 (51.6)

Abbreviations: ART, antiretroviral therapy; HVL, high viral load; IQR, interquartile range.

than among those on ART for longer than 12 months. In addition, the cohort that completed EAC within the 3-month schedule (aOR, 0.49; 95% CI, 0.25–0.99; $P = .045$) was less likely to have persistent viremia than those who had completed EAC after 3 months (Table 4).

DISCUSSION

In this study, we assessed VL testing and viral suppression following EAC completion among people with HIV with suspected treatment failure and identified factors associated with persistent viremia among PWH who completed EAC in Akwa Ibom State, Nigeria. Up to 94.8% of the clients with HVL were enrolled in EAC, and 81.5% of these completed EAC in accordance with the national guidelines [12]. The majority (73.8%) of clients who initially had HVL were resuppressed after EAC. These results highlight the importance of implementing WHO and national guidelines on managing HVL. However, our study also highlights a major gap in the EAC cascade—that is, the low EAC completion rate.

Despite the importance of EAC, programs face several challenges in implementing all the steps of the EAC cascade. Our analysis showed a delay between receipt of HVL results at the health facility and client initiation of EAC sessions, with the majority of clients initiating EAC 1 month or more after a documented HVL result. This lag time could delay diagnosis of

Table 2. EAC Uptake Disaggregated by Client and Facility Characteristics for 3257 PWH With a VL of ≥1000 Copies/mL, Akwa Ibom, Nigeria, January 2021–June 2021

Characteristics	Categories	Total (n = 3257)	Received EAC (n = 3088), No. (%)	OR (95% CI)	*P* Value	AOR (95% CI)	*P* Value
Sex	Male	1087	1038 (99.5)	Reference			
	Female	2170	2050 (94.5)	0.806 (0.57–1.13)	.22	1.26 (0.86–1.85)	.23
Age	15–24 y	508	480 (94.5)	1.03 (0.92–1.14)	.62	1.04 (0.92–1.17)	.505
	25–29 y	515	489 (95.0)				
	30–34 y	646	608 (94.1)				
	35–39 y	523	500 (95.6)				
	40+ y	1065	1011 (94.9)				
Highest educational level	No secondary school education	1282	1197 (93.4)	Reference			
	Have secondary school education	1813	1744 (96.2)	2.6 (1.68–3.89)	<.01	1.79 (1.17–2.52)	<.001*
Residential category	Within ART facility catchment area	2990	2834 (94.8)	Reference			
	Outside ART facility catchment area	219	208 (95.0)	0.74 (0.51–1.04)	.084	1.32 (0.67–2.57)	.42
Duration on ART since initiation	≤12 mo	2070	1952 (94.3)	Reference			
	>12 mo	1187	1135 (95.6)	1.65 (1.05–2.57)	.03	0.81 (0.56–1.19)	.29
Facility category	Low–medium client load	895	833 (93.1)	Reference			
	High client load	2362	2255 (95.5)	0.64 (0.46–0.88)	.06	1.00 (0.71–1.43)	.96
Multimonth drug dispensing schedule	No	1576	1424 (90.4)	Reference			
	Yes	1681	1664 (98.9)	10.45 (6.30–17.33)	<.01	10.72 (6.23–18.44)	<.001*

Abbreviations: AOR, multivariable adjusted odds ratio; ART, antiretroviral therapy; EAC, enhanced adherence counseling; OR, odds ratio; PWH, people with HIV; VL, viral load.

*$P < .05$

Table 3. Factors Associated With EAC Completion Disaggregated by Client and Facility Characteristics for 3088 PWH Enrolled in the EAC Intervention in Akwa Ibom, Nigeria, January 2021–June 2021

Characteristics	Categories	Total (n = 3088)	Completed EAC (n = 2517), No. (%)	OR (95% CI)	*P* Value	AOR (95% CI)	*P* Value
Sex	Male	1038	828 (76.2)	Reference			
	Female	2050	1689 (77.8)	0.84 (0.69–1.02)	.08	0.79 (0.63–0.97)	.027*
Age	15–24 y	480	385 (80.2)	1.01 (0.95–1.08)	.72	1.03 (0.96–1.10)	.44
	25–29 y	489	407 (83.2)				
	30–34 y	608	487 (80.1)				
	35–39 y	500	413 (82.6)				
	40+ y	1011	825 (81.6)				
Highest educational level	No secondary school education	1282	997 (77.8)	Reference			
	Have secondary school education	1813	1408 (77.7)	0.84 (0.69– 1.02)	.078	0.83 (0.68–1.02)	.07
Residential category	Within ART facility catchment area	2990	2323 (77.7)	Reference			
	Outside ART facility catchment area	219	156 (71.2)	1.52 (1.09–2.10)	.013	1.48 (1.03–2.11)	.033*
Duration on ART since initiation	≤12 mo	2070	1593 (77.0)	Reference			
	>12 mo	1187	923 (77.8)	1.02 (0.84–1.23)	.84	0.99 (0.81–1.22)	.92
Facility category	Low–medium client load	895	641 (71.6)	Reference			
	High client load	2362	1876 (79.4)	1.48 (1.22–1.80)	<.001	1.58 (1.29–1.94)	<.001*
Time to EAC commencement	After 1 mo	1360	967 (71.1)	Reference			
	Within 1 mo	1728	1550 (89.7)	3.53 (2.91–4.30)	<.001	3.30 (2.69–4.04)	<.001*
Multimonth drug dispensing schedule	No	1424	1062 (74.6)	Reference			
	Yes	1664	1455 (87.4)	2.37 (1.97–2.86)	<.001	2.30 (1.87–2.83)	<.001*

Multivariable logistic regression analysis.

Abbreviations: AOR, multivariable adjusted odds ratio; ART, antiretroviral therapy; EAC, enhanced adherence counseling; OR, odds ratio; PWH, people with HIV; VL, viral load.

virologic failure, identification of ART resistance, and the switch to a second-line ART regimen [14, 15]. Delaying ART switch for patients with resistance increases the risk of sexual transmission of ART-resistant viral strains [16, 17] and compromises second-line and future treatment options [15] due to the accumulation of drug-resistant mutations and cross-resistance. Identifying the factors associated with timely EAC enrollment and completion could help achieve optimal treatment outcomes.

Without EAC, clients with true treatment failure risk potentially continuing on failing regimens, exposing them to adverse HIV-related outcomes [15, 18]. In our analysis, a significant proportion of clients in the SIDHAS-supported program did not complete the 3 recommended EAC sessions, primarily due to client transfer to other facilities and loss to follow-up. Several analyses have assessed the proportion of clients in HIV care programs who officially or unofficially transfer out (the latter also known as silent transfer or self-transfer) and have found that clients who transfer are at risk of poor adherence and increased mortality [19–22]. Considering the already higher risk of poor adherence among those with unsuppressed VL, proper transfer of care and follow-up to ensure continuity of appropriate treatment are recommended for this subgroup.

EAC uptake and completion were associated with factors such as the volume of clients served by the ART facility. Clients enrolled at facilities with a large client volume have better EAC cascade outcomes than those at lower-volume facilities. The high-volume facilities in the study area are located in densely populated areas of the state and are better staffed and resourced than the smaller-volume facilities, which are often located in sparsely populated, hard-to-reach locations, increasing transportation costs and affecting facility attendance for EAC. Previous studies have shown that long travel distances and lack of money for transport to health institutions affect ART adherence and clinic follow-up [23, 24]. However, our study findings were different. PWH residing outside the ART facility catchment area were 1.6 times more likely to complete EAC compared with those within the catchment area. This could suggest that non-facility-based approaches could be developed to support clients who need EAC but live far from health facilities. Differentiated models for delivering EAC, such as by phone, could be explored to accommodate clients residing far from the facility catchment area [25, 26].

The majority (75.9%) of clients underwent repeat VL testing. Other studies have reported lower VL testing uptake for those who completed EAC [14, 27–30]. Factors that may have

Table 4. Client and Facility Characteristics Associated With Persistent Viremia Among 3088 PWH With High VL Enrolled in the EAC Intervention in Akwa Ibom, Nigeria, January 2021–June 2021

Characteristics	Categories	Total (n = 3088)	Have VL >1000 Copies/mL (n = 64), No. (%)	OR (95% CI)	*P* Value	AOR (95% CI)	*P* Value
Sex	Male	1038	19 (1.8)	Reference			
	Female	2050	45 (2.2)	0.85 (0.49–1.47)	.56	0.84 (0.44–1.61)	.61
Age	15–24 y	480	9 (1.9)	1.0 (0.98–1.03)	.57	0.90 (0.73–1.10)	.28
	25–29 y	489	10 (2.0)				
	30–34 y	608	12 (2.0)				
	35–39 y	500	9 (1.8)				
	40+ y	1011	24 (2.4)				
Highest educational level	No secondary school education	1282	25 (2.0)	Reference			
	Have secondary school education	1813	36 (2.0)	1.01 (0.60–1.70)	.959	0.79 (0.44–1.40)	.41
Residential category	Within ART facility catchment area	2990	51 (1.7)	0.76 (0.44–1.31)	.32	1.43 (0.43–4.79)	.56
	Outside ART facility catchment area	219	4 (1.8)	Reference			
	≤12 mo	2070	25 (1.2)	0.38 (0.23–0.63)	<.001	0.42 (0.24–0.74)	<.01
Duration on ART since initiation	>12 mo	1187	39 (3.3)	Reference			
Time to completion of EAC	Within 3 mo	-	1951	0.60 (0.33–1.10)	.1	0.49 (0.25–0.99)	.045
	Longer than 3 mo	-	329	Reference			
Facility category	Low–medium client load	895	19 (2.1)	Reference			
	High client load	2362	45 (1.9)	0.76 (0.44–1.31)	.32	0.61 (0.33–1.11)	.11
Time to EAC commencement	After 1 mo	1360	24 (1.8)	Reference			
	Within 1 mo	1728	40 (2.3)	1.06 (0.63–1.76)	.837	0.87 (0.49–1.56)	.65
Multimonth drug dispensing schedule	No	1424	31 (2.2)	Reference			
	Yes	1664	33 (2.0)	0.72 (0.44–1.20)	.21	1.02 (0.52–1.82)	.95

Multivariable logistic regression analysis.

Abbreviations: AOR, multivariable adjusted odds ratio; ART, antiretroviral therapy; EAC, enhanced adherence counseling; OR, odds ratio; PWH, people with HIV; VL, viral load.

contributed to the high VL testing uptake seen in our study setting include client education to increase literacy on VL at every visit and expansion of VL sample collection centers through existing decentralized drug distribution structures [31].

Our resuppression rate was much higher than both the WHO target (70%) [8] and the rates found in other studies [27, 28, 32, 33]. This could have been due to the convenient way in which EAC was delivered in the SIDHAS-supported facilities. The program allowed EAC via phone calls for clients who could not come to the facility, enabling 3-month refills, and at high-volume facilities, multidisciplinary teams were used in the review, monitoring, and follow-up of unsuppressed clients on EAC [13, 34].

Duration on ART was significantly associated with suppression post-EAC. Patients on ART for 12 months or less were less likely to have persistent viremia compared with those on ART for longer. This finding is different from the findings reported in other studies [14, 35]. Although our study was not designed to answer this question, it is possible that patients on ART for longer may have accumulated multiple drug resistance mutations, especially as the regimen in use at the time was not as efficacious as the DTG-based regimen and thus less likely to resuppress.

The Nigeria national guidelines [12] recommend 3 or more enhanced adherence counseling sessions, requiring that good adherence is first established before a repeat VL is offered. However, our study reports higher odds of persistent viremia among those who had EAC extending beyond 3 months, compared with those who completed EAC within the recommended 3 months. The value of extending EAC beyond the recommended 3 months should be evaluated further against the need to avoid prolonging exposure of patients to failing regimens.

Our study has some limitations. First, the retrospective nature of the study limited the review of records to those available in client folders and did not allow for comprehensive assessment of other potential factors that could be associated with persistent viremia after EAC. For instance, variables like socioeconomic status of the patient (eg, marital status) and mode of EAC delivery, which could have played an important role in enrollment for EAC, completion of EAC, repeat viral load testing, and viral suppression, were missing or not consistently

recorded in source documents. Thus, we were unable to account for the influence of these factors in our analysis. Despite these limitations, to our knowledge this is the largest analysis in Nigeria documenting enrollment and completion of EAC. The study results provide useful information for HIV program managers and health providers to improve outcomes for a significant number of people who fail first-line and second-line treatment.

CONCLUSIONS

This study assessed VL testing and viral suppression following EAC completion among people with HIV with suspected treatment failure and identified factors associated with persistent viremia among PWH who completed EAC in Akwa Ibom State, Nigeria. We achieved an HVL resuppression rate of >74%, but the low EAC completion rate exposed a major gap in the EAC cascade. Additional intervention beyond the basic EAC is recommended, especially for those with needs that require extension of their enhanced adherence counseling beyond the 3-month duration.

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