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Research Article

Factors Associated with ART Adherence and Viral Load Suppression Among Persons Living with HIV in Likasi, Democratic Republic of Congo

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Abstract

The 90-90-90 UNAIDS targets to measure the progress toward HIV control were not achieved globally in 2020, with significant differences between countries. Many low- and middle-income countries in sub-Saharan Africa, including the DRC, had the worst outcomes. These target shortfalls, especially in viral load suppression, suggest continued HIV transmission, mortality, and morbidity. Several factors have been found to influence viral load suppression. This study sought to determine the patient and facility factors associated with adherence to ART and viral load suppression among people living with HIV. A cross-sectional study was carried out in 2021 among 367 adult HIV patients receiving ART in health facilities in Likasi. Adherence to ART was measured using self-reports and was categorized as adherent or non-adherent. Viral load level was the most recently measured value, and viral load suppression was defined using the 1000 copies/mL WHO cut-off. Data analysis was done using SAS software. Frequency and percentage were used to describe the sample; Chi Square determined the patient and facility factors associated with 1) adherence to ART and 2) viral load suppression; Odds ratios determined the strength of the associations. The results showed suboptimal levels of adherence to ART (82%) and viral load suppression (74%). Adherence was most likely among patients who 1) disclosed their status, 2) were in health facilities of > 459 patients, and 3) were in health facilities with very good hospitality. Adherence was less likely among patients 1) who disclosed to their partners, 2) who were in secondary-level facilities, and 3) in Kikula health zone. The likelihood of suppressing viral load was higher in adherent patients and those who disclosed their HIV status. Subjects with an NGO support group and those from a secondary-level facility were less likely to suppress their viral load. Conclusions: Likasi is behind in achieving the UNAIDS viral load suppression goal. Several factors impact ART adherence and viral load suppression. The health system management, policymakers, and practitioners could target these factors for improvement and contribute to achieving the 95-95-95 UNAIDS targets. This first assessment of the factors associated with ART adherence and viral load suppression in Likasi fills the

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existing literature gap and calls for further studies.

Keywords

HIV, Viral Load Suppression, ART Adherence, Patients' Factors, Health Facilities' Factors

1. Introduction

HIV/AIDS (Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome) is a public health problem in the world. In 2021, about 38.4 million people were living with HIV, 1.5 million were newly infected, and 650,000 died from AIDS-related illnesses worldwide [1]. It is the second most fatal infectious disease globally [2], with no curative treatment or preventive vaccine, and people must take daily medicine [3]. It affects the physical and overall quality of life and perceptions of people living with HIV (PLHIV) [4]. Consequently, PLHIV and their countries cannot reach their full potential [5].

There is a disparity in HIV prevention and treatment [1, 6]. Low- and middle-income countries do not have the same access to antiretroviral as high-income and face more challenges in controlling the HIV epidemic [7, 8]. The healthcare access difference is also noticeable between rural and urban areas [8, 9]. Consequently, there is a disproportionate global distribution of HIV, with Africa [10] accounting for two-thirds of all people living with HIV and Sub-Saharan Africa bearing the world's highest HIV prevalence and incidence [11-13].

The disproportionated distribution of HIV/AIDS called for a global community effort, led by the UNAIDS (Joint United Nations program on HIV/AIDS) to address the public health threat due to the HIV/AIDS epidemic [14]. To achieve this goal, they adopted the HIV care continuum framework at the individual level and the HIV care cascade at the population level [15] to assess the progress [16, 17]. These tools constitute valuable public health tools that provide policymakers and health service providers with information for gap identification and strategy development for improvement to support PLHIV and achieve the HIV elimination goal [15, 18].

Previous 90-90-90 UNAIDS targets set for 2020 [19] were not achieved, with global attainments at only 84%, 73%, and 66% [1] and significant differences between countries. Many low- and middle-income countries in sub-Saharan Africa were not on track, with the DRC being one of the countries that had the worst outcomes of 62.9%-60.9%-15.7% [20].

The UNAIDS targets reach shortfall suggests continued HIV transmission, which perpetuates HIV/AIDS-related mortality and morbidity and hinders the achievement of the current 95-95-95 goals set for HIV elimination by 2030. It is, therefore, crucial to examine HIV programs to find insufficiencies at any step of the care continuum and take corrective action. Viral load suppression is the final step in the continuum and primary goal of HIV treatment and public health interventions.

According to the WHO, testing viral load is the preferred approach to monitoring the treatment response [21]. Thus, assessing viral load suppression is essential to address the problem of continued HIV transmission and subsequent consequences. Adherence to ART (Antiretroviral therapy) is essential to sustain viral load suppression and provides information about the risk of failure to viral load suppression. In resource-limited areas where measuring viral load suppression is challenging, adherence to ART is used as a proxy [21-23].

This study aims to assess ART adherence and viral load suppression and determine the factors influencing them among PLHIV in health centers in Likasi and to address the gap in research on this topic. Knowing the association of these factors could equip providers with tools to impact patients' treatment success and evidence-based strategies for effective healthcare services and, thus, address the HIV problem. The results of this study will also assist the region and country in HIV/AIDS intervention prioritization and resource allocation and inform policy development to increase the population's adherence to treatment and viral load suppression, thus ensuring the achievement of HIV/AIDS control and elimination by 2030. To our knowledge, no previous studies assessed the factors associated with viral load suppression and adherence to ART in our study area [6, 24, 25]. The results of this study will fill the literature gap.

2. Materials and Methods

2.1. Study Area and Ethical Considerations

The study was conducted in Likasi city, in Haut Katanga Province, DRC. This study was a part of the study "Facteurs de persistence de la charge virale chez les PVVIH (Personne Vivant avec le VIH) sous ARV dans la ville de Likasi," conducted by SANRU Asbl and submitted to the Ethics committee at the University of Lubumbashi (UNILU/CEM/120/2018). The UGA IRB approved this proposal under the ID: PROJECT00005954.

2.2. Study Design

This is a cross-sectional study conducted among PLHIV

attending the health facilities in Likasi from September 2021 to December 2021. Purposive sampling was used to enroll patients. A questionnaire in French containing information on health facilities and key viral load suppression factors was administered to patients who provided informed consent to participate in the study. Trained research staff administered the questionnaire and recorded other relevant variables from patients' files. The data was entered in EpiInfo version 7.0 and exported into SAS version 9.4 for analysis.

The first outcome of this study was adherence to ART, assessed through self-reporting, which is the most frequently used method to assess adherence to ART and is associated with successful viral load suppression [21, 26]. Patients reported how often they forget to take ART and were categorized into adherent (never or rarely forget) and non-adherent (often or more often forget). The second outcome was Viral Load Suppression (VLSup) determined using the WHO definition of "less than 1000 copies/ml" [24]. The viral load levels used were the most recently recorded in the patient's charts, and viral load suppression was transcribed as "Yes" or "No" if the viral load value was < 1000 or >= 1000 copies/ml, respectively.

The independent variables of interest for this study included patients' factors (age, gender, education level, marital status, employment status, HIV status disclosure, to whom disclosed status, means of transport, duration on ART, WHO stage) and health facility factors (NGO support group, peer support group, hospitality at the facility, medicine pick up interval, health zone, healthcare structure type, and healthcare facility size).

2.3. Statistical Analysis

A descriptive analysis was performed on these variables of interest to report the characteristics of the sample.

A bivariate analysis assessed the association of each independent variable with Adherence to ART and Viral load suppression. Chi-square test of independence was used to establish the association, and the statistical significance of the associations was assessed at $p<0.05$.

Multivariate logistic regression was used to determine the association of each independent variable with adherence to ART and Viral load suppression, controlling for other variables. Odds Ratios at 95% CI were used to measure the strength, and the statistical significance of the associations was assessed at $p<0.05$.

3. Results

3.1. Sample Description

The sample included 367 PLHIV, predominantly females (65%). The median age was 36 years (IQR: 15). More than half of the sample had a high school or college education (53%), while the rest had primary-level education or no formal education (47%). The majority were married or cohabiting (64%), employed (70%), suppressed their viral load (74%), and adhered to ART (82%).

Table 1 contains the parameters that describe the study sample.

Table 1. *Sociodemographic, Clinical, and Facility Characteristics of Study Participants.*

Characteristic	N	%
Sociodemographic factors	367	100
Sex		
Male	128	34.88
Female	239	65.12
Age		
Age <=29	94	25.61
Age 30-44	182	49.59
Age >44	91	24.80
Occupation		
Unemployed	110	29.97
Employed	257	70.03
Marital status		
Married/cohabiting.	236	64.31
Single	71	19.35
Widow or Divorced	60	16.35
Education status		
None or Primary	171	46.59
High School or College	196	53.41
Means of transport		
Walk	157	42.78
Motorcycle	162	44.14
Bike or Car	48	13.08
Disclosed HIV status?		
No	95	25.89
Yes	272	74.11
To whom disclose		
No one	95	25.89
Partner	148	40.33
Other	124	33.79
Clinical factors		
Duration on ART		
<=12 months	140	38.15

Characteristic	N	%
>12 months	227	61.85
WHO stage		
Stage 1	242	65.94
stage 2	88	23.98
stage 3-4	37	10.08
Adherence		
Not adherent	65	17.71
Adherent	302	82.29
VL suppressed		
No	97	26.43
Yes	270	73.57
Facility factors		
Structure type		
Primary level	243	66.21
Secondary level	124	33.79
Health zone		
Likasi	93	25.34
Kikula	158	43.05
Kambove	116	31.61
Facility size		
<=151	111	30.25
152-459	172	46.87
>459	84	22.89
Meds Pick up interval		
1-month	54	14.71
3-months	261	71.12
6-month	52	14.17
Hospitality at the facility		
Fair or Bad	21	5.72
Good	187	50.95
Very good	159	43.32
Peer Support		
No	284	77.81
Yes	81	22.19
NGO Support group		
No	246	67.03
Yes	121	32.97

*N=sample size

3.2. Bivariate Analysis of Factors Associated with Adherence to ART

The bivariate analysis showed the following factors to have a statistically significant association with adherence to ART.

Patient factors: education status (χ^2 = 4.47, p=0.034), disclosure of status (χ^2 = 12.17, p=0.0005), to whom disclosed status (χ^2 = 14.58, p=0.0007).

Facility factors: facility size (χ^2 = 10.11, p=0.0064), hospitality at the facility (χ^2 = 30.75, p<.0001), medicine pickup interval (χ^2 = 8.88, p=0.0118), and health zone (χ^2 = 13.29, p=0.0013).

3.3. Bivariate Analysis of Factors Associated with Viral Load Suppression

The bivariate analysis showed the following factors to have a statistically significant association with viral load suppression.

Patient factors: adherence to ART (χ^2 = 79.861, p<.0001), Disclose HIV status (χ^2 = 7.145, p=0.0075), to whom disclose status (χ^2 = 9.258, p=0.0098).

Facility factors: structure type (χ^2 = 5.331, p=0.021), hospitality at the facility (χ^2 = 16.826, p=0.0002), NGO support group (χ^2 = 9.159, p=0.0025), and pickup interval (χ^2 = 7.592, p=0.023).

3.4. Multivariate Analysis of Factors Associated with Adherence to ART

The results of the multivariate analysis of factors associated with adherence to ART are as follows.

The odds of adherence to ART were high among:

1) Patients who disclosed their status compared to those who did not (OR=3.709, 95% CI [1.499, 9.182],
2) Patients in health facilities of >459 capacity size compared to those in health facilities < 152 (OR=7.067, CI [1.66, 30.079],
3) Patients in health facilities with very good hospitality compared to those with bad or fair hospitality (OR=7.133, 95% CI [1.902, 26.75].

The odds of adherence to ART were lower among:

1) Patients who disclosed their status to their partners compared to those who disclosed their status to no one (OR=0.308, CI: 0113, 0.834),
2) Patients in the health zone Kikula compared to those in the health zone Likasi (OR=0.309, 95% CI [0.112, 0.853],
3) Patients in secondary-level health facilities compared to those in primary-level health facilities (OR=0.133, 95% CI [0.047, 0.377].

3.5. Multivariate Analysis of Factors Associated with Viral Load Suppression

The results of the multivariate analysis of factors associated with viral load suppression are as follows.

The odds of viral load suppression were higher among:

1) Patients who were adherent to ART compared to those who were not adherent (OR=10.934, 95% CI [5.13, 23.306],
2) Patients who disclosed their HIV status compared to those who did not disclose their status (OR=2.324, 95% CI [1.037, 5.208].

The odds of viral load suppression were lower among:

1) Patients with an NGO support group compared to those who did not have one (OR= 0.383, 95% CI [0.178, 0.824],
2) Patients who attended a secondary level facility compared to those who attended a primary level (OR=0.187, 95% CI [0.076, 0.461].

4. Discussion

We conducted a cross-sectional study to determine the factors associated with viral load suppression and adherence to ART among PLHIV in health centers in Likasi. We hypothesized that there were differences in the patients and healthcare facility factors between PLHIV 1) who adhered and those who did not adhere to ART and 2) who suppressed and those who did not suppress their viral load. We found that 18% of PLHIV did not adhere to ART, and 26% did not suppress their viral load. Adherence to ART was associated with Disclosed status, to whom disclosed, structure type, health zone, facility size, and hospitality. Viral load suppression was associated with adherence to ART, disclosing HIV status, health facility structure type, and having an NGO support group.

The 18% of people who were not adherent and 26% who did not suppress their viral load represent a risk for potential HIV transmission and increased incidence in this community and general population [27-29].

Our finding is similar to the 20.9% non-adherence reported in Kinshasa, DRC [30], but slightly higher than the reported viral load non-suppression rate of 19% in two provinces of DRC [31] and 17.7% in the city of Kinshasa [32]. Besides the fact that these two prior studies used the same database, the difference with our study can be explained by the variation of HIV distribution within a country and province [33-35]. This suggests that more efforts are needed to ensure the achievement of viral suppression among PLHIV in Likasi.

Our result shows that the likelihood of suppressing viral load was higher in subjects who were adherent to treatment than those who were not. This result is in accordance with our expectations. The plausible explanation of this association is that missing a dose allows the virus to grow rapidly and thus not achieve viral load suppression [36]. There is strong evidence about this relationship, including the following. Lower ART adherence increases persistent low-level HIV viremia [37] or HIV RNA [38]. Also, longitudinal studies reported that people with suboptimal adherence had more detectable viral load than those with best adherence [39, 40]. Further, a Randomized Control Trial found a negative association between poor self-report adherence and viral load suppression [41]. Our finding suggests a need for monitoring and assessing ART adherence to achieve viral load suppression in Likasi.

People who Disclosed their HIV status were more likely to be adherent to ART and to suppress their viral load than those who did not disclose. This association is consistent with the literature that explains that, by disclosing your status to others, you will more likely not refrain from taking your treatment in the presence of others and, thus, will always take ART [42, 43]. It is also believed that by disclosing your status, you will receive support from your partner, family, and friends and maintain adherence to ART [44]. It was reported, for example, in Goma, DRC, that people who did not share their HIV status were more likely to be lost to follow-up [45] and did not, hence, adhere to treatment. Similar findings were reported by others showing a significant association between either non-disclosure with non-viral load suppression or disclosure with viral load suppression [46, 47]. However, this is not always true, as people can be discriminated against and stigmatized because they are known as HIV-positive [48, 49]. This can explain why, in our study, those who disclosed to their partner were less likely to adhere to ART than those who disclosed to no one. Also, a study reported a non-significant positive association between non-disclosure and viral load non-suppression in the heterosexual group and a negative association in the MSM group [50]. This negative relationship in the MSM group is most likely due to the associated stigma that refrains them from disclosing their status [51]. It is possible that people who did not disclose their status in Likasi face stigma that impedes their viral load suppression. Our finding suggests that patients be provided with education to help them make informed choices on to whom to disclose their status [44] and be empowered and supported to take their medicine regardless of the environment or people surrounding them. Practitioners should also acquire competencies to reduce stigma, which can be a barrier to viral load suppression.

We also found that health facilities with very good hospitality were more likely to have adherent patients than those with bad or fair hospitality. This finding was consistent with our expectations, as poor staff attitudes toward patients and low patient satisfaction with services have a negative impact on health outcomes [52, 53]. Several studies have also shown this relationship in terms of dissatisfaction with health services or healthcare facilities [53, 54] and unpleasant experiences with clinic staff [55-58]. We suggest providing ongoing training, mentoring, supportive supervision, and monitoring of healthcare and community workers to improve patient-provider relationships and enable discussion of ART

adherence.

Subjects receiving care at a secondary-level facility were less likely to adhere to ART and suppress their viral load than those receiving care at a primary-level facility.

Our findings are similar to those reported in Zimbabwe, where the odds of non-suppression were higher in secondary and tertiary levels health facilities compared to primary levels care settings [59]. The association might be explained by the organization of the healthcare delivery system in DRC, consisting of delivering the minimum package of primary health care, including curative, preventive, and promotional services at health centers, which are the primary level facilities [60]. Thus, the health centers are the first contact of PLHIV for testing and diagnosis and where the relationship between clinician and patient is established. Additionally, in health centers, patients see the same nurses throughout their care, while in secondary-level facilities, nurses rotate between departments, resulting in a lack of connection with patients. The continuity of the patient-clinician relationship allows retention in care and, ultimately, better outcomes [61]. Also, when patients start their care at a higher-level facility and then are referred to a primary-level facility to receive the appropriate care, they tend to get lost in follow-up if there is no good planning [62]. It is possible, therefore, that secondary-level facilities in our study have patients who have been off-treatment while they were lost to follow-up. Our study suggests a need to establish a good relationship between providers and patients, starting when they first contact. Also, Health zone management should organize care at different health facilities and coordinate collaboration between health facilities to ensure appropriate transfer of patients from one facility to another for sustained care.

In this study, PLHIV with an NGO support group were less likely to suppress their viral load than those who did not have one. We expected to find a positive relationship as the WHO recommends that HIV programs integrate support groups to address retention and ART adherence [63] and, ultimately, viral load suppression. Studies have shown that support groups increase PLHIV's health literacy and improve outcomes, including mortality, morbidity, retention in care, quality of life, and enhanced treatment success [64-68]. However, other studies showed otherwise in Zimbabwe [69], Rwanda [70], and other African countries, including Kenya, Tanzania, Uganda, and Nigeria [71]. The differences in the types of association between the support groups and viral load might be due to the variety of support groups' main goals. If a support group focuses on a community's specific needs, they can miss other factors that are not the focus of their programs. Indeed, according to SANRU, only one NGO support group served the health facilities included in this study, and it was in the health zone of Kikula. The focus of this NGO was offering stand-alone Voluntary Counseling and Testing (VCT) and mobile HIV Testing Services (HTS) [72]. Thus, the negative relationship found in this study might be due to the NGO's focus on testing.

The health zone of Kikula had patients who were less likely to adhere to treatment than those in Likasi health zone. Given that the health zone in DRC constitutes the operational unit for planning and implementing the health policy and functions as an autonomous decentralized entity equipped with its own management bodies and its action plan [73], we suspect management must be a reason for non-adherence. The 2020 semi-annual report by SANRU documented that the Kikula health zone did not achieve the expected performance level for HIV testing [74]. In accordance with the literature [54, 75, 76], we believe that the education level also plays a role as people in Kikula were significantly less likely to have secondary or college-level education than primary education or no formal education compared to those in Likasi health zone. We suggest developing partnerships with NGOs and other established advocacy groups to communicate the need for support that targets viral load suppression.

Strengths and Limitations

This is the first study conducted in Likasi, an understudied area, to assess the factors influencing viral load suppression and adherence to ART. It provides insights about what to keep an eye on to achieve the UNAIDS' viral load suppression goal. It also constitutes a reference for future studies and replication in other settings.

This study has limitations that could be addressed in future research. First, the cross-sectional design limits establishing a causal relationship; confounding factors may affect the relationship between our outcomes (viral load suppression and adherence to ART) and predictors. Second, since we sampled participants at the health facility level, the results cannot be generalized to other settings or the whole population. Lastly, the outcomes measurements. While a viral load result of less than 1000 copies/ml determines the viral load suppression [24], measurements differ daily, and long-term trends are better for evaluating disease progression. Although self-reporting for adherence has been established as a practical method to assess adherence to ART [77, 78] and has a significant association with viral load [79], this method can overestimate our outcome because of recall bias and social desirability bias [80].

5. Conclusions

This study aimed to determine the factors associated with viral load suppression and Adherence to ART and address the lack of studies in Likasi. The results show that viral load suppression and adherence to ART are a problem and are associated with patient and facility factors. The health zone management team could use these results to improve the services provided in the health facilities. Practitioners could target these factors to reinforce adherence, achieve viral load suppression, and ultimately control HIV. Because this study is the first assessing the factors associated with viral load suppression in Likasi, it fills the existing literature gap.

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
DRC	Democratic Republic of Congo
HIV	Human Immunodeficiency Virus
NGO	Nongovernmental Organization
PLHIV	People Living with HIV
UNAIDS	Joint United Nations Program on HIV and AIDS
VLSup	Viral Load Suppression
PVVIH	Personne Vivant Avec le VIH

Supplementary Material

The supplementary material can be accessed at https://doi.org/10.11648/j.cajph.20251104.17

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Author Contributions

Mbuyi Madeleine Kabongo: literature review, data curation, data analysis and interpretation, writing the original draft, reviewing and editing.

Philippe Lukanu Ngwala: conceptualization, resources, reviewing and editing, supervising data analysis.

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Leonard Yabadile: Data collection.

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Bernard Kasongo: Data collection.

Albert Kalonji: project administration and data collection.

Mohammad Rifat Haider: reviewing and editing, supervising data analysis.

Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest.

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