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Effect of the COVID-19 Pandemic on HIV-1 Viral Load Monitoring among Patients on ART at INSP, Guinea, 2014-2024

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Abstract

Therapeutic monitoring of people living with HIV (PLHIV) relies mainly on HIV viral load (VL) measurement. This study evaluated the impact of the COVID-19 pandemic on HIV-1 viral load testing among PLHIV on antiretroviral therapy (ART) at the National Institute of Public Health (INSP) in Guinea from 2014 to 2024. **Methods:** A retrospective cross-sectional study was conducted at the HIV/Hepatitis Molecular Biology Laboratory of INSP on 29,529 samples from PLHIV. Viral load was measured by real-time PCR using NorDiag/HAIN and Abbott platforms. Data were analyzed with R software. Virological failure was defined as a VL ≥ 1000 copies/mL. **Results:** A marked improvement in virological control was observed over time, increasing from 77.5% before the COVID-19 pandemic to 88.8% after, with a decrease in failure rates from 22.5% to 11.2%. Most samples were from women (72.8%) and adults aged 18-49 years. The average treatment duration increased from 3.9 to 6.3 years between the two periods. Health centers became the main referring structures post-pandemic, reflecting increased decentralization. Multivariate analyses showed that men, individuals under 18 years, and patients followed in university hospitals before the pandemic had a higher risk of virological failure. Conversely, patients followed in NGOs or health centers during the pandemic had better outcomes. Adult age, longer treatment duration, and

first-line follow-up were associated with better viral suppression. **Conclusion:** The results reveal improved virological monitoring in Guinea despite disruptions caused by the pandemic. However, persistent inequalities call for targeted interventions to improve equity and achieve UNAIDS viral suppression targets.

Keywords

HIV Viral Load, Virological Failure, Antiretroviral Therapy (ART), COVID-19 Impact

1. Context

Worldwide, nearly 39.9 million people were living with HIV (PLHIV) in 2023, and antiretroviral treatment has changed their lives [1]. Viral load is an essential indicator for monitoring these PLHIV [2]. It plays a crucial role in assessing the effectiveness of antiretroviral (ARV) treatments in these patients by monitoring viral replication and guiding clinical decision-making [3]. Assessing viral load in PLHIV is a fundamental indicator of the effectiveness of antiretroviral treatments and of strategies to combat the epidemic. An undetectable viral load indicates an effective response to antiretroviral therapy (ART). In contrast, a detectable viral load ≥ 1000 copies/ml is associated with an increased likelihood of treatment failure, frequently due to inadequate adherence or the emergence of viral resistance [4].

The COVID-19 pandemic, declared a global health emergency by the WHO in March 2020, has caused significant disruption to healthcare systems, particularly in the continuity of HIV care [5]. A study conducted in three West African countries (Burkina Faso, Côte d'Ivoire, and Nigeria) revealed a significant decline in the initiation of antiretroviral treatment and in the number of viral load tests performed each week in the early months of the COVID-19 pandemic [6]. Furthermore, a meta-analysis in 2022 confirmed that, in several low-resource countries, the pandemic had caused temporary disruptions, resulting in an overall negative impact on the continuity of HIV care [7].

In the United States, despite telemedicine consultations, 35% of PLHIV reported difficulties obtaining viral load tests during the pandemic [8]. Despite the decrease in viral load testing, some studies have found stabilisation or even improvement in suppression rates. In Malawi, although the number of viral load tests fell by 40% during the pandemic, viral load suppression remained stable at 93% - 94% [9].

In Guinea, HIV prevalence in the general population is 1.5%, according to the 2018 Demographic and Health Survey. A study conducted in 2023 estimated that nearly 128,000 people are living with HIV in the country, of whom approximately 69% are receiving antiretroviral therapy (ART) [4] [10]. Despite these various studies documenting the effect of COVID-19 on HIV care in several countries, little data is available on this dynamic of viral load suppression in the Guinean

context. The analysis of data collected from 2014 to 2024 thus provides a valuable opportunity to assess the impact of the health crisis on virological monitoring and continuity of care among PLHIV.

The objective of this study was to evaluate the effect of the COVID-19 pandemic on HIV-1 viral load suppression in PLHIV receiving ARV treatment at the INSP from 2014 to 2024.

2. Materials and Methods

2.1. Study Design

This was a cross-sectional study with an analytical focus and retrospective data collection, based on samples from PLHIV received at the INSP's HIV/Hepatitis molecular biology laboratory for HIV-1 viral load testing between 2014 and 2024. The National Institute of Public Health (INSP) of Guinea is a public administrative and scientific institution (EPAS) with legal personality and financial and managerial autonomy in accordance with the laws and regulations governing public administrative institutions. It aims to assist public authorities in decision-making and in evaluating public health policies and interventions in Guinea. Its head office is currently located in Kakoulimaya in the municipality of Coyah. It comprises four departments (the Public Health Research Department, the Pharmaceutical Chemistry Department, the Human Resources Development Department, and the National Public Health Laboratory Department). The National Public Health Laboratory is responsible for diagnosing diseases with epidemic potential, standardising national-level analysis methods, and monitoring the quality of medical and biological processes and techniques. It comprises various units, including biochemistry, bacteriology, parasitology, immunology, haematology, and molecular biology, which is subdivided into two sub-units: HIV/hepatitis molecular biology and respiratory virus molecular biology.

The HIV/Hepatitis Molecular Biology Laboratory is the national reference laboratory responsible for the diagnosis and virological monitoring of people living with HIV and those with hepatitis, on the one hand, and other non-respiratory viruses on the other.

2.2. Population and Sample

Study populations: The study covered 29,529 samples from PLHIV received at the INSP's HIV/Hepatitis molecular biology laboratory for HIV-1 viral load testing between 2014 and 2024. **Inclusion criteria:** All samples from PLHIV, regardless of gender, age, or origin, received by the INSP's HIV/Hepatitis molecular biology laboratory for HIV-1 viral load testing between 2014 and 2024 were included in the study.

Inclusion criteria: all samples from PLHIV for which data were incomplete were excluded from this study.

Sampling: We conducted an exhaustive sampling of all samples that met our selection criteria.

2.3. Operational Definition of Variables

Dependent variable: HIV-1 viral load was our dependent variable. This was a dichotomous variable (controlled vs. detectable). We considered HIV-1 viral load to be high when the number of copies was greater than or equal to 1000 copies/ml and suppressed when the number of copies was less than 1000 copies/ml.

Independent variables: our independent variables consisted of gender (female/male), age (<18 years, 18 - 49 years, and ≥50 years), referral sites (CMC, NGO, CS, CHU_ID, CHU_Donka, and private), ART (first-line/second-line), and duration of treatment.

2.4. Data Collection

We collected data as follows:

❖ For the group of patients admitted to the INSP with an HIV-1 viral load request form completed by the prescribing physician at the treatment site, a 3 to 4 cc sample was taken in an EDTA tube. These samples were sent to the HIV/Hepatitis molecular biology laboratory in accordance with the internal sample delivery protocol. After verifying that the information was correct, the data was entered into the database using Microsoft Access software.

For samples collected at treatment sites in the city of Conakry, the sample collection team visited these sites twice a week to collect and transport them to the laboratory. The information and quality of the samples were then verified in accordance with the reception protocol, followed by entry into the database using Microsoft Access.

2.5. Laboratory Analysis Techniques

The principle of the HIV viral load test is a nucleic acid amplification test for quantifying HIV-1 RNA in human plasma. It is based on three main processes:

i. Extraction of HIV-1 RNA from EDTA or citrate plasma samples,
ii. Reverse transcription of viral RNA into complementary target DNA (cDNA), and
iii. PCR amplification of the newly synthesised target cDNA and simultaneous measurement of fluorescence resulting from the cleavage of the double-labelled oligonucleotide detection probe specific to HIV. It is based on the principle of real-time PCR, in which an oligonucleotide detection probe labelled at the 5' end with an emitting fluorochrome (reporter) and at the 3' end with a non-fluorescent quencher group is hydrolysed.

✓ To measure HIV viral load in this study, we used two platforms (open and ABBOTT).
✓ For the open platform, RNA extraction was performed using the NorDiag/HAIN extractor with GXT NA reagents supplied by Biocentric. Amplification was performed using Roche's Lightcycler 96 thermocycler and Fluorocycler XT with Biocentric's Generic HIV-1 reagents [11].
✓ For the Abbott platform, the m2000sp extractor was used for RNA extraction and the m2000rt for amplification [12].

2.6. Data Analysis

Our data were analysed using R software version 4.3.2. For quantitative variables, we calculated means and standard deviations. The numbers and percentages were calculated for the qualitative variables. We performed chi-square tests and bivariate and multivariate logistic regression to investigate associations between the dependent variable (HIV-1 viral load) and the independent variables (gender, age groups, sites of origin, ART, treatment duration, and referral reasons). The significance threshold was set at 5%.

2.7. Ethical Considerations

The data was collected anonymously, and the results obtained were used strictly in the interests of science.

3. Results

Figure 1: The analysis covered an initial total of 33,176 samples from people living with HIV (PLHIV) collected from various health facilities across the country. Initially, 1451 samples were excluded because the date of initiation of antiretroviral therapy (ART) was missing. Subsequently, an additional 937 individuals were excluded because their files lacked viral load (VL) data, bringing the total to 29,788 patients with usable viral load data. Finally, 259 cases were excluded due to insufficient data on antiretroviral treatment regimens, which are essential for comparative analyses. The final sample size for the analysis thus comprised 29,529 participants.

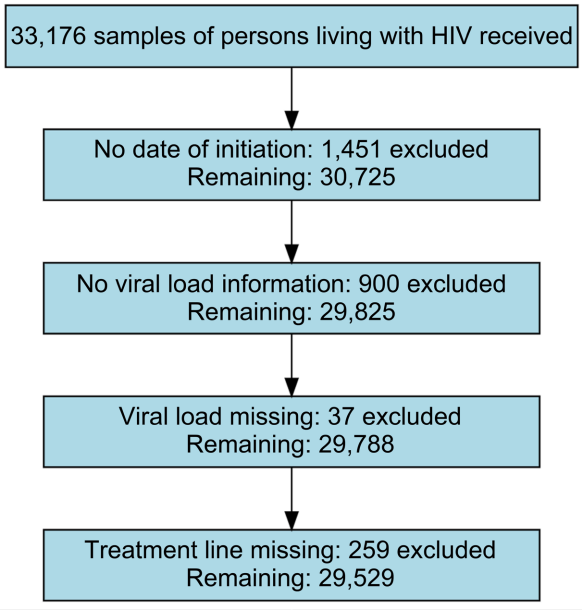

Figure 1. Sample inclusion diagram.

Table 1: Of this total of 29,529 samples included for viral load monitoring, there

was a predominance of samples from women (72.8%). Health centres (HCs) were the primary source of samples (29.2%), followed by university hospitals (27.3%), NGOs (22.0%), and CMCs (20.3%), while private facilities and the Donka University Hospital accounted for less than 1% of submissions. Almost all samples (98.2%) came from patients undergoing first-line treatment. The majority of results (80.6%) indicated satisfactory virological control, although 19.4% of samples showed virological failure. The average age of individuals associated with the samples was 39.8 years (±11.1), with an average duration of antiretroviral treatment of 4.52 years (±3.50). Finally, the temporal distribution of samples shows a predominance before the COVID-19 pandemic (65.0%), with a marked decrease in submissions during (18.1%) and after the pandemic (16.9%).

Table 1. Distribution of samples according to site of origin and period (before, during, and after) COVID-19.

	[ALL]
	N **= 29,529**
ONG	6495 (22.0%)
CS	8622 (29.2%)
CHU_ID	8048 (27.3%)
Prive	220 (0.75%)
CHU_Donka	155 (0.52%)
before_COVID19	19,193 (65.0%)
during_COVID19	5351 (18.1%)
post_COVID19	4985 (16.9%)

Table 2 shows the evolution of the characteristics of samples received by the INSP for viral load testing, broken down into three periods: before, during, and after the COVID-19 pandemic. There is a consistent female predominance across the samples, with an increasing proportion of women (71.1% before, 76.0% during, and 76.2% after the pandemic). Health centres (HCs) have become the primary source of post-pandemic samples (45.5% compared to 23.4% previously), while contributions from CMCs and CHU_IDs have decreased. Almost all samples came from individuals undergoing first-line treatment, with a slight increase in this proportion over time (from 97.8% to 99.3%). The age groups reveal a clear predominance of adults aged 18 to 49, who accounted for 74.8% of samples before the pandemic and up to 89.0% after. At the same time, the proportion of young people and older people declined. The average duration of antiretroviral treatment increased gradually (from 3.90 ± 3.00 to 6.27 ± 4.17 years). Finally, virological results indicate a continuous improvement in viral load control, rising from 77.5% to 88.8%, while virological failure rates decreased from 22.5% to 11.2% (Table 3).

Table 2. Characteristics of patient samples according to sampling period.

Variable	Before COVID-19 (N = 19,190)	During COVID-19 (N = 5353)	Post COVID-19 (N = 4986)
Sex			
Women	13,639 (71.1%)	4070 (76.0%)	3798 (76.2%)
Man	5551 (28.9%)	1283 (24.0%)	1188 (23.8%)
Health Centre			
CMC	4729 (24.6%)	841 (15.7%)	419 (8.4%)
ONG	4411 (23.0%)	1043 (19.5%)	1041 (20.9%)
CS	4492 (23.4%)	1861 (34.8%)	2269 (45.5%)
CHU_ID	5240 (27.3%)	1578 (29.5%)	1230 (24.7%)
Prive	187 (0.97%)	25 (0.47%)	8 (0.16%)
CHU Donka	131 (0.68%)	5 (0.09%)	19 (0.38%)
Treatment line			
First line	18,769 (97.8%)	5286 (98.7%)	4951 (99.3%)
Second line	421 (2.19%)	67 (1.25%)	35 (0.70%)
Age (years)			
<18	1032 (5.38%)	33 (0.62%)	12 (0.24%)
18 - 49	14,357 (74.8%)	4687 (87.6%)	4440 (89.0%)
≥50	3801 (19.8%)	633 (11.8%)	534 (10.7%)
Duration treatment (moy ± AND)	3.90 ± 3.00	5.11 ± 3.84	6.27 ± 4.17
Year of collection	100%	100%	100% Virological failure
Virological status controlled viral load	14,864 (77.5%)	4514 (84.3%)	4430 (88.8%)
Virological failure	4326 (22.5%)	839 (15.7%)	556 (11.2%)

Table 3 presents a comparative analysis of the determinants of controlled viral load versus virological failure across sampling periods at the INSP. Before the COVID-19 pandemic, men had a significantly higher risk of virological failure compared to women (OR = 1.22; 95% CI = [1.14 - 1.32]; $p < 0.001$), a trend that was also observed after the pandemic (OR = 1.32; 95% CI = [1.09 - 1.61]; $p = 0.006$), but absent during the pandemic. About health centres, patients affiliated with CHU_ID before the pandemic had an increased risk of virological failure (OR = 1.51; $p < 0.001$), while those affiliated with NGOs and CS during the pandemic were significantly protected (OR = 0.67 and 0.62, respectively; $p \leq 0.001$).

No strong association was observed with the treatment regimen. Age appeared to be a significant determining factor: compared with young people (<18 years), adults (18 - 49 years) and older people (≥50 years) had a significantly reduced risk of virological failure across all periods ($p < 0.001$), with ORs ranging from 0.49 to 0.08.

Finally, treatment duration was slightly but significantly shorter in cases of failure before the pandemic (3.63 years vs. 3.98 years; OR = 0.96; $p < 0.001$), whereas no notable difference was observed during or after the pandemic.

Table 3. Analysis of viral load in patients admitted to the INSP according to sampling periods.

Variables	Before COVID19			During COVID19			Post COVID19		
	viral load control $N = 14,864$	virological failure $N = 4326$	OR	viral load control $N = 4514$	virological failure $N = 839$	OR	viral load control $N = 4430$	virological failure $N = 556$	OR
Gender									
Women	72.0% [71.3%; 72.8%]	67.8% [66.4%; 69.2%]	Ref.	76.0% [74.8%; 77.3%]	76.0% [73.0%; 78.9%]	Ref.	76.8% [75.5%; 78.0%]	71.4% [67.4%; 75.1%]	Ref.
Man	28.0% [27.2%; 28.7%]	32.2% [30.8%; 33.6%]	1.22 [1.14; 1.32]	24.0% [22.7%; 25.2%]	24.0% [21.1%; 27.0%]	1.00 [0.84; 1.19]	23.2% [22.0%; 24.5%]	28.6% [24.9%; 32.6%]	1.32 [1.09; 1.61]
Health centre:									
CMC	25.3% [24.6%; 26.0%]	22.5% [21.3%; 23.8%]	Ref.	14.6% [13.6%; 15.7%]	21.5% [18.7%; 24.4%]	Ref.	8.17% [7.38%; 9.02%]	10.3% [7.86%; 13.1%]	Ref.
ONG	23.7% [23.0%; 24.4%]	20.5% [19.3%; 21.7%]	0.97 [0.88; 1.07]	19.5% [18.4%; 20.7%]	19.2% [16.6%; 22.0%]	0.67 [0.53; 0.85]	20.7% [19.6%; 22.0%]	21.9% [18.6%; 25.6%]	. [.;.]
CS	24.1% [23.4%; 24.8%]	21.2% [20.0%; 22.4%]	0.99 [0.89; 1.09]	35.2% [33.9%; 36.7%]	32.2% [29.0%; 35.5%]	0.62 [0.51; 0.77]	45.6% [44.1%; 47.0%]	45.1% [41.0%; 49.4%]	. [.;.]
CHU ID	25.3% [24.6%; 26.0%]	34.1% [32.7%; 35.5%]	1.51 [1.38; 1.66]	30.1% [28.7%; 31.4%]	26.2% [23.3%; 29.3%]	0.59 [0.48; 0.74]	24.9% [23.7%; 26.2%]	22.5% [19.1%; 26.2%]	. [.;.]
Private	0.94% [0.79%; 1.10%]	1.11% [0.82%; 1.47%]	1.33 [0.94; 1.85]	0.40% [0.24%; 0.63%]	0.83% [0.34%; 1.71%]	1.45 [0.55; 3.40]	0.18% [0.08%; 0.36%]	0.00% [0.00%; 0.66%]	. [.;.]
CHU Donka	0.71% [0.58%; 0.85%]	0.60% [0.39%; 0.88%]	0.96 [0.61; 1.46]	0.09% [0.02%; 0.23%]	0.12% [0.00%; 0.66%]	1.01 [0.04; 7.36]	0.41% [0.24%; 0.64%]	0.18% [0.00%; 1.00%]	. [.;.]
Treatment lines									
First line	97.9% [97.6%; 98.1%]	97.5% [97.0%; 98.0%]	Ref.	98.8% [98.5%; 99.1%]	98.3% [97.2%; 99.1%]	Ref.	99.3% [99.0%; 99.5%]	99.5% [98.4%; 99.9%]	Ref.
Second line	2.11% [1.89%; 2.36%]	2.47% [2.03%; 2.98%]	1.18 [0.94; 1.46]	1.17% [0.88%; 1.53%]	1.67% [0.92%; 2.78%]	1.44 [0.76; 2.54]	0.72% [0.49%; 1.02%]	0.54% [0.11%; 1.57%]	0.78 [0.18; 2.20]
Age in years									
[1, 18)	4.37% [4.04%; 4.71%]	8.85% [8.02%; 9.74%]	Ref.	0.38% [0.22%; 0.60%]	1.91% [1.09%; 3.08%]	Ref.	0.14% [0.05%; 0.29%]	1.08% [0.40%; 2.33%]	Ref.
[18, 50)	74.9% [74.2%; 75.6%]	74.4% [73.1%; 75.7%]	0.49 [0.43; 0.56]	87.0% [86.0%; 87.9%]	90.7% [88.5%; 92.6%]	0.21 [0.10; 0.42]	88.7% [87.7%; 89.6%]	91.9% [89.3%; 94.0%]	0.13 [0.04; 0.43]
[50, 89]	20.7% [20.1%; 21.4%]	16.7% [15.6%; 17.9%]	0.40 [0.34; 0.46]	12.6% [11.7%; 13.7%]	7.39% [5.71%; 9.37%]	0.12 [0.06; 0.24]	11.2% [10.3%; 12.1%]	7.01% [5.04%; 9.46%]	0.08 [0.02; 0.27]
Treatment duration	3.98 [3.94; 4.03]	3.63 [3.54; 3.71]	0.96 [0.95; 0.97]	5.15 [5.04; 5.27]	4.88 [4.62; 5.14]	0.98 [0.96; 1.00]	6.28 [6.16; 6.41]	6.12 [5.78; 6.45]	0.99 [0.97; 1.01]

4. Discussion

The viral load (VL) of HIV-1 is a fundamental indicator for the clinical monitoring of people living with HIV (PLHIV) and for evaluating the effectiveness of

antiretroviral (ARV) treatments. It is in this context that we conducted this study on samples received at the HIV/Hepatitis molecular biology laboratory of the INSP in Guinea, which enabled us to gain an overview of viral load evolution and identify factors associated with virological failure in patients on ART. In our series, the average duration of antiretroviral treatment increased gradually across the COVID-19 period (before, during, and after), and virological results indicate continuous improvement in viral load control, with virological failure rates decreasing. This is consistent with the results of a Burkinabe study reporting good clinical tolerance and virological success (over 85%) with triple therapy (tenofovir disoproxil fumarate-emtricitabine-efavirenz) in the first-line treatment of HIV-1 infection. However, the literature reports a high prevalence of detectable viral load despite ARV treatment in a study of infected French children [13]. Although our results demonstrate satisfactory virological control, the low proportion of virological failure highlights the need to strengthen virological surveillance. We noted a consistent female predominance among the samples, with an increasing proportion of women before, during, and after the pandemic. Similar observations have been reported by UNAIDS, indicating that in sub-Saharan Africa, women are more likely to seek health services, including for HIV. This attendance increased even during the COVID-19 pandemic, despite restrictions [14]. A higher rate of adherence to ARV treatment among women was also reported by Cameroonians and Malians, explaining their regularity in biological monitoring [15]. According to the 2018 Guinea Demographic Health Survey, women make up the majority of people living with HIV [16].

Health centres (HCs) have gradually become the primary source of post-pandemic samples, while contributions from CMCs and CHU_IDs have declined. Our findings are supported by the literature, which has demonstrated that CSs are the cornerstones of decentralised HIV care and that their role in the treatment-for-all strategy makes them the primary collection points for viral load data [17]. The proximity of these health centres to the population would explain the high rate of samples collected in these facilities.

In our series, we found a statistically significant association between male gender and virological failure before and after the COVID-19 pandemic. Regarding healthcare facilities, patients treated at university hospitals before the pandemic had an increased risk of virological failure, whereas those treated at NGOs and community health centres during the pandemic were significantly protected. The Ivorians also found that men were systematically more exposed to virological failure due to their poorer adherence to treatment, delayed diagnosis, and limited contact with care facilities [18].

This progress is encouraging and in line with UNAIDS' global targets (95-95-95). It could be explained by improved access to ARVs, better adherence to treatment, and strengthened health system capacity, particularly in virological monitoring. However, the significant proportion of virological failures (19.4%) highlights the need to enhance surveillance, therapeutic education, and resistance management [14] [19].

Analysis of the determinants of virological failure reveals several salient points. First, men are at higher risk of virological failure than women, both before and after the pandemic (OR > 1.2; $p < 0.01$). This disparity could be linked to differences in compliance, stigmatisation, or access to care, as suggested in other African contexts. Secondly, age appears to be a protective factor: adults and older people have a significantly lower risk of virological failure than young people (<18 years old). This finding supports the hypothesis that maturity and experience promote better adherence to treatment [20].

Furthermore, the duration of antiretroviral treatment is also associated with virological control, particularly before the pandemic. Patients with longer treatment durations are less likely to experience virological failure, highlighting the importance of long-term follow-up and patient retention in care programmes. However, the COVID-19 pandemic has had a significant impact on virological monitoring dynamics, with a marked decline in the number of samples analysed and a change in patient origin. This situation reflects disruptions to the health system and the need to strengthen the resilience of HIV services in the face of health crises.

Finally, it is essential to highlight the persistent challenges in Guinea: low viral load testing coverage, infrastructure and supply issues, data management challenges, and limited access to early screening. These obstacles hinder the achievement of viral suppression targets and call for targeted interventions, including strengthening health centres' capacity, integrating community services, and improving logistics management.

5. Conclusion

This study shows a gradual improvement in viral load control among PLHIV in Guinea between 2014 and 2024, despite disruptions related to the COVID-19 pandemic. However, specific vulnerabilities persist, particularly among young people and men, as well as in certain healthcare facilities. These findings highlight the need to strengthen virological monitoring, treatment adherence, and the decentralisation of care to achieve the global viral suppression targets set by UNAIDS (95-95-95).

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Estimations épidémiologiques de l'ONUSIDA (2024).

[2] World Health Organization (WHO) (2023) The Role of HIV Viral Suppression in Improving Individual Health and Reducing Transmission. https://www.who.int/publications/i/item/9789240055179

[3] Braunstein, S.L., Robertson, M.M., Myers, J. and Nash, D. (2016) Using HIV Viral Load from Surveillance to Estimate the Timing of Antiretroviral Therapy Initiation. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, **73**, 222-227. https://doi.org/10.1097/qai.0000000000001052

[4] Rapport annuel 2023 de la riposte au VIH/Sida en République de Guinée.

[5] World Health Organization (WHO) (2020) COVID-19 Strategy Update—14 April 2020. https://www.who.int/publications/i/item/covid-19-strategy-update---14-april-2020

[6] Ben Farhat, J., Tiendrebeogo, T., Malateste, K., Poda, A., Minga, A., Messou, E., *et al.* (2024) Effects of the COVID-19 Pandemic on ART Initiation and Access to HIV Viral Load Monitoring in Adults Living with HIV in West Africa: A Regression Discontinuity Analysis. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, **96**, 114-120. https://doi.org/10.1097/qai.0000000000003404

[7] Mude, W., Mwenyango, H., Preston, R., O'Mullan, C., Vaughan, G. and Jones, G. (2023) HIV Testing Disruptions and Service Adaptations during the COVID-19 Pandemic: A Systematic Literature Review. *AIDS and Behavior*, **28**, 186-200. https://doi.org/10.1007/s10461-023-04139-4

[8] Galaviz, K.I., Shah, N.S., Gutierrez, M., Collins, L.F., Lahiri, C.D., Moran, C.A., *et al.* (2022) Patient Experiences with Telemedicine for HIV Care during the First COVID-19 Wave in Atlanta, Georgia. *AIDS Research and Human Retroviruses*, **38**, 415-420. https://doi.org/10.1089/aid.2021.0109

[9] Kalua, T., Egger, M., Jahn, A., Chimpandule, T., Kolola, R. and Anderegg, N. (2022) HIV Suppression Was Maintained during the COVID-19 Pandemic in Malawi: A Program-Level Cohort Study. *Journal of Clinical Epidemiology*, **150**, 116-125. https://doi.org/10.1016/j.jclinepi.2022.06.019

[10] VIH/Sida: Lutte contre la stigmatisation et dépistage précoce. UNICEF. https://www.unicef.org/guinea/recits/vihsida-lutte-contre-la-stigmatisation-et-d%C3%A9pistage-pr%C3%A9coce

[11] Biocentric. GENERIC HIV Charge Virale. https://www.google.com/search?q=generic-hiv-charge-viral&rlz=1C5CHFA_enMA1082MA1082&oq=generic-hiv-charge-

[12] Payan, C., Brault, C., Peigne, M., Loison, J. and Chennebault, J.M. (2003) Measuring the HIV Viral Load with LCx (Abbott): Importance for the Therapeutic Follow-Up of 3 Patients Infected by Type O HIV. *Transfusion Clinique et Biologique*, **10**, 72-73. https://doi.org/10.1016/s1246-7820(03)00025-9

[13] Delaugerre, C., Chaix, M., Warszawski, J., Rouzioux, C. and Blanche, S. (2007) La résistance du VIH-1 aux antirétroviraux chez les enfants infectés: Du nouveau-né à l'adolescent. *Archives de Pédiatrie*, **14**, 298-302. https://doi.org/10.1016/j.arcped.2006.12.007

[14] UNAIDS_FactSheet_fr.pdf. https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_fr.pdf

[15] Nzapze, D.D., Kengni, E.F., Bekolo, C.E. and Kouanfack, C. (2024) Incidence et déterminants du rebond de la charge virale chez les personnes sous dispensation multi mois d'antirétroviraux à l'Hôpital Régional Annexe de Dschang de 2018-2023. *The Pan African Medical Journal*, **49**, Article No. 74. https://doi.org/10.11604/pamj.2024.49.74.45348

[16] Enquête Démographique et de Santé 2018. UNICEF. https://www.unicef.org/guinea/rapports/enqu%C3%AAte-d%C3%A9mographique-et-de-sant%C3%A9-2018

[17] Govindasamy, D., Meghij, J., Negussi, E.K., Baggaley, R.C., Ford, N. and Kranzer, K. (2014) Interventions to Improve or Facilitate Linkage to or Retention in Pre-Art (HIV) Care and Initiation of ART in Low- and Middle-Income Settings—A Systematic Review. *Journal of the International AIDS Society*, **17**, Article No. 19032. https://doi.org/10.7448/ias.17.1.19032

[18] Cisse, V., Niang, I., Diallo, K., Senghor, G., Diop, S. and Manga, N. (2019) Facteurs associés à l'échec virologique chez les patients infectés par le VIH suivis dans le district sanitaire de Oussouye, région de Ziguinchor au Sénégal. *Médecine et Maladies Infectieuses*, **49**, S146. https://doi.org/10.1016/j.medmal.2019.04.351

[19] Le sida à la croisée des chemins. https://www.unaids.org/sites/default/files/media_asset/2024-unaids-global-aids-update-summary_fr.pdf

[20] Telly, N., Traoré, S., Guindo, I., Daou, S., Maiga, A., Traoré, S., *et al.* (2021) Comparison of the Performance of Viral Load Screening from Plasma and from the One Blotting Paper (Oudried Blood Spot), Protocol in People Living with the Human Immunodeficiency Virus (PLHIV) in Bamako. *Mali Medical*, **36**, 58-65.