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Culture, Clinic and HIV/AIDS: a focus on the challenges of caring for patients under treatment at the Mother and Child University Hospital Center of N'djamena in Chad

Wilfried TIAM KAMKUIGNI[1*], Rayam KOULADOUM[2], Kouame Stanislas KAFFLOUMAN[1], Carole NJIOMOUO LANGA[3]

[1]School of Public Health, Texila American University, Central University of Nicaragua, Nicaragua
[2]Higher Professional Institute of Science and Technology, Maroua, Cameroon
[3]Higher Teacher Training College, University of Maroua, Cameroon

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Corresponding Author:
Wilfried TIAM KAMKUIGNI

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ABSTRACT

Human immunodeficiency virus type 1 (HIV) infection is one of the leading causes of morbidity and mortality worldwide. The goal of antiretroviral therapy (ART) is viral suppression. Despite numerous efforts through public policy, the failure to achieve viral suppression remains a major concern for the Chadian healthcare system. The objective of this study was to analyze the challenges of managing patients on ART at the Mother and Child University Hospital in N'Djamena.

Methodology: A cross-sectional study was conducted from August 7 to September 6, 2025, among 422 women living with HIV/AIDS, followed at the HIV Treatment Center (CTA) of the Mother and Child University Hospital in N'Djamena. Data were collected using a structured questionnaire and medical records. Statistical analysis was performed using SPSS software, and associations between variables were assessed using bivariate and multivariate logistic regression.

Results: As a result, the prevalence of unsuppressed viral load was 36.49%, compared to 14.45% of suppressed loads (50–1,000 copies/ml) and 49.05% undetectable loads, for an overall suppression rate of 63.5%. Challenges such as stigmatization (OR = 9.18; p = 0.001) and recourse to traditional healers (OR = 22.42; p = 0.001); high stress (OR = 268.64; p = 0.001), alcohol or tobacco use (OR = 19.58; p = 0.001), and associated hepatitis (OR = 1; p = 0.003) were the main factors associated with patient management.

Conclusion: Ultimately, achieving care objectives requires an integrated and multidimensional approach to treatment.

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INTRODUCTION

Human immunodeficiency virus type 1 (HIV) infection has been a leading cause of morbidity and mortality worldwide since its first discovery in the early 1980s (UNAIDS, 2021). This chronic, progressive infection targets the immune system, particularly CD4+ T cells, thus compromising the body's ability to defend itself against opportunistic infections and certain cancers. A report by the World Health Organization (WHO, 2024) indicates that in 2023, nearly 39.9 million people were living with HIV globally, including approximately 25.7 million in sub-Saharan Africa, representing almost 70% of the world's affected population

(OMS, 2024). Moreover, countries with strong economies such as the United States, France, Germany, etc., recorded a significant decrease in infection rates during the same period thanks to effective screening and treatment policies, thus reinforcing the data that sub-Saharan Africa remains the epicenter of the pandemic (WHO, 2024; UNAIDS, 2023).

Africa alone bears more than 65% of the global burden of the HIV pandemic, with nearly 60% of adults living with HIV being women. In the central and western parts of the African continent, approximately 4.8 million people were living with HIV in 2022 (UNAIDS, 2023), with high prevalence in countries such as Nigeria (1.9 million) and Côte d'Ivoire (410,000) (UNAIDS, 2023).

In Chad, HIV remains a public health concern. The prevalence rate is estimated at 1.5% according to the Demographic and Health Survey (DHS, 2020). Approximately 110,000 people are living with HIV, of whom 79% know their HIV status and 75% are receiving antiretroviral treatment (UNAIDS, 2023). However, treatment coverage remains insufficient, particularly among men (62%) and children (11%). Despite a 45% decrease in incidence since 2010, HIV-related mortality remains high, accounting for 61% of HIV-related deaths during this period (UNAIDS, 2024). These figures highlight the ongoing challenges related to care delivery, equitable access to treatment, and combating stigma in the country (WHO, 2024; UNAIDS, 2023).

To date, precise data on ART failure and success rates at the Mother and Child University Hospital in N'Djamena are not available. However, studies conducted in similar contexts in sub-Saharan Africa indicate that treatment failure rates vary between 3.6% and 39%, depending on various factors such as age, the presence of opportunistic infections, and treatment adherence (Machila et al., 2023).

Several African studies have reported varying rates of viral suppression. Studies on the evolution of viral load in HIV-1 patients on antiretroviral therapy (ART) show encouraging results: 51% in Douala (Essomba et al., 2015), 66% at the Point G University Hospital (Telly et al., 2022), and 67% in Niamey (Gado et al., 2022). Viral load changes depend on multiple factors: adherence, age, sex, nutritional status, co-infections, education level, and regularity of medical follow-up (Fonsah et al., 2017; Bidashimwa et al., 2024). These studies highlight the effectiveness of ART in viral suppression and improving immune status. A study by Fonsah et al. (2017) revealed that even small interruptions in medication intake can lead to a significant increase in viral load (Fonsah et al., 2017).

Antiretroviral therapy aims to prevent progression to AIDS by restoring immunity and helping to maintain an undetectable viral load. Viral load suppression (VL) is a key indicator of the effectiveness of antiretroviral therapy (ART) in patients living with HIV-1 (UNAIDS, 2021).

By making the viral load undetectable and restoring immunity, this treatment increases life expectancy, improves quality of life, and reduces the risk of HIV transmission (Ouedraogo et al., 2014). The reference threshold for viral load used to assess treatment outcome is 1000 copies/ml (WHO, 2016). Below this threshold, the viral load is considered undetectable or suppressed, demonstrating effective treatment. The opposite indicates treatment failure. Following this vision, UNAIDS has set a global "95-95-95" target for 2030: to diagnose 95% of all people living with HIV, to provide antiretroviral therapy (ART) to 95% of those living with HIV, and to achieve an undetectable viral load in 95% of those on treatment (UNAIDS, 2024). However, viral suppression is not always achieved in all patients on treatment. Several factors—biological, clinical, therapeutic, or sociocultural—can be associated with an unsuppressed viral load.

Our study aims to analyze the main challenges in the care of patients living with HIV/AIDS (PLHIV) receiving antiretroviral therapy (ART) at the Treatment and Care Center (TCC) of the Mother and Child University Hospital Center (CHU) in N'Djamena, Chad. More specifically, it will identify sociocultural challenges and determine the clinical and health-related challenges influencing the care of PLHIV, using unsuppressed viral load as an indicator.

METHODOLOGY

Study Design

We opted for a cross-sectional quantitative study including a retrospective phase. Data collection took place from August 7 to September 6, 2025, at the accredited treatment center of the University Hospital Center for Mother and Child in N'Djamena

Study Location

Chad is located in the center of the African continent. It lies between 8° and 24° north latitude and between 14° and 24° east longitude and covers an area of 1,284,000 km².

N'Djamena, the capital of Chad, is located at 12°8' north latitude and 15°2' east longitude. It lies in western Chad, bordering Cameroon and approximately 8 km south of Lake Chad. Currently, it covers 7,120 hectares, meaning its area has doubled in recent years (Rapport annuel AFD, 2024). N'Djamena is situated along paved roads from Moundou, passing through N'Djamena, to Bokoro, running from south to north, and between Kousseri and Massenya, following a west-east route. The city is currently expanding eastward and further south along the Chari River, extending northward to Hassan Djamouss International Airport. The population of Ndjamena is estimated in 2024 at 1,656,000 inhabitants and is composed of several ethnic groups, the main ones being the Ngambays, the Arabs, the Hausa, the Boulala, the Marbas, the Kanuri, the Toupouri (Rapport annuel AFD, 2024).

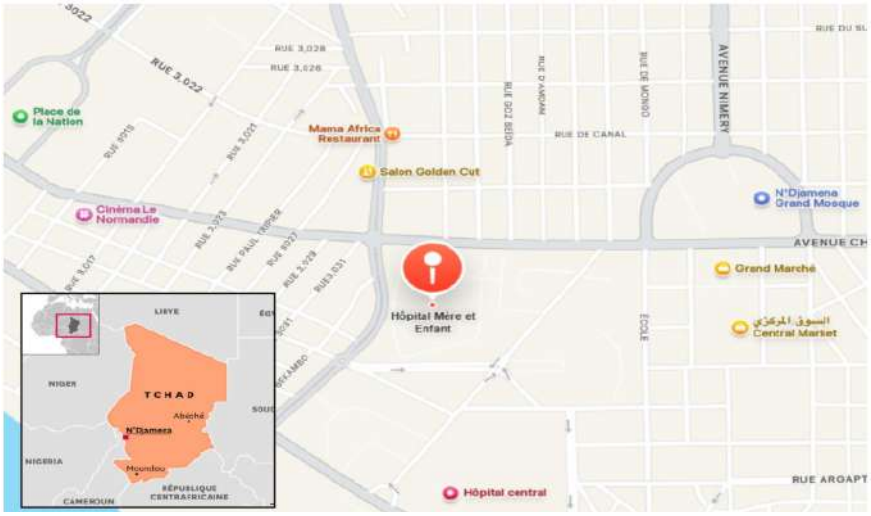

Figure 1: Geographic location of The Mother and Child Hospital of N'diamena

The Mother and Child Hospital, located in N'Djamena, the capital of Chad, was founded in 2011 (Figure 1). The HIV/AIDS Treatment Center (CTA) of this Mother and Child University Hospital plays a vital role in the fight against HIV/AIDS in Chad. It serves as a model for other care centers and contributes to improving the quality of life of people living with HIV. It is built on a significant area (15,000 square meters) and is located in the 3rd arrondissement, in the Gardole neighborhood (Rapport annuel AFD, 2024). This facility is strategically positioned within the N'Djamena health district and is bordered by:

- The N'Djamena University Hospital and Charles de Gaulle Avenue to the north;
- The Ministry of Foreign Affairs, African Integration, and the Central Market to the east;
- To the south, approximately 150 meters, by the National General Referral Hospital (HGRN) and the municipal building;
- To the west, by Canal Saint Martin Avenue and the AL Mouna center. It has 295 beds, 250 of which are for inpatient care.

Sample and Sampling

The study population consisted of people living with HIV (PLHIV) on antiretroviral therapy (ART) and followed at the HIV Treatment Center (CTA) of the Mother and Child University Hospital in N'Djamena, Chad.

The inclusion criterion was any person infected with HIV-1 and followed at the CTA of the Mother and Child University Hospital in N'Djamena, Chad, who had undergone a viral load (VL) test and agreed to participate in the study; those who had not undergone at least one VL test were excluded.

Our sampling method was non-probability convenience sampling, using successive recruitment of PLHIV presenting at the CTA for medical follow-up.

The minimum sample size was calculated using the following formula:

$$n = \frac{[t^2 \times p(1-p)]}{e^2}$$

n = expected sample size

t = confidence level derived from the confidence level (1.96 for a 95% confidence level).

p = estimated proportion of the population exhibiting the studied characteristic (6%). (Rothman et al., 2008)

e = margin of error (set at 5%).

Using the standard prevalence of 50% exhibiting the studied characteristic

Numerical application:

N = ([1.96 × 1.96 × 0.5 (1-0.5))/(0.0025) =384.16

A minimum sample size estimated at 384.16, i.e., **385** participants.

Data Collection and Analysis

For this study, we approached patients followed at the CTA (Center for Treatment and Analysis) of the Mother and Child University Hospital in N'Djamena, Chad, to obtain their consent to participate in the survey. First, we explained the importance of participating in the study using the information leaflet. Next, we obtained their informed consent before administering pre-tested individual questionnaires to gather information on their sociodemographic, clinical, socioeconomic, and cultural characteristics. Finally, we reviewed their medical records to collect additional information to supplement the data for analysis.

The collected data were entered and analyzed using SPSS (Statistical Package for Social Sciences) software for Windows, version 23.0. Diagrams and figures were created using Microsoft Excel 2016. Qualitative data were expressed as counts and percentage frequencies, and compared using the Chi-square test or Fisher's exact test. Quantitative variables were presented using the mean or

median and their parameters of dispersion (standard deviation and interquartile range, respectively) according to the Gaussian normality distribution.

Ethical Considerations

Before the start of our study, in accordance with the Declaration of Helsinki on ethical principles applicable to medical research involving human subjects, we obtained ethical clearance from the ISPST Ethics Committee, as well as authorization to conduct the study at the CAT of the Mother and Child University Hospital in N'Djamena, Chad. An information form and a free and informed consent form were developed for all study participants. Participants were free to withdraw from the study at any time for any reason. Data were collected in strict compliance with confidentiality. The rights of participants, their dignity, their privacy, and the confidentiality of their personal data were protected during and after the study.

RESULTS

Population distribution according to viral load status

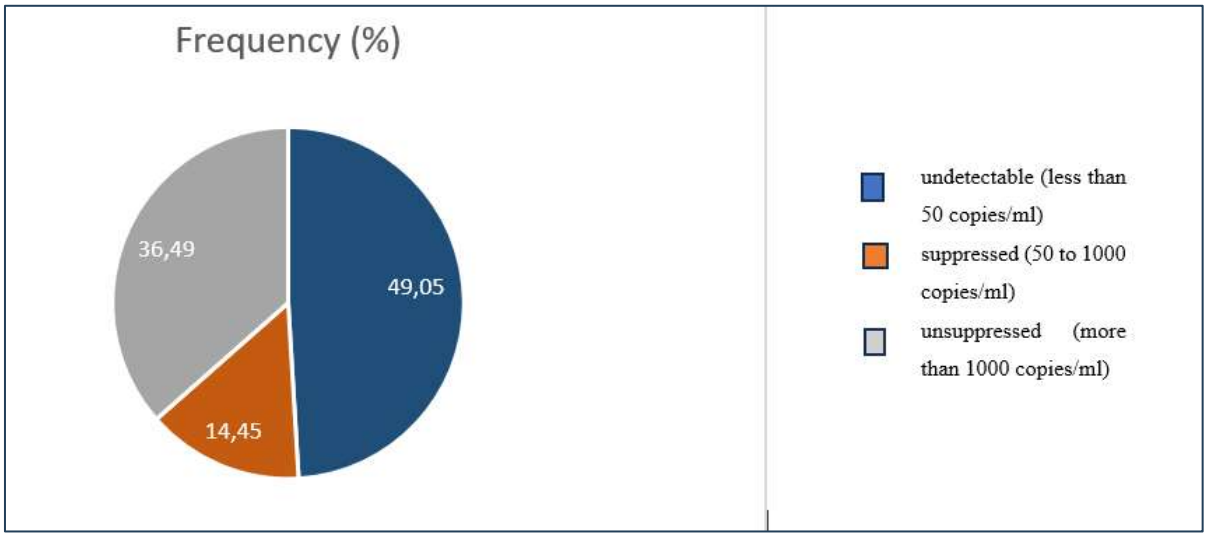

Figure 2: Distribution of the population according to viral load status

49.05% have an undetectable viral load (< 50 copies/ml), 14.45% a suppressed load (50-1000), and 36.49% an unsuppressed load (> 1000 copies/ml) (figure 2)

Unsuppressed viral load and sociodemographic characteristics

Table 1: Relationship between unsuppressed viral load and sociodemographic characteristics

Sociodemographic characteristics	VIRAL LOAD Not deleted N=154 n(%)	Deleted N=268 n(%)	OR(IC)	P
Age				
<20	3(23.08)	10(76,92)	0.31(0.06-1.11)	0.068
[20 - 30[	51(36,43)	89(63.57)	0.99(0.65-1.51)	0.984
[30 - 40[	72(36.55)	125(63.45)	1(0.67-1.49)	0.982
[40 - 50[	20(33.9)	39(66,1)	0.87(0.48-1.55)	0.655
≥50	8(61,54)	5(38,46)	2.87(0.91-9.81)	0.057
Marital status				
Bride)	18(36)	32(64)	0.97(0.51-1.79)	0.938
Widow/Widower	112(35.9)	200(64.1)	0.90(0.57-1.42)	0.669
Bachelor	15(48,39)	16(51,61)	1.69(0.80-3.57)	0.153
Divorcee)	9(31,03)	20(68.97)	0.77(0.32-1.71)	0.527
Education level:				
None	51(38,35)	82(61,65)	1.12(0.73-1.71)	0.592
Primary	38(40.86)	55(59,14)	1.26(0.78-2.03)	0.322
Secondary	52(37,14)	88(62,86)	1.04(0.68-1.58)	0.845
Superior	13(23,21)	43(76,79)	0.48(0.24-0.91)	**0.026**

Occupation :				
Housewife/unemployed,	30(32.97)	61(67.03)	0.82(0.49-1.33)	0.430
High school student,	89(37.55)	148(62.45)	1.10(0.74-1.66)	0.609
Informal sector,	19(37,25)	32(62.75)	1.03(0.55-1.89)	0.904
Public sector	10(47,62)	11(52,38)	1.62(0.65-3.98)	0.277
Private sector,	6(27,27)	16(72,73)	0.63(0.22-1.63)	0.356
Number of dependent children				
0	6(35,29)	11(64,71)	0.94(0.31-2.68)	0.916
1 to 2	36(33,33)	72(66,67)	0.83(0.52-1.31)	0.429
3 to 5	74(37,76)	122(62,24)	1.10(0.74-1.64)	0.616
6 and over	38(37,62)	63(62,38)	1.06(0.66-1.69)	0.786
People living in the household				
Friends	0(0)	1(100)	0(0-33.06)	0.448
Woman and children	123(36,18)	217(63,82)	0.93(0.56-1.54)	0.783
Parent, brother, sister	31(38,27)	50(61,73)	1.09(0.66-1.80)	0.711
Place of residence				
Rural	2(28,57)	5(71,43)	0.69(0.09-3.55)	0.661
Urban	152(36,63)	263(63,37)	-	0.661
Distance from the CTA				
Distant	71(49,31)	73(50,69)	2.28(1.50-3.46)	**<0.001**
Close	38(21.97)	135(78.03)	0.32(0.20-0.49)	**<0.001**
Very far away	45(42.86)	60(57,14)	1.42(0.90-2.24)	0.118

A higher level of education protects against viral load failure (OR=0.48, p=0.026), suggesting that education promotes better treatment adherence. Age ≥ 50 years tends to increase the risk (OR=2.87, p=0.057), although this is not statistically significant. Longer distance from the treatment center significantly increases this risk (OR=2.28, p<0.001), while living nearby is protective (OR=0.32, p<0.001). Other sociodemographic factors do not show a significant association with viral load failure (table 1).

Unsuppressed viral load and sociocultural characteristics

Table 2: Relationship between unsuppressed viral load and sociocultural characteristics

Sociocultural characteristics	**Viral load Not deleted N=154 n(%)**	**Deleted N=268 n(%)**	**OR(IC)**	**P**
Religion				
None	10(50)	10(50)	1.78(0.70-4.51)	0.199
Christian	52(38,24)	84(61,76)	1.11(0.72-1.70)	0.608
Muslim woman	92(34.59)	174(65,41)	0.80(0.53-1.20)	0.288
Community stigmatization				
No	144(35,12)	266(64,88)	-	
Yes	10(83,33)	2(16,67)	9.18(2.20-62.38)	**0.001**
Consulting traditional healers or traditional practitioners				
No	142(34,72)	267(65,28)	-	
Yes	12(92,31)	1(7.69)	22.42(3.82-488.42)	**<0.001**

Community stigmatization is strongly linked to failure to suppress viral load, multiplying the risk (OR=9.18, p=0.001). Furthermore, recourse to traditional healers or practitioners significantly increases this risk (OR=22.42, p<0.001). In contrast, religion and other sociocultural variables do not show a significant association (table 2).

Unsuppressed viral load and clinical characteristics

Table 3: Relationship between unsuppressed viral load and clinical characteristics

Clinical characteristics	Viral load Not deleted N=154 n(%)	Deleted N=268 n(%)	OR(IC)	P
Date of HIV diagnosis				
2-4 years	46(37.7)	76(62,3)	1.07(0.69-1.66)	0.741
5-7 years old	31(31,96)	66(68.04)	0.77(0.47-1.24)	0.291
6 months - 1 year	31(41,89)	43(58,11)	1.31(0.78-2.19)	0.288
Less than 6 months	1(25)	3(75)	0.57(0.02-5.47)	0.631
Over 8 years	45(36)	80(64)	0.97(0.62-1.49)	0.891
Antiretroviral treatment				
No	1(33,33)	2(66,67)	0.86(0.03-11.51)	0.909
Yes	153(36,52)	266(63,48)		
Do you suffer from any comorbidities?				
None	149(35,73)	268(64,27)		
Viral hepatitis	5(100)	0(0)	-1(2.15--1)	**0.003**
Side effects related to your treatment				
No	152(36,45)	265(63.55)	0.86(0.12-7.30)	0.869
Yes	2(40)	3(60)		
Stress				
No	13(4,8)	258(95,2)		
Yes	141(93,38)	10(6.62)	268.64(119.12-659.90)	**<0.001**
Multiple sexual partners				
No	151(36.92)	258(63.08)	1.94 (0.55-8.91	0.397
Yes	3(23.08)	10(76,92)	-	
Using a condom				
No	15(68,18)	7(31,82)	4.01(1.61-10.74)	**0.001**
Yes	139(34.75)	261(65.25)		
Alcohol consumption and cigarettes				
No	123(31,7)	265(68.3)	19.58(6.50-81.98)	**<0.001**
Yes	31(91,18)	3(8,82)		
Other chronic diseases				
No	154(36,67)	266(63,33)	-1(0.16--1)	0.283
Yes	0(0)	2(100)		

Viral hepatitis is associated with systematic failure to suppress viral suppression in this small group (p=0.003). High stress dramatically increases the risk of failure to suppress viral suppression (OR=268.64, p<0.001). Furthermore, not using condoms (OR=4.01) and consuming alcohol or cigarettes (OR=19.58) significantly increase this risk, both being statistically significant ($p \leq 0.001$). Other clinical factors, such as the duration of diagnosis or treatment, do not show a significant impact on viral suppression (table 3).

DISCUSSION

Population distribution according to viral load status

The results showed an overall viral suppression rate of 63.5% (49.05% undetectable and 14.45% suppressed), with 36.49% of cases having an unsuppressed viral load (>1000 copies/ml). This rate was intermediate compared to cited sub-Saharan African studies, such as Essomba et al. (2015), who reported 51% suppression in Douala (Cameroon), Telly et al. (2022), with 66% at the CHU du Point G (Mali), and Gado et al. (2022), reporting 67% in Niamey (Niger). These comparisons highlight moderate therapeutic efficacy in our setting, potentially influenced by local factors such as access to care and adherence, similar to the challenges discussed by Fonsah et al. (2017) and Bidashimwa et al. (2024), which highlight the impact of age, nutritional status, co-infections and regularity of follow-up on virological evolution.

Unsuppressed viral load and sociodemographic characteristics

The results indicate a predominantly young population (46.68% between 30 and 40 years old and 33.18% between 20 and 30 years old), married (73.93%), with a high secondary education level (33.18%) but a high rate of no formal education (31.52%). The majority were unemployed or homemakers (56.16%), with a high family burden (46.45% have 3-5 children). Nearly 98.34% resided in urban areas, but distance from the CTA influences access (41% close, 34.12% far).

In terms of associations, a higher level of education is protective (OR = 0.48; p = 0.026), consistent with the findings of Fonsah et al. (2017) and Bidashimwa et al. (2024), who emphasize that education promotes better adherence to and understanding of treatment, thus reducing the risk of non-suppression. Age ≥ 50 years tends to increase the risk (OR = 2.87; p = 0.057), although not statistically significant, which corroborates the studies by Bidashimwa et al. (2024) and Essomba et al. (2015), where advanced age is linked to lower adherence due to comorbidities or missed doses. A longer distance from the ACT increases the risk (OR = 2.28; p < 0.001), unlike a protective proximity (OR = 0.32; p < 0.001). This environmental-sociodemographic factor, mentioned by Telly et al. (2022), is a logistical barrier in sub-Saharan Africa, impacting regular monitoring and adherence to ART. However, unlike Iliyasu et al. (2005) or Byakika -Tusiime et al. (2005), who reported strong associations with marital status or sex, these variables were not significant in our study, suggesting contextual specificities in Chad where high family burdens could dilute these effects.

Unsuppressed viral load and sociocultural characteristics

Socio-culturally, Muslims are the dominant group (62.95%), followed by Christians (32.30%), with little stigmatization (97.16% none) and little recourse to traditional healers (96.92% none).

Community stigmatization multiplies the risk (OR = 9.18; p = 0.001), similar to the findings of Marcellin et al. (2008) in Cameroon, where discrimination reduces adherence due to fear of disclosure. The use of traditional healers increases the risk (OR = 22.42; p < 0.001), a cultural factor cited by Keita et al. (2023) and Maiga et al. (2024) as a cause of treatment discontinuation in West Africa, promoting the use of ineffective alternative treatments. Religion is not associated with adherence, unlike in some studies such as Iliyasu et al. (2005) in Nigeria, where beliefs influence adherence.

Unsuppressed viral load and clinical characteristics

Clinically, the majority of patients had been diagnosed for more than two years (81.52% cumulatively), were on antiretroviral therapy (99.29%), and had few comorbidities (viral hepatitis at 1.18%) and side effects (1.18%). Stress levels were low to moderate (64.22% at the lowest level), with low rates of multiple sexual partners (3.08%) and high condom use (94.79%). Alcohol/cigarette consumption was limited (8.06%), and other chronic diseases were rare (0.47%).

The associations reveal that viral hepatitis is linked to non-suppression (p = 0.003), consistent with the work of Bidashimwa et al. (2024) and Fonsah et al. (2017), who identify co-infections as amplifiers of viral replication despite ART. High stress multiplies the risk (OR = 268.64; p < 0.001), an extreme association compared to Musumari et al. (2014), who associate food insecurity and psychosocial stress with non-adherence, increasing viral load. Non-use of condoms (OR = 4.01; p ≤ 0.001) and alcohol/cigarette consumption (OR = 19.58; p ≤ 0.001) increase the risk, in line with Eholié et al. (2007) and Mills et al. (2006), who reported lower adherence in sub-Saharan Africa due to risky behaviors, although our low prevalence of these factors suggests an impact concentrated on a minority. Contrary to Ouedraogo et al. (2014), the duration of diagnosis did not significantly influence suppression, indicating long-term therapeutic stability in our cohort, potentially due to regular follow-up at the CTA.

CONCLUSION

This study reveals that sociocultural factors (community stigma, consultation with traditional healers) and clinical factors (comorbidity, stress, condom non-use, alcohol and cigarette consumption) influence non-suppression; while there are similarities to studies from sub-Saharan Africa, there are also specificities unique to the Chadian context. However, a qualitative approach would help elicit respondents' perceptions and provide a better understanding of the underlying psychosocial dimensions associated with treatment non-adherence or the failure to suppress viral load.

LIMIT OF THE STUDY

Our study had its limitations, especially the lack of funds for research, so we only did a quantitative study.

ETHICAL CONSIDERATION

The study received proper authorization from the director of the Mother-Child University Hospital in N'Djamena, Chad. However, we submitted the survey under a confidentiality clause.

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CONFLICT OF INTEREST

The authors declare that they have no affiliation with or involvement in any organization or entity with a financial interest in the subject matter.

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