

HIV-1 Serodiscordant Couples in Ndjamen (Chad): Analysis of Behavioral Patterns, Viral Load and Antiretroviral Therapy Adherence

Seïd Idriss Ahmat^{1,2,3*}, Hassan Mahamat Ali^{1,2}, Yeri Esther Hien¹, Adawaye Chatte⁴, Djamaladine Mahamat Doungous⁵, François Tabsoba¹, Seïdé Hamid Moussa⁶, Zara Moussa Mahamat⁷, Aly Savadogo¹, Yves Traore¹

¹Laboratory of Applied Biochemistry and Immunology, University Joseph KI-ZERBO, Ouagadougou, Burkina Faso

²National Reference Laboratory for HIV and Hepatitis, N'Djamena, Chad

³Laboratory of the Military Instruction Hospital of N'Djamena, N'Djamena, Chad

⁴Department of Public Health, Faculty of Human Health Sciences, N'Djamena, Chad

⁵Department of Biomedical and Pharmaceutical Sciences, National Higher Institute of Science and Technology of Abéché, Abéché, Chad

⁶Higher Institute of Medical and Health Sciences, La Francophonie University of N'Djamena, N'Djamena, Chad

⁷Health Department, Emikoussi University of N'Djamena, N'Djamena, Chad

Email: *seid_ahmat@yahoo.fr

How to cite this paper: Ahmat, S.I., Ali, H.M., Hien, Y.E., Chatte, A., Doungous, D.M., Tabsoba, F., Moussa, S.H., Mahamat, Z.M., Savadogo, A. and Traore, Y. (2025) HIV-1 Serodiscordant Couples in Ndjamen (Chad): Analysis of Behavioral Patterns, Viral Load and Antiretroviral Therapy Adherence. *Advances in Infectious Diseases*, 15, 268-277. <https://doi.org/10.4236/aid.2025.152020>

Received: March 13, 2025

Accepted: May 5, 2025

Published: May 8, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative

Commons Attribution-NonCommercial

International License (CC BY-NC 4.0).

<http://creativecommons.org/licenses/by-nc/4.0/>



Open Access

Abstract

The Human Immunodeficiency Virus (HIV) remains a major global public health challenge. By 2022, there were nearly 39.9 million people globally living with HIV, 53% are women and girls. Serodiscordant couples, a couple with one partner positive for HIV, play a critical role in HIV transmission. This is particularly evident in sub-Saharan Africa, where up to 10.90% of couples are serodiscordant, making them a key population for targeted prevention efforts. This study aimed to determine the impact of viral load, antiretroviral therapy (ART) adherence and the behavioral pattern of serodiscordant couple likely to influence HIV transmission. A prospective study was carried out and concerned HIV-1 serodiscordant couples. Parameters such as age, frequency of HIV testing, duration of relationship, number of children, social status, and educational level of partners were analyzed. Questionnaires were used to assess emotional support, communication, and HIV knowledge. Adherence to ART was assessed by pill counting and self-report. Plasma viral load of HIV-positive partners was measured using the GeneXpert platform. Thirty-four (34) HIV-1 serodiscordant couples were included in our study. Women (HIV negative) had an average age of 33 ± 2.21 , while the HIV-negative men had an average age of 40.63 ± 1.73 . The frequency of HIV testing was 1.60 times/year for women and 2.15 times/year for men. Analysis of viral load showed that,

91.2% of HIV-positive partners had an undetectable viral load, with adherence to ART observed in 91.2%. Open communication and emotional support were present in 88.2% and 72.4% of partners respectively. Our results suggest that HIV non-transmission in these couples is influenced by both treatment adherence which contributed to viral load suppression and positive interpersonal relationships. Emotional support and open communication are key factors that could contribute to preserving the health of serodiscordant couples.

Keywords

ART Adherence, Viral Load, Serodiscordant Couple, Relationship Dynamics

1. Introduction

HIV-1 remains a major global public health challenge, with an estimated 39.9 million people living with HIV according to the 2023 UNAIDS report [1]. In Chad, the prevalence rate is estimated at 1.2% among the adult population, reflecting progress in fighting HIV infection but also highlighting persistent challenges [2]. Among the 140,000 people living with HIV in the country, a significant proportion belong to serodiscordant couples, where one partner is HIV-positive and the other is HIV-negative [3]. These couples represent a key group for transmission prevention, particularly in sub-Saharan Africa, where up to 10.90% of couples are serodiscordant [4].

Research on HIV-1 has shed light not only on the biological mechanisms of transmission but also on the human behaviors that influence these dynamics. Among populations at-risk, HIV-negative partners in serodiscordant couples represent a particularly relevant study population. Although these individuals are exposed to a higher risk of HIV infection, some remain HIV-negative despite having close relationships with an HIV-positive partner [5] [6].

Studies have shown that the use of prevention methods, such as pre-exposure prophylaxis and safer sex practices, significantly reduces the risk of transmission [7]. Additionally, communication within the couple including discussions about testing and adherence to antiretroviral treatment by the HIV-positive partner plays a key role in prevention [8]. However, in Chad, cultural barriers and persistent HIV-related stigma limit access to care and information, thereby hindering preventive behaviors [9]. Furthermore, psychosocial factors such as social support, mental health, and education level also influence these behaviors [10].

In this context, our study aims to understand the contribution of viral load suppression, antiretroviral therapy adherence, behavioral and psychosocial factors, as well as the relational dynamics of serodiscordant couples in Chad that contribute to HIV-1 resistance among HIV-negative partners. This knowledge is essential for designing targeted and effective interventions adapted to local realities.

2. Material and Methods

2.1. Study Population

The study population consisted of HIV-1 serodiscordant couples, monitoring in the national reference laboratory for HIV and hepatitis and the laboratory of military Instruction hospital at N'Djamena, Chad.

2.2. Type and Period of Study

A prospective study was carried out from October 2022 to October 2023 at the National Reference Laboratory for HIV and Hepatitis and the Laboratory of the Military Instruction Hospital of N'Djamena, with the collaboration of the Laboratory of Applied Biochemistry and Immunology of Joseph KI-ZERBO University, Ouagadougou, Burkina Faso. HIV-1 serodiscordant couples who attended consultations were included in the study. To be eligible, couples had to report being sexually active for at least one year. "Sexually active" was defined as having engaged in penile-vaginal penetrative sex with a primary partner at least once in the past year.

2.3. Sampling

We did an exhaustive sampling, involving 34 serodiscordant couples meeting the inclusion criteria. A pre-established questionnaire form containing the targeted information was used to collect the data.

Inclusion criteria for the study were couples who:

- Had a confirmed serological status (one partner HIV-positive and the other HIV-negative).
- Had been in a stable relationship for at least one year.
- Provided informed consent from both partners.

2.4. Viral Load Measurements

HIV-RNA viral load was measured in HIV-infected patients after six-month follow-up. Five (5) mL of venous blood samples were collected from the HIV-positive partners into an ethylenediaminetetraacetic acid (EDTA) tube. Plasma was obtained by centrifugation of the whole blood at 3000 rpm and then used to determine the HIV-1 plasma viral load. HIV-RNA viral load was measured by GeneXpert® technology (Cepheid, Maurens-Scopont, France). It is a fully automated viral load analysis including RNA extraction and purification, reverse transcription, and real-time cDNA quantification, all in a single cartridge. The Xpert HIV-1 VL assay was conducted according to the manufacturer's instructions. Briefly, 1 mL of plasma sample was added to the cartridge, which was then loaded into the GeneXpert instrument. The steps of total RNA extraction, purification, reverse transcription, and cDNA quantification were fully automated and carried out within the cartridge system. The test can quantitate HIV-1 RNA over the range of 40 - 10,000,000 copies/mL.

2.5. Measuring ART Adherence of HIV-Positive Partners

Adherence to ART was assessed by pill counting and self-report. For pill counting, the date of withdrawal of the pill bottles was noted on the patient's chart, then every 10-day, patient was invited to count the remaining pills by telephone call, a total of 180 pills were counted. To evaluate the self-reported adherence, validated questionnaires, such as the Morisky Medication Adherence Scale (MMAS) were administered during the monthly appointment, in order to assess the patient's perception of adherence.

2.6. Study Parameters

The study parameters were grouped into sociodemographic (age, sex, social status and educational level), behavioral (adherence to ART of HIV+ partner, frequency of HIV follow-up testing of HIV-negative partner, number of years since partner became positive, frequency of sexual intercourse, duration of the couple's marriage, number of children since the positive partner learned status, and knowledge of HIV transmission by HIV-negative partner), relational dynamics of the couples (emotional support, open communication, and medical monitoring) and biological parameters (plasma viral load of HIV-positive partners).

2.7. Data Collection and Processing

All statistical analysis was performed using SPSS statistical software version 22.0. The Chi-square statistical test with a 95% confidence interval was used to define the correlation between plasma viral load and ART Adherence. Differences were considered significant for p-values ≤ 0.05

2.8. Ethical Considerations

The study was approved by the Chad Ministry of Public Health through the Center for Psycho-Medicosocial Support. The study was conducted according to Helsinki's declaration. All participants gave written informed consent to take part in this study after having read the study information sheet and having any questions answered. The privacy rights were observed at all times.

3. Results

3.1. Baseline Characteristics of the Study Participants

We included 34 HIV-serodiscordant couples. HIV-negative women accounted for 44.11% of cases. With an average age of 33 ± 2.21 , they were tested around 1.6 times a year. HIV-negative women had been living with an HIV-positive partner for around 8.6 years and had an average of 2.6 children. Among them, 86.7% had a lower socioeconomic status, and 40% had only a primary education. In contrast, HIV-negative men in serodiscordant couples accounted for 55.89% of cases. Their average age was significantly higher, reaching 40.63 ± 1.73 years. They were tested at 2.15 times a year and had been living with an HIV-positive partner for around 14.46 years. They had at least 3 children. Among them, 47.4% had a lower

socioeconomic status, and only 36.8% had a primary education. Overall, serodiscordant couples reported an average of 3.24 sexual acts per week. Characteristics of couples included in our study are presented in **Table 1**.

Table 1. Baseline characteristics of the study participants.

	Women (n = 34)		Men (n = 34)		Couple
	HIV+	HIV-	HIV+	HIV-	
Frequencies	19	15	15	19	
Age \pm sem	30.84 \pm 1.27	33 \pm 2.21	43.73 \pm 2.19	40.63 \pm 1.73	
Frequency of HIV test/year	NA	1.60 (1 - 4)	NA	2.15 (1 - 4)	
Frequency of sexual intercourse/week					3.24 (1 - 4)
time elapsed since serology discovery	9.26 (1 - 20)		14.46 (1 - 34)		
Duration of marriage (years)		8.63 (1 - 20)		9.60 (3 - 25)	
Number of children		2.57 (1 - 5)		3.20 (0 - 9)	
Social status					
- Low		13 (86.70%)		9 (47.40%)	
- Moderate		2 (13.30%)		10 (52.60%)	
Educational level					
- No schooling		3 (20%)		1 (5.30%)	
- Primary		6 (40%)		3 (15.80%)	
- Secondary		4 (26.7%)		3 (36.80%)	
- Higher		3 (13.30%)		8 (42.10%)	

3.2. Analysis of Behavioral Patterns

We analyzed prevention methods such as pre-exposure prophylaxis used by serodiscordant couple to prevent the infection of HIV negative partner. We observed that not all couples participating in this study used pre-exposure prophylaxis (PrEP) or condoms. Regarding the relational dynamics between the partners of serodiscordant couples (**Table 2**), the results of our study showed that 30 (88.2%) and 28 (72.4%) of HIV-positive partners had respectively a benefit of emotional support and open communication from their HIV-negative partners. Adequate medical monitoring had been reported by 27 (79.4%) participants. Unfortunately, most of the participants had little knowledge of the modes of transmission of HIV 19 (55.9%) (**Table 2**).

3.3. Analysis of Viral Load and Antiretroviral Therapy Adherence

Viral load analysis showed that 31 HIV+ partners (91.2%) had plasma viral load suppressed. Patients with unsuppressed viral load presented a mean of 6272.206

(40 - 139,000) copies/mL (**Table 3**). Good adherence to ART was observed in 31 (91.2%) HIV-positive partners versus 3 (8.8%) with bad adherence. A strong correlation between viral load and ART adherence was observed ($p < 0.001$) (**Table 4**).

Table 2. Relationship dynamics of couples and knowledge of HIV transmission modes.

	Emotional support	Open communication	Medical monitoring
No	4 (11.8%)	No 6 (17.6%)	Yes 7 (20.6)
Yes	30 (88.2%)	Yes 28 (72.4%)	No 27 (79.4)
Total	34 (100%)	34 (100%)	34 (100)

HIV transmission Knowledge	Frequency	Percentage
Good	9	26.5
Poor	19	55.9
Moderate	6	17.6
Total	34	100.0

Table 3. Distribution of plasma viral load in seropositive partners.

Viral load of HIV-positive partners	Frequency	Percentage
Mean: 6272.206 copies/ml (40 - 139,000)		
40 - 999 (viral load suppressed)	31	91.2
>1000 (viral load not suppressed)	3	8.8
Total	34	100.0

Table 4. Cross-tabulated data between ART adherence and viral load.

		Viral load				Total
		0 - 999	1000 - 1999	139,000 - 139,999	70,000 - 70,999	
Adherence to ART	No	0	1	1	1	3
	Yes	31	0	0	0	31
Total		31	1	1	1	34

4. Discussion

This study employed a conceptual framework to examine the role of viral load, ART adherence, social and interpersonal dynamics in prevention of HIV-1 transmission among serodiscordant couples. We revealed intricate dynamics, particularly concerning demographic characteristics, testing behaviors, and social implications in addition to viral load suppression and ART adherence.

In our sample of 34 serodiscordant couples, 44.11% of women are HIV-negative, with an average age of 33 years. In sub-Saharan Africa, it has been demonstrated that women of childbearing age are disproportionately affected by the HIV epidemic (UNAIDS, 2013). Among non-infected women, 86.7% had low social

status, which may restrict their access to healthcare and education [11]. In contrast, HIV-negative men were older, with an average age of 40.63 years, reflecting socioeconomic and cultural factors that influence partner selection and relationship dynamics. These older men also appeared more likely to undergo regular HIV testing, with an average frequency of 2.15 times per year, a finding that contrasts with the challenges in maintaining preventive behaviors observed in other studies [12].

The average duration of relationships was 8.63 years for women and 14.46 years for men, indicating relationship stability despite serodiscordance. This longevity may facilitate the adoption of effective prevention strategies, such as the use of ART to reduce transmission risk [13]. However, 40% of men and 86.7% of women had only primary education or less, which may limit their understanding of risks and prevention options [14].

The psychosocial implications in the lives of serodiscordant couple are also important. Couples often experience high levels of stress and anxiety related to managing their serostatus, which can affect communication and decision-making regarding reproductive health [15]. Psychological support and HIV education are crucial to help these couples overcome these challenges [16].

Emotional support plays a vital role in reducing stress and anxiety, improving adherence to ART and pre-exposure prophylaxis (PrEP), and reducing risk behaviors [17] [18]. Couples with adequate psychosocial support are less likely to experience HIV transmission [15].

Open communication between partners is also essential. Couples who communicate effectively are more likely to discuss risks and prevention strategies, thereby reducing the risk of HIV transmission [12] [19]. However, only 26.5% of HIV-negative partners had a good understanding of HIV transmission modes, a gap that may contribute to risky behaviors [20] [21].

Among HIV-positive partners, 91.2% had an undetectable viral load, demonstrating the effectiveness of ART. This finding supports the “U = U” (Undetectable = Untransmittable) concept, which shows that an undetectable viral load virtually eliminates the risk of sexual transmission [22] [23]. However, the 8.8% with an unsuppressed viral load (ranging from 1000 to 70,999 copies/mL) represent a potential transmission risk, highlighting the need for targeted interventions for these individuals.

Finally, ART adherence was 91.2%, a high rate that largely explains the non-transmission of HIV in these couples. However, non-adherence in some partners can be attributed to factors such as forgetfulness, stigma, occupational demands, or substance use [24]. The strong correlation between viral load and ART adherence ($p < 0.001$) suggests that immunological and virological factors contribute to HIV non-transmission in these couples.

5. Conclusion

Our study underscores the critical importance of ART adherence and effective

viral load control to reduce the risk of HIV transmission within serodiscordant couples. These factors are essential to ensure the safety of the HIV-negative partner. Additionally, behavioral aspects, including emotional support, open communication and HIV education, play an important role in the management of these couples. Further studies, such as the detection of viral RNA in the genital secretions of HIV-positive partners, could shed light on the mechanisms of non-transmission of the virus in these couples.

Author's Contribution

This study is the result of research conducted by SIA & HMA, who were responsible for the study design, data collection, analysis, and interpretation. The coordination of the study, as well as the revision of the manuscript, were overseen by Professor Yves TRAORÉ, Dr. Yeri Esther HIEN, and Dr. Adawaye CHATTÉ. All authors have read and approved the final version of the manuscript.

Scientific Contribution

This article provides a significant scientific contribution by elucidating the critical role of viral load suppression, adherence to antiretroviral therapy (ART), and behavioral factors in preventing HIV-1 transmission among HIV-negative partners within serodiscordant couples in Chad. The findings underscore the importance of these parameters in mitigating transmission risk, offering valuable insights for the development of targeted prevention and management strategies in this unique context.

Conflicts of Interest

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

References

- [1] UNAIDS (2024) Fact Sheet 2024—Latest Global and Regional HIV Statistics on the Status of the AIDS Epidemic.
- [2] OMS Tchad (2023) Rapport biennal Santé pour Tous: Engagements et Réalisations Tchad.
- [3] Chihana, M.L., Conan, N., Ellman, T., Poulet, E., Garone, D.B., Ortuno, R., *et al.* (2021) The HIV Cascade of Care among Serodiscordant Couples in Four High HIV Prevalence Settings in Sub-Saharan Africa. *South African Medical Journal*, **111**, 768-776. <https://doi.org/10.7196/samj.2021.v111i8.15489>
- [4] Eyawo, O., de Walque, D., Ford, N., Gakii, G., Lester, R.T. and Mills, E.J. (2010) HIV Status in Discordant Couples in Sub-Saharan Africa: A Systematic Review and Meta-Analysis. *The Lancet Infectious Diseases*, **10**, 770-777. [https://doi.org/10.1016/s1473-3099\(10\)70189-4](https://doi.org/10.1016/s1473-3099(10)70189-4)
- [5] Cohen, M.S., Gamble, T. and McCauley, M. (2020) Prevention of HIV Transmission and the HPTN 052 Study. *Annual Review of Medicine*, **71**, 347-360. <https://doi.org/10.1146/annurev-med-110918-034551>
- [6] Desgrées-du-Loû, A. and Orne-Gliemann, J. (2008) Couple-Centred Testing and

- Counselling for HIV Serodiscordant Heterosexual Couples in Sub-Saharan Africa. *Reproductive Health Matters*, **16**, 151-161. [https://doi.org/10.1016/s0968-8080\(08\)32407-0](https://doi.org/10.1016/s0968-8080(08)32407-0)
- [7] Thigpen, M.C., Kebaabetswe, P.M., Paxton, L.A., Smith, D.K., Rose, C.E., Segolodi, T.M., *et al.* (2012) Antiretroviral Preexposure Prophylaxis for Heterosexual HIV Transmission in Botswana. *New England Journal of Medicine*, **367**, 423-434. <https://doi.org/10.1056/nejmoa1110711>
- [8] Burton, J., Darbes, L.A. and Operario, D. (2008) Couples-Focused Behavioral Interventions for Prevention of HIV: Systematic Review of the State of Evidence. *AIDS and Behavior*, **14**, 1-10. <https://doi.org/10.1007/s10461-008-9471-4>
- [9] MSPP (2022) Plan National de Développement Sanitaire (PNDS).
- [10] Gerbi, G.B., Habtemariam, T., Robnett, V., Nganwa, D. and Tameru, B. (2012) Psychosocial Factors as Predictors of HIV/AIDS Risky Behaviors among People Living with HIV/AIDS. *Journal of AIDS and HIV Research*, **4**, 8-16.
- [11] Soubeiga, S.T., Compaoré, R., Djigma, F., Zagre, N., Assengone, E., Traoré, L., *et al.* (2015) Evaluation du traitement antirétroviral chez les femmes enceintes VIH-1 positif, sur la transmission de l'infection de la mère à l'enfant: Cas du Centre Médical Saint Camille de Ouagadougou, au Burkina Faso. *Pan African Medical Journal*, **20**, Article 399. <https://doi.org/10.11604/pamj.2015.20.399.5627>
- [12] Roxby, A.C., Ben-Youssef, L., Marx, G., Kinoti, F., Bosire, R., Guthrie, B., *et al.* (2016) Dual Contraceptive Method Use in HIV-Serodiscordant Kenyan Couples. *Journal of Family Planning and Reproductive Health Care*, **42**, 264-270. <https://doi.org/10.1136/jfprhc-2015-101233>
- [13] Bavinton, B.R., Jin, F., Prestage, G., Zablotska, I., Koelsch, K.K., Phanuphak, N., *et al.* (2014) *BMC Public Health*, **14**, Article No. 917. <https://doi.org/10.1186/1471-2458-14-917>
- [14] Mashaphu, S., Wyatt, G.E., Gomo, E. and Tomita, A. (2018) Intimate Partner Violence among HIV-Serodiscordant Couples in Durban, South Africa. *South African Medical Journal*, **108**, 960-964. <https://doi.org/10.7196/samj.2018.v108i11.13095>
- [15] Lelaka, C.M., Moyo, I., Tshivhase, L. and Mavhandu-Mudzusi, A.H. (2022) Psychosocial Support for HIV Serodiscordant Couples. *Health Psychology and Behavioral Medicine*, **10**, 537-556. <https://doi.org/10.1080/21642850.2022.2084098>
- [16] King, R., Wamai, N., Khana, K., Johansson, E., Lindkvist, P. and Bunnell, R. (2012) "maybe His Blood Is Still Strong": A Qualitative Study among HIV-Sero-Discordant Couples on ART in Rural Uganda. *BMC Public Health*, **12**, Article No. 801. <https://doi.org/10.1186/1471-2458-12-801>
- [17] Reynolds, S.J., Makumbi, F., Nakigozi, G., Kagaayi, J., Gray, R.H., Wawer, M., *et al.* (2011) HIV-1 Transmission among HIV-1 Discordant Couples before and after the Introduction of Antiretroviral Therapy. *AIDS*, **25**, 473-477. <https://doi.org/10.1097/qad.0b013e3283437c2b>
- [18] Cohen, M.S., Chen, Y.Q., McCauley, M., Gamble, T., Hosseinipour, M.C., Kumarasamy, N., *et al.* (2011) Prevention of HIV-1 Infection with Early Antiretroviral Therapy. *New England Journal of Medicine*, **365**, 493-505. <https://doi.org/10.1056/nejmoa1105243>
- [19] Tchakounté, C., Nkenfou, C.N., Tchouangueu, T.F., Ngoufack, N.M., Tchuandom, S.B., Ngono, O.D., *et al.* (2020) HIV Serodiscordance among Couples in Cameroon: Effects on Sexual and Reproductive Health. *International Journal of Maternal and Child Health and AIDS (IJMA)*, **9**, 330-336. <https://doi.org/10.21106/ijma.370>

-
- [20] Tadesse, M. (2014) Assessment of HIV Discordance and Associated Risk Factors among Couples Receiving HIV Test in Dilla, Ethiopia. *BMC Research Notes*, **7**, Article No. 893. <https://doi.org/10.1186/1756-0500-7-893>
- [21] Yasin, I. (2023) Occurrence and Factors Associated with HIV-Sero-Discordance in Couples at Iganga General Hospital-Iganga District, Eastern Uganda. *IDOSR Journal of Experimental Sciences*, **9**, 17-28. <https://doi.org/10.59298/idosr/jes/101.1.7002>
- [22] Rodger, A.J., Cambiano, V., Bruun, T., Vernazza, P., Collins, S., Degen, O., *et al.* (2019) *The Lancet*, **393**, 2428-2438. [https://doi.org/10.1016/s0140-6736\(19\)30418-0](https://doi.org/10.1016/s0140-6736(19)30418-0)
- [23] Gandhi, R.T., Bedimo, R., Hoy, J.F., Landovitz, R.J., Smith, D.M., Eaton, E.F., *et al.* (2023) Antiretroviral Drugs for Treatment and Prevention of HIV Infection in Adults: 2022 Recommendations of the International Antiviral Society-USA Panel. *JAMA*, **329**, 63-84. <https://doi.org/10.1001/jama.2022.22246>
- [24] Essomba, E.N., Adiogo, D., Kedy, D.C., Amang, B., Lehman, L.G. and Coppieters, Y. (2015) Facteurs associés à la non observance thérapeutique des sujets adultes infectés par le VIH sous antirétroviraux dans un hôpital de référence à Douala. *Pan African Medical Journal*, **20**, Article 412. <https://doi.org/10.11604/pamj.2015.20.412.5678>