



A Cross-Sectional Study on the Impact of Operation Triple Zero (OTZ) Program on Viral Load Suppression amongst Members of the Adolescent Club in 68 Nigerian Army Reference Hospital Yaba Lagos, Nigeria

Nkechinyere Harrison^{1*} , Ismail Lawal², Yakubu Adamu² , Kehinde Aribisala³, Adegbeniga Olarinoye², Uzoamaka Agbaim¹, Funmilayo Owolabi⁴, Dooshima Okonkwo³, Laura Chittenden², Nathan Okeji⁴

¹Centre for Infectious Disease Clinic, 68 Nigerian Army Reference Hospital, Lagos, Nigeria

²United States Army Medical Research Directorate-Africa, Abuja, Nigeria

³Henry Jackson Foundation Medical Research International LTD/GTE, Abuja, Nigeria

⁴Nigerian Ministry of Defence Health Implementation Program, Abuja, Nigeria

Email: *nke1207@yahoo.com

How to cite this paper: Harrison, N., Lawal, I., Adamu, Y., Aribisala, K., Olarinoye, A., Agbaim, U., Owolabi, F., Okonkwo, D., Chittenden, L. and Okeji, N. (2024) A Cross-Sectional Study on the Impact of Operation Triple Zero (OTZ) Program on Viral Load Suppression amongst Members of the Adolescent Club in 68 Nigerian Army Reference Hospital Yaba Lagos, Nigeria. *World Journal of AIDS*, 14, 35-44.

<https://doi.org/10.4236/wja.2024.142003>

Received: November 17, 2023

Accepted: May 3, 2024

Published: May 6, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

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



Open Access

Abstract

Background: In Nigeria, adolescents and young people (AYP) aged 10 - 24, comprise 22.3% of the population and with HIV prevalence of 3.5%. The AYP living with HIV enrolled at the 68 NARHY, Lagos reflects the national challenges with poor viral suppression. The OTZ program aligns with the UNAIDS 95-95-95 goals. It seeks to empower AYPLHIV to be in charge of their treatment and commit to triple zero outcomes—zero missed appointments, zero missed drugs, and zero viral loads. The purpose of the study was to assess the impact of the OTZ program on viral load suppression among members of the adolescent club in 68 NARHY, Lagos. **Method:** A cross-sectional retrospective study to evaluate the impact of the OTZ program on the viral load of 53 AYP enrolled in the OTZ program between March 2019 to December 2019 was analyzed. The Percentage of viral load suppression before enrollment compared with 6 and 12 months after enrollment into the OTZ program. The AYP is grouped into 10 - 14, 15 - 19, and 20 - 24 years. Activities conducted were peer driven monthly meetings with the AYP during which the adolescents interacted on issues relating to improving their treatment outcomes, healthcare workers reviewed their clinical status, viral load result, provider peer counseling, and caregivers' engagement to support adherence to medication and ARV refills. **Results:** Before OTZ, 81% aged 10 -

14 years, 75% aged 15 - 19 years, and 25% aged 20 - 24 years were virally suppressed (VL less than 1000 copies/ml). Six months after enrollment, 94% were virally suppressed—95% aged 10 - 14 years, 96% aged 15 - 19 years, and 66% aged 20-24 years. Twelve months after enrollment, 96% of AYP were virally suppressed—100% aged 10-14 years, 93% aged 15 - 19 years, and 100% aged 20 - 24 years. Males' viral load (VL) suppression improved from 79% to 96% and 92%, while females' VL suppression improved from 69% to 93% and 100% at 6 and 12 months respectively. **Conclusion:** The OTZ activities contributed to improved viral load suppression in the AYP of the facility.

Keywords

Impact, Operation Triple Zero, Adolescent, Viral Load, Nigeria

1. Background

Nigeria has one of the highest global burdens of HIV with 1.9 million people living with the virus, a prevalence of 1.4% [1]. It is estimated that 4 million adolescents and young people (AYP) aged 15 - 24 years are living with HIV in the world while children below 15 years account for 3.2 million. Nigeria has a HIV prevalence of 3.5% among these adolescents and young adults which is the highest in West and Central Africa [2]. The difference in HIV prevalence between men and women is greatest in adolescents aged 20 - 24 years with women three times more likely to be living with HIV than their male counterparts [1]. Adolescents and young people aged 10 - 24 years constitute one-third of the population in sub-Saharan Africa and the largest of the AYP population in Nigeria is within 10 - 14 years with 12.3%. Other age groups 15 - 19 and 20 - 24 years constitute 8.8% and 7.2% respectively of Nigeria's population [3].

Achieving viral load suppression among adolescents living with HIV continues to hold back the attainment of sustainable development goals and the ending of the HIV epidemic by 2030 [4] [5].

The available evidence highlights several factors that have contributed to poor Viral load suppression and adherence among adolescents. These include stigma, side effects of Anti-Retroviral drugs (ARVs) adherence problems, non-disclosure, inadequate family support, and dependence on caregivers [5]-[10].

Significant adolescent engagement is one of the standards for high-quality adolescent-friendly health services, and adolescent peer support is a key strategy to achieve this standard [11].

Although robust descriptions of actual service delivery models focusing on or intentionally including adolescents are not readily available, many health facilities in low- and middle-income countries within sub-Saharan Africa appear to include peer support activities for adolescents and young people living with HIV. Such models provide support in a variety of ways, such as individual or group support, community- or facility-based, and in-person or virtual [11].

Operation Triple Zero (OTZ) program engages AYPLHIV as active stakeholders and partners in their health by promoting a responsive service delivery model. AYPLHIV joining OTZ clubs are offered a comprehensive HIV treatment literacy package and are empowered to be self-health managers. They also commit to the treatment goal of achieving “three zeroes”: zero missed appointments, zero missed drugs/medications, and zero viral load (VL). OTZ empowers AYP to take charge of their health, and their decisions, receive support from fellow peers, and identify with peers who are doing well [12]. OTZ offers comprehensive youth-friendly HIV services, a treatment literacy package, motivational messaging and counseling, and peer-to-peer support and mentorship. Facility support staff and OTZ champions (adolescent peers) motivate and support adolescents and youth living with HIV to become active stakeholders and partners in their health. The program prioritizes timely antiretroviral refills and encourages viral load sample collection during OTZ club meetings to support continuity in care.

The Nigerian Ministry of Defence-US Department of Defense Walter Reed Program Nigeria (NMOD-DOD-WRPN) started the OTZ program in 2018 following a USG interagency study tour to the Kenya program. The 68 Nigerian Army Reference Hospital Yaba, Lagos Nigeria (68 NARHY) OTZ was inaugurated in 2018 after facility orientation and engagement of a volunteer OTZ champion.

This study therefore aims to assess the impact of the OTZ program on viral load suppression among members of the adolescent club in 68NARHY.

2. Method

A cross sectional retrospective study to evaluate the impact of operation triple zero (OTZ) program on viral load outcome of AYP enrolled at 68 NARH Yaba, Lagos. The viral load results of 53 AYP enrolled 68 NARH Yaba, Lagos between March 2019 to December 2019 were collected from the electronic medical records, and the results were analyzed at three different time points; before enrollment into the program and at 6 and 12 months after OTZ enrolment. The viral load suppression rates at enrollment, 6 and 12 months were compared as well as their significance. These patients were grouped into three age categories: 10 - 14 years, 15 - 19 years, and 20 - 24 years.

All activities relating to patient clinic attendance and investigations were recorded in the hospital case notes and double-entered into the FileMaker Pro version 6 by a data entry specialist and trained data assistants. Data for this study were then exported as a Microsoft Excel file and imported into Statistical Package for Social Sciences (SPSS v23, Chicago Inc.) for cleaning and analyses.

2.1. Study Setting

This study was carried out at the Centre for Infectious Disease Clinic (CID) of the 68 Nigerian Army Reference Hospital Yaba, Lagos, a 500-bed tertiary mili-

tary hospital with an average out-patient volume of 75 clients per day. This referral hospital provides services to both military and civilian populations and is located at the heart of the Yaba Local Council Development Area of Lagos.

The OTZ program was introduced in April 2018 at the site this was to address the challenge of poor viral load and missed appointment observed by clients within this age band whom were accessing services from the program. The OTZ program is an intervention designed to address missed appointment, non-adherence to medication which was, causing unsuppressed viral load suppression amongst these populations. The catchment populations are children from age 10 years, adolescents, and young adults up to age 24 years.

Criteria for enrollment included:

- 1) HIV positive and aged between 10 - 24 years.
- 2) Received full disclosure of HIV status.
- 3) Voluntary commitment to the OTZ program.

Implementation process:

- 1) Identification and orientation of facility team consisting of a dedicated facility Counselor, a clinician and an adolescent or youth peer for Care and treatment and PMTCT.

- 2) Site provided with an adapted register and a telephone for tracking and following up with members.

- 3) Enrollment of members based on the stated criteria.

- 4) Follow up with enrolled members frequently by SMS and/or WhatsApp with motivational messaging, e-counseling, updates on viral load due dates etc.

- 5) Conduct periodic/monthly OTZ meetings, and data reviews with members with support from United States Army Medical Research Directorate-Africa/Nigeria, where members socialized review viral load results and conduct health education to reinforce adherence to treatment and linkage to other services.

Enrollment commenced at the site in March 2019.

2.2. Statistical Analyses

Descriptive statistics were calculated. The variables of interest were compared at enrollment, 6 and 12 months after using a dependent sample t-test, with statistical significance level defined at $p\text{-value} \leq 0.05$.

2.3. Ethical Approval and Consent

This study received a non-research determination from the National Health Research Ethics Committee in Abuja, Nigeria, and the Walter Reed Army Institute of Research Human Subjects Protections Branch in Silver Spring, Maryland, USA.

The protocol number and name are **RV 543**, Evaluation of Changing Guidelines, Systems, and Practices on Prevention, Diagnostic and Treatment Activities in the Military HIV Program in Nigeria. We adhered to the 1964 declaration of Helsinki guidelines. Data extraction excluded AYP's unique identifiers such as name, surname, patient folder number, and identity number.

3. Result

Sex distribution of the participants shows that 54.7% were females while 45.3% were males. Concerning age distribution 39.6% were 10 - 14 years, 52.8% were 15 - 19 years and 7.5% were 20 - 24 (**Table 1**).

Before enrollment into the OTZ program, 73.6% of the AYP were virally suppressed with 81% of those aged 10 - 14 years, 75% who were between 15 - 19 years and 25% of those between 20 - 24 years were suppressed. While 6 months after enrollment, 94.2% were suppressed with 95.2% of those aged 10 - 14 years, 96.4% who were between 15 - 19 years and 66.7% of those within 20 - 24 years were virally suppressed. Also, 12 months after enrollment into OTZ program, 96.2% of them got virally suppressed with 100% of those aged 10 - 14 years, 92.9% of those aged 15 - 19 years and 100% of those aged 20 - 24 years were virally suppressed (**Table 2, Figure 1**).

The P-value for the difference in viral load suppression rate at enrollment, 6 and 12 months were 0.618, 0.462 respectively (**Table 2**).

Viral load suppression by sex was 69% at enrollment, 92.9% and 100% at 6 and 12 months respectively in female, while in the male it was 79.2% at enrollment, 95.8% and 91.7% at 6 and 12 months respectively (**Figure 2**).

4. Discussion

In this study, we set out to assess the impact of OTZ program on viral load suppression among members of adolescent club in 68NARHY, Lagos. The proportion of AYP with viral suppression after 6 and 12 months after enrolling into the OTZ program was relatively high at 94.2% and 96.2%. Nevertheless, viral suppression at enrollment into OTZ for AYP was at 73.6%, with 81% of those aged 10 - 14 years, 75% who were between 15 - 19 years and 25% of those between 20 - 24 years. This viral suppression amongst AYP at 73.6% is considerably lower than the WHO target of 95% [13]. However, this finding is similar to the findings in other studies in some African countries where viral suppression rate was 74.2% in Kenya and 74% South Africa [14] [15]. At 6 months after enrollment into OTZ, suppression rate was at 94.2% with 95.2% of those aged 10 - 14 years, 96.4% who were between 15 - 19 years and 66.7% of those within 20 - 24 years. Also, 12 months after enrollment into OTZ, 96.2% of them got virally suppressed with 100% of those aged 10 - 14 years, 92.9% of those aged 15 - 19 years and 100% of those aged 20 - 24 years.

About 54.7% of the AYP were females while 45.3% were males. This finding aligns with the global trend which shows that more adolescent females are living with HIV [16] [17].

The OTZ activities helped in achieving the WHO target of 95% in our study. This finding from our study is similar to the observation of Oryokot *et al.* in Uganda where the application of quality improvement intervention was shown to improve Viral load among adolescent from 63.1% to 91.4% over a one-year period [5].

Table 1. Frequency distribution by sex and age group.

Sex	Frequency	Percent	Cumulative Percent
F	29	54.7	54.7
M	24	45.3	100
Total	53	100	
Age Groups (Years)			
10 - 14	21	39.6	39.6
15 - 19	28	52.8	92.5
20 - 24	4	7.5	100
Total	53	100	

Table 2. Viral load suppression across age groups.

Age Groups (Years)	Viral Load Suppression Rate		
	Before Enrollment	6 Month After Enrollment	12 Month After Enrollment
10 - 14	81.0%	95.2%	100.0%
15 - 19	75.0%	96.4%	92.9%
20 - 24	25.0%	66.7%	100.0%
Total	73.6%	94.2%	96.2%
P-Value		0.618	0.462

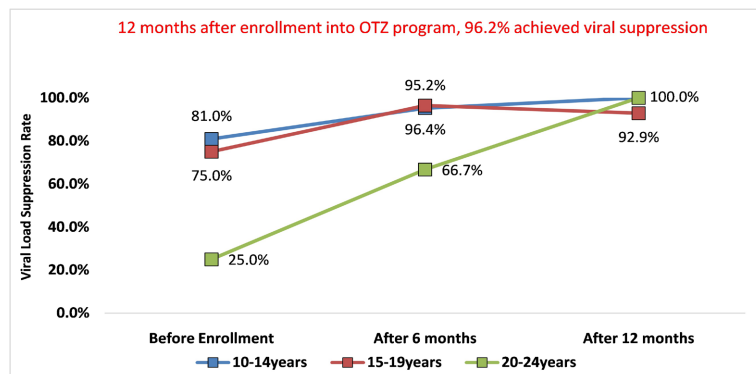


Figure 1. Trend in viral load suppression by age groups (Years).

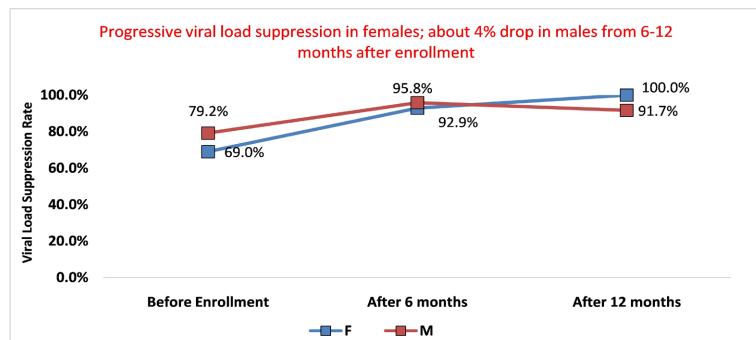


Figure 2. Trend in viral load suppression by sex.

Similarly, impact stories on Operation Tipple Zero showed 95% of adolescents enrolled achieved viral suppression at Ciheb's Partnership for Advanced Care and Treatment (PACT) Endeleva program [18].

Viral suppression by sex for male was 80% and female 69.2% at enrollment, at 6 months male 95.8% and female 92.9%, at 12-month male 91.7% and female 100%. Evidence on the relationship between gender and viral load suppression is mixed. While some studies showed that males were more likely to achieve viral load suppression compared to females, others found that males are more likely to achieve viral non suppression [8] [15] [19] [20] [21] [22] [23].

However, we found that older adolescent females were more likely to attain viral suppression compared to males. Previous studies have shown that adherence among males ALHIV is poor compared to females; furthermore, it has also been reported that males have poor treatment seeking behaviors and as such to get males to test for HIV, link and retain them to ART care remains a challenge [20] [24].

This study is one of the first in Nigeria to evaluate the impact of OTZ program on Viral load suppression among adolescent and this analysis was a practical assessment of policy enactment. However, this study also has some limitations. For example, the short observational period of a single year may not have been of sufficient duration when looking at facility-level data to draw meaningful comparisons, also the sample size is small for generalization of observations made in this study. In addition, the study is subject to other risk or confounding factors that may be present but were not measured e.g. how to correctly ensure adherence to medication in the absent of testing the drug metabolite in the client's blood.

In this study, we showed some benefit in terms of viral load suppression in adolescent and young adults with enrollment in OTZ program, but this finding may not be generalizable due to the limitations of this study. We recommend further studies to generate additional evidence to validate our findings.

5. Conclusions

This study has demonstrated that through enrollment in the OTZ program, AYP's viral load suppression rate improved tremendously and reached levels above 95%. Therefore, enrollment into the OTZ program is recommended for all AYPs on ART programs.

The findings have further strengthened its usefulness to policymakers and program managers to scale up the OTZ program at all treatment facilities.

Funding

This work was supported by a cooperative agreement (W81XWH-18-2-0040) between the Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., and the U.S. Department of Defense (DoD) and supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through DoD.

Acknowledgements

The authors wish to acknowledge the important contributions of staff from the Nigerian Ministry of Defence, DoD colleagues, implementing partners and other technical stakeholders across all supported countries who have made the implementation of this work possible.

Disclaimer

The views expressed are those of the authors and should not be construed to represent the positions of the U.S. Army, the Department of Defense, the Uniformed Services University, HJF, or the Department of State. The investigators have adhered to the policies for protection of human subjects as prescribed in AR 70-25.

Conflicts of Interest

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

References

- [1] Joint United Nations Programme on HIV/AIDS (UNAIDS) (2019) New Survey Results Indicate That Nigeria Has an HIV Prevalence of 1.4%. https://www.unaids.org/sites/default/files/20190314_PR_Nigeria_en.pdf
- [2] Joint United Nations Programme on HIV/AIDS (UNAIDS) (2014) The Gap Report. https://www.unaids.org/en/resources/documents/2014/20140716_UNAIDS_gap_report
- [3] National Agency for the Control of AIDS (NACA) (2016) National HIV Strategy for Adolescents and Young People 2016-2020. <https://naca.gov.ng/national-hiv-strategy-for-adolescents-and-young-people/>
- [4] Johnston, R. (2016) Arsenic and the 2030 Agenda for Sustainable Development. *Arsenic Research and Global Sustainability—Proceedings of the 6th International Congress on Arsenic in the Environment*, New York, 25-27 September 2015, 12-14. <https://doi.org/10.1201/B20466-7>
- [5] Oryokot, B., Miya, Y., Logose, B., Ajambo, E., Oluka, A.I., Odoi, C., Etukoit, B.M., Mugenyi, L. and Mugisha, K. (2020) Interventions to Improve HIV Viral Load Suppression among the Adolescents: Evidence of Improvement Science through a Quality Improvement Approach in Eastern Uganda. *World Journal of Aids*, **10**, 94-106. <https://doi.org/10.4236/wja.2020.102008>
- [6] Inzaule, S.C., Hamers, R.L., Kityo, C., Rinke de Wit, T.F. and Roura, M. (2016) Long-Term Antiretroviral Treatment Adherence in HIV-Infected Adolescents and Adults in Uganda: A Qualitative Study. *PLOS ONE*, **11**, e0167492. <https://doi.org/10.1371/journal.pone.0167492>
- [7] Nabukeera-Barungi, N., Elyanu, P., Asire, B., Katureebe, C., Lukabwe, I., Namusoke, E., Musinguzi, J., Atuyambe, L. and Tumwesigye, N. (2015) Adherence to Antiretroviral Therapy and Retention in Care for Adolescents Living with HIV from 10 Districts in Uganda. *BMC Infectious Diseases*, **15**, Article No. 520. <https://doi.org/10.1186/s12879-015-1265-5>
- [8] Chhim, K., Mburu, G., Tuot, S., Sopha, R., Khol, V., Chhoun, P. and Yi, S. (2018)

- Factors Associated with Viral Non-Suppression among Adolescents Living with HIV in Cambodia: A Cross-Sectional Study. *AIDS Research and Therapy*, **15**, Article No. 20. <https://doi.org/10.1186/s12981-018-0205-z>
- [9] Jobanputra, K., Parker, L.A., Azih, C., Okello, V., Maphalala, G., Kershberger, B., Khogali, M., Lujan, J., Antierens, A., Teck, R., Ellman, T., Kosgei, R. and Reid, T. (2015) Factors Associated with Virological Failure and Suppression after Enhanced Adherence Counselling in Children, Adolescents and Adults on Antiretroviral Therapy for HIV in Swaziland. *PLOS ONE*, **10**, e0116144. <https://doi.org/10.1371/journal.pone.0116144>
- [10] Isaac, E., Ajani, A., Iliya, J., Christianah, O. and Hassan, D. (2020) HIV Viral Suppression in Children in a Subnational Antiretroviral Treatment Programme in Nigeria. *World Journal of AIDS*, **10**, 170-185.
- [11] World Health Organization (2019) Technical Brief: Adolescent-Friendly Health Services for Adolescent Living with HIV: From Theory to Practice. p. 7. <https://www.who.int/publications/i/item/adolescent-friendly-health-services-for-adolescents-living-with-hiv>
- [12] PEPFAR Solutions Platform (2018) Operation Triple Zero: Empowering Adolescents and Young People Living with HIV to Take Control of Their Health in Kenya. <https://www.pepfarsolutions.org/solutions/2018/10/30/operation-triple-zero-empowering-adolescents-and-young-people-living-with-hiv-to-take-control-of-their-own-health>
- [13] Joint United Nations Programme on HIV/AIDS (UNAIDS) (2014) Fast-Track Ending the Aids Epidemic by 2030. https://www.unaids.org/sites/default/files/media_asset/JC2686_WAD2014report_en.pdf
- [14] Mwangi, A. and van Wyk, B. (2021) Factors Associated with Viral Suppression among Adolescents on Antiretroviral Therapy in Homa Bay County, Kenya: A Retrospective Cross-Sectional Study. *HIV/AIDS (Auckland, N.Z.)*, **13**, 1111-1118. <https://doi.org/10.2147/HIV.S345731>
- [15] Okonji, E.F., van Wyk, B., Mukumbang, F.C. and Hughes, G.D. (2021) Determinants of Viral Suppression among Adolescents on Antiretroviral Treatment in Ehlanzeni District, South Africa: A Cross-Sectional Analysis. *AIDS Research and Therapy*, **18**, Article No. 66. <https://doi.org/10.1186/s12981-021-00391-7>
- [16] UN Women (2018) Facts and Figures: HIV and AIDS. <https://www.unwomen.org/en/what-we-do/hiv-and-aids/facts-and-figures>
- [17] Joint United Nations Programme on HIV/AIDS (UNAIDS) (2022) UNAIDS Global AIDS Update. https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf
- [18] Center for International Health, Education and Biosecurity (2021) Operation Triple Zero Supports Adolescents in Overcoming HIV. <https://www.ciheb.org/News/Impact-Stories/2021-Impact-Stories/Operation-Triple-Zero-Supports-Adolescents-in-Overcoming-HIV.html>
- [19] Van Wyk, B.E., Kriel, E. and Mukumbang, F. (2020) Two-Year Viral Load Suppression among Adolescents Receiving Antiretroviral Therapy in the Cape Metropole, South Africa, 2013-2015: A Retrospective Cohort Analysis. *South African Medical Journal*, **110**, 1213-1217. <https://doi.org/10.7196/SAMJ.2020.v110i12.14509>
- [20] Umar, E., Levy, J.A., Bailey, R.C., Donenberg, G., Hershov, R.C. and Mackesy-Amiti, M.E. (2019) Virological Non-Suppression and Its Correlates among Adolescents and Young People Living with HIV in Southern Malawi. *Aids and Behavior*, **23**, 513-522. <https://doi.org/10.1007/s10461-018-2255-6>

- [21] Muri, L., Gamell, A., Ntamatungiro, A.J., Glass, T.R., Luwanda, L.B., Battegay, M., Furrer, H., Hatz, C., Tanner, M., Felger, I., Klimkait, T., Letang, E. and KIULARCO Study Group (2017) Development of HIV Drug Resistance and Therapeutic Failure in Children and Adolescents in Rural Tanzania: An Emerging Public Health Concern. *AIDS (London, England)*, **31**, 61-70. <https://doi.org/10.1097/QAD.0000000000001273>
- [22] Bulage, L., Ssewanyana, I., Nankabirwa, V., Nsubuga, F., Kihembo, C., Pande, G., Ario, A.R., Matovu, J.K., Wanyenze, R.K. and Kiyaga, C. (2017) Factors Associated with Virological Non-Suppression among HIV-Positive Patients on Antiretroviral Therapy in Uganda, August 2014-July 2015. *BMC Infectious Diseases*, **17**, Article No. 326. <https://doi.org/10.1186/s12879-017-2428-3>
- [23] Kipp, W., Alibhai, A., Saunders, L.D., Senthilselvan, A., Kaler, A., Konde-Lule, J., Okech-Ojony, J. and Rubaale, T. (2010) Gender Differences in Antiretroviral Treatment Outcomes of HIV Patients in Rural Uganda. *AIDS Care*, **22**, 271-278. <https://doi.org/10.1080/09540120903193625>
- [24] Colvin, C.J. (2019) Strategies for Engaging Men in HIV Services. *The Lancet HIV*, **6**, e191-e200. [https://doi.org/10.1016/S2352-3018\(19\)30032-3](https://doi.org/10.1016/S2352-3018(19)30032-3)