Retention in HIV care and its predictors among HIV-infected men who have sex with men in Plateau state, North Central Nigeria

Tolulope O. Afolaranmi¹, Zuwaira I. Hassan², Obinna J. Ugwu³, Akinyemi O.D. Ofakunrin⁴, Kayode K. Bello⁵, Moses P. Chingle¹, Ali I. Shugaba⁶

¹Department of Community Medicine, University of Jos and Jos University Teaching Hospital, Jos, Plateau State, ²Department of Community Medicine, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, ³Ginza Medical Centre, Jos, Plateau State, ⁴Department of Pediatrics, University of Jos and Jos University Teaching Hospital, Jos, Plateau State, ⁵Department of Community Medicine, Jos University Teaching Hospital, Jos, Plateau State, ⁶Department of Human Anatomy, University of Jos, Plateau State, Nigeria

ABSTRACT

Background: Retention in HIV care is the constancy of engagement in HIV treatment, care and support services which is essential to reducing morbidity and mortality associated with the infection as well as halting the development of resistance to antiretroviral therapy (ART). In most African countries, Nigeria inclusive, men who have sex with men (MSM) are major contributors to HIV/AIDS burden. HIV-positive MSM are generally understudied and mostly underserved due to social, political and legislation factors resulting in limited characterization and documentation of the existing health disparities particularly with regards to retention in HIV care. It was against this backdrop that we conducted this study to assess the level of retention in HIV care and its predictors among MSM linked to HIV care.

Methods: A cross-sectional study conducted among 114 HIV-positive MSM in 2019 using interviewer-administered questionnaire. Data analysis was carried out using version 7 of Epi Info statistical software version 7 and a probability value of less than 0.05 used as the cut-off for drawing statistically significant conclusion.

Results: The average age in years of the respondents was 26.0 ± 5.4 while 43 (37.7%) of the participants were adequately retained in HIV care. Adequate retention in HIV care was found to be predicted by awareness of regular male partner’s HIV status (AOR = 11.2; 95% confidence interval [CI] = 1.924–65.167) and financial difficulty (AOR = 0.1; 95% CI = 0.022–0.840).

Conclusions: A suboptimal level of retention in HIV care was demonstrated in the study with awareness of male partner’s HIV status and financial buoyancy as its main predictors.

Keywords: Continuum of care, HIV infection, MSM, Nigeria, predictors, retention in care

Introduction

The burden of HIV/AIDS in sub-Saharan African countries is high with findings from studies indicating that men who have sex with men (MSM) are disproportionately affected and contributing significantly to HIV/AIDS burden. Additionally, the risk of HIV infection among the MSM population is high compared to the general population due to some biological, social, and cultural factors. This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

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behavioural and structural vulnerabilities and if compounded by stigma, discrimination, violence and criminalization is likely to negatively impact retention and continuum of HIV care. Retention in HIV care is the constancy of engagement in HIV treatment, care and support services which is essential to reducing morbidity and mortality associated with the infection as well as halting the development of resistance to antiretroviral therapy (ART). It has been reported that only 60% of a cohort on ART across 13 African countries were retained in care after 2 years of enrolment. This alarming rate of attrition underscores the importance of a good understanding of the concept and predictors of retention in HIV care in the general population but more importantly among the MSM. In most African countries, Nigeria inclusive, HIV-positive MSM are understudied and mostly underserved due to social, political, legislation and health institutional related factors resulting in limited characterization and documentation of the existing health disparities particularly with regards to access and retention in HIV care. It was against this backdrop that we conducted this study to assess the level of retention in HIV care and its predictors among MSM linked to HIV care in Plateau state with the view of providing relevant information significant enough to stimulate actions and drive home-grown policies.

Methodology

Study location
We conducted this study in Plateau state, Nigeria, with a population of 3.2 million people. There is a well-established MSM network in the state with viable and functional smaller units as well as an HIV support group which is not health facility affiliated. The MSM network had an estimated membership of 150 persons living with HIV and linked to HIV care in health facilities within and outside the state. The HIV-infected MSM constitute the membership of non-facility-based HIV support group within the MSM network.

Study participants
All HIV-positive MSM linked to HIV care in any health facility and affiliated to the existing non-health facility HIV support group constituted the study population.

Design of the study
The design of this study was cross-sectional and conducted 2019 to assess the level of retention in HIV care and its predictors among HIV-positive MSM linked to care.

Estimation of study sample size
The formula for a cross-sectional study was used to estimate the sample size with its component part consisting of the 95% confidence interval (CI) set at 1.96, level of accuracy at 0.05 and the proportion of MSM retained in HIV care from another study which was 82.3% (0.823). A sample size of 224 was arrived but in view of the fact that the estimated population of HIV-infected MSM from support group documentation was less than 10,000. Hence, correction for finite population was applied using the appropriate formula giving a minimum sample size of 93 HIV-infected MSM linked to HIV care.

Criteria for inclusion in the study
All HIV-infected MSM affiliated to the HIV support group within the MSM network in the state who were 18 years and above, linked to HIV care within the last 12 months preceding the study as documented in the support group register, were eligible for participation. However, excluded from the study comprised those who were either sick or out of town for the duration of the study.

Technique of sampling of the participants
Respondent-driven sampling approach was employed in recruiting consenting eligible MSM into the study. Eligible HIV-infected MSM were recruited into the study through the identified MSM network and HIV support group coordinators who were well regarded by their peers and influential within their networks. This was done in the course of their contacts with the HIV-infected members during meetings and social visits. A preliminary list of eligible HIV-infected MSM who had met inclusion criteria was compiled by these coordinators using the HIV support group documentation on diagnosis, drug pick and linkage to care. This list formed the frame from which the respondents were sampled and the process continued until a saturation point was reached, where all consenting eligible respondents had been sampled and no respondent was gotten for a 1-month period.

Collection of data
Data were collected through an interviewer’s administration approach using an adapted data collection instrument. Three identified MSM network coordinators had training on the study protocol including the questionnaire for a day by the researcher in their designated location of choice. Proper translation and back translation of the questionnaire to Hausa were done by different persons competent and vast in language translation. The relevant component part of the questionnaire was pretested among HIV-infected persons accessing HIV care in one of the comprehensive HIV treatment sites in the state. This enabled estimation of the time of administration of the tool, correction of any ambiguity and assessment the face validity of the tool. Overall Cronbach alpha reliability assessment of the questionnaire was done using SPSS software with a Cronbach alpha score of 0.84 obtained. Prior to the administration of the questionnaire, informed consent was elicited and documented from all the respondents.

Grading of responses
Explanatory variables in this study were categorized as demographic characteristics of the respondents, the sexual behaviours and enabling factors. The outcome measure of the study was the level of retention in HIV care categorized as adequate and non-adequate. Retention in HIV care was adjudged as adequate if the respondents consistently keep his
Analysis of data

Version 7 of Epi Info statistical software was used for the analysis of data. Descriptive statistical analysis was carried out on quantitative variables such as age of the respondent, age at first same and/or heterosexual experience with mean and standard deviation used as summary indices once the assumptions of normality had been fulfilled. Other explanatory variables such as marital status, sexual orientation, family history of same-sex orientation, smoking, alcohol and others substance use were presented in frequency table expressed in frequencies and percentages. The primary outcome variable expressed as adequate and non-adequate retention in HIV care was presented in frequency and percentage. A stepwise model approach to logistic regression used in determining the predictors of the outcome variable. Binary logistic regression was applied to each of the explanatory variables; any variable with a probability value of less than 0.50 was set aside and fed into the multiple logistic regression model. The 0.50 value was picked as a cut-off so as to allow for a significant number of variables to be available for sufficient interaction in the model. Factors were then fed into the model cumulatively but step-wisely with sociodemographic factors fed in first followed by the sexual behavioural factors and then the factors categorized as enabling factors allowing for the factors to be adjusted for one another. The effects of the explanatory variables on the outcome variable were quantifiable using odds ratio while a probability value of less than 0.05 used as the cut-off for drawing statistically significant conclusion.

Ethical clearance

Ethical approval was obtained from the institutional review board of The Jos University Teaching Hospital for this study (JUTH/DCS/ADM/127/XXVIII/1180).

Results

One hundred and fourteen HIV-infected MSM linked to HIV care participated in this study. Majority (81.6%) of the respondents were 30 years or less with an average age of 26.0 ± 5.4 years. With regards to the marital status of the studied participants, 105 (92.1%) were single while the remaining 7 (6.1%), 2 (1.8%) were married and separated, respectively. Seventy-three (64.0%) of the respondents were strictly homosexuals while 41 (36.0%) were bisexuals. Furthermore, the average age at same-sex sexual debut was 19.1 ± 5.1 years with 46 (40.4%) debuting same sex before the age of 18 years. Slightly above a third (35.1% and 36.8%) of the MSM had a family history of same sexual orientation and being employed in paid jobs, respectively [Table 1].

Slightly above two-thirds (77.2%) of the respondents had been diagnosed with HIV infection for a period of 5 years and less while less than a third (21.9%) of the study participants knew the HIV status of their regular male partners as well. Importantly, 71 (62.3%) were not adequately retained in HIV care. The odds of retention in HIV care among the respondents who were aware of their regular male partner’s HIV status was 11.2 times compared to those who did not know (95% CI = 1.924–15.167) after adjusting for all other factors in the model. Furthermore, financial difficulty was also found to be a predictor of adequate HIV care retention as the odds of being retained in care among those with financial difficulties were 0.1 times compared to those without financial difficulties after holding all other factors in the model constant [Table 2].

Discussion

The level of retention in HIV care among the respondents was poor with almost two-thirds not being adequately retained in care. The finding of this study shares similarities with what was obtained in another study conducted in the United States of America where less than half of the subjects studied were retained in HIV care. This similarity further reiterates the fact that retention in HIV care could have more behavioural influence than geographical variation.

Table 1: Respondents’ characteristics and level of retention in care

| Variable                        | Frequency | Percentage n=114 |
|---------------------------------|-----------|------------------|
| **Age (years)**                 |           |                  |
| ≤30                             | 93        | 81.6             |
| 31 and above                    | 21        | 18.4             |
| Mean age                        | 26.0±5.4 years |              |
| **Marital status**              |           |                  |
| Single                          | 105       | 92.1             |
| Married                         | 7         | 6.1              |
| Separated                       | 2         | 1.8              |
| **Sexual orientation**          |           |                  |
| Homosexual                      | 73        | 64.0             |
| Bisexual                        | 41        | 36.0             |
| **Age at same-sex debut (years)** |          |                  |
| <17                             | 46        | 40.4             |
| ≥18                             | 68        | 59.6             |
| Mean age at same-sex debut      | 31.9±5.1 years |              |
| **Family type**                 |           |                  |
| Monogamy                        | 41        | 36.0             |
| Polygamy                        | 73        | 64.0             |
| **Family history of same-sex orientation** | | |
| Absent                          | 74        | 64.9             |
| Present                         | 40        | 35.1             |
| **Highest level of education attained** | | |
| Primary                         | 8         | 7.0              |
| Secondary                       | 62        | 54.4             |
| Tertiary                        | 44        | 38.6             |
| **Employment status**           |           |                  |
| Employed in paid job            | 42        | 36.8             |
| Not employed                    | 72        | 63.2             |
| **Level of retention in HIV care** |          |                  |
| Adequate                        | 43        | 37.7             |
| Nonadequate                     | 71        | 62.3             |
Similar studies conducted among MSM in the African continent, including Nigeria, found a much higher level of retention in HIV care when compared to ours in that regard[8,18,24,25]. This variation could be attributable to that fact HIV care and service delivery

| Factors                                           | Odds ratio (95% CI) | Step 1 | Step 2 | Step 3 | Step 4 |
|---------------------------------------------------|---------------------|--------|--------|--------|--------|
| Characteristics frequency (%)                     |                     |        |        |        |        |
| Age (years 31 and above)                          |                     |        |        |        |        |
| ≤30 21 (18.4)                                     | 0.2 (0.006-0.926)   |        | 0.2 (0.060-1.013) | 0.2 (0.034-0.987) | 0.1 (0.005-1.504) |
| Family type                                       |                     |        |        |        |        |
| Monogamy 41 (36.0)                                | 0.6 (0.265-1.529)   |        | 0.6 (0.257-1.603) | 0.8 (0.292-2.153) | 0.7 (0.160-2.848) |
| Polygamy 73 (64.0)                                | 1                   |        | 1       | 1       | 1       |
| Sexual orientation                                |                     |        |        |        |        |
| Homosexual 73 (64.0)                              | 1.9 (0.755-4.912)   |        | 1.7 (0.646-4.623) | 1.2 (0.419-3.535) | 1.1 (0.248-5.132) |
| Bisexual 41 (36.0)                                | 1                   |        | 1       | 1       | 1       |
| Family history of same-sex orientation            |                     |        |        |        |        |
| Absent 74 (64.9)                                   | 0.2 (0.095-0.657)   |        | 0.3 (0.092-0.807) | 0.5 (0.156-1.673) | 1.3 (0.173-9.832) |
| Present 40 (35.1)                                  | 1                   |        | 1       | 1       | 1       |
| Pattern of substance use                          |                     |        |        |        |        |
| Cigarette smoking                                 |                     |        |        |        |        |
| Yes 42 (36.8)                                     | 0.9 (0.353-2.248)   |        | 0.9 (0.308-2.591) | 1.3 (0.288-6.089) |
| No 72 (63.2)                                      | 1                   |        | 1       | 1       | 1       |
| Alcohol use                                       |                     |        |        |        |        |
| Yes 24 (21.1)                                     | 0.5 (0.162-1.725)   |        | 0.5 (0.181-1.842) | 1.2 (0.083-17.311) |
| No 90 (78.9)                                      | 1                   |        | 1       | 1       | 1       |
| Injection drugs use                               |                     |        |        |        |        |
| Yes 18 (15.8)                                     | 0.4 (0.078-2.457)   |        | 0.2 (0.017-1.706) | 0.1 (0.002-1.679) |
| No 96 (84.2)                                      | 1                   |        | 1       | 1       | 1       |
| Sexual Behaviours                                 |                     |        |        |        |        |
| Engagement in transactional sex                   |                     |        |        |        |        |
| Engaged 51 (44.7)                                 | 1.1 (0.378-3.108)   |        | 1.2 (0.273-1.602) |
| Not engaged 63 (55.3)                             | 1                   |        | 1       | 1       | 1       |
| History of other STIs                             |                     |        |        |        |        |
| Positive 78 (68.4)                                | 1.2 (0.424-3.352)   |        | 2.1 (0.426-10.168) |
| Negative 36 (31.6)                                | 1                   |        | 1       | 1       | 1       |
| Number of same-sex sexual partners                |                     |        |        |        |        |
| Two or more 97 (85.1)                             | 0.3 (0.078-1.62)    |        | 0.2 (0.016-1.895) |
| One 17 (14.9)                                     | 1                   |        | 1       | 1       | 1       |
| Enabling factors                                  |                     |        |        |        |        |
| Duration of HIV Diagnosis                         |                     |        |        |        |        |
| 6 years and above 26 (22.8)                       | 0.5 (0.049-5.983)   |        |        |        |        |
| ≤5 years 88 (77.2)                                | 1                   |        | 1       | 1       | 1       |
| Awareness of regular male partner's HIV status    |                     |        |        |        |        |
| Yes 25 (21.9)                                     | 11.2 (1.924-15.167)* |        |        |        |        |
| No 89 (78.1)                                      | 1                   |        | 1       | 1       | 1       |
| Perceived of being healthy enough to discontinue HIV care |                 |        |        |        |        |
| Yes 26 (22.8)                                     | 1.0 (0.209-4.837)   |        | 1       | 1       | 1       |
| No 88 (77.2)                                      | 1                   |        | 1       | 1       | 1       |
| Awareness of death of any HIV-infected MSM following discontinuation of HIV care |   |        |        |        |        |
| Yes 56 (48.2)                                     | 0.1 (0.015-0.688)*  |        |        |        |        |
| No 58 (51.8)                                      | 1                   |        | 1       | 1       | 1       |
| Discrimination by caregivers                      |                     |        |        |        |        |
| Yes 27 (23.7)                                     | 0.6 (0.081-4.200)   |        | 1       | 1       | 1       |
| No 87 (76.3)                                      | 1                   |        | 1       | 1       | 1       |
| Financial difficulty                              |                     |        |        |        |        |
| Yes 18 (15.8)                                     | 0.1 (0.022-0.840)*  |        |        |        |        |
| No 96 (84.2)                                      | 1                   |        | 1       | 1       | 1       |
| Fear of rejection                                 |                     |        |        |        |        |
| Yes 14 (12.3)                                     | 0.4 (0.055-3.263)   |        | 1       | 1       | 1       |
| No 100 (87.7)                                     | 1                   |        | 1       | 1       | 1       |

Odds ratio=Adjusted odds ratio; CI=confidence interval; *statistically significant. Odds ratio+ = Crude odds ratio
system in Nigeria may not be MSM friendly particularly in the face of an existing legislation criminalizing same-sex act and low level of social acceptance. Also, the difference in the timeline employed in the assessment of constancy of care could also be adduced as a reason. Furthermore, these variations could also be attributable to the fact the structure of HIV treatment, care and support services for MSM vary between the study settings with the Nigerian settings not particularly structured to addressing the peculiar healthcare needs of HIV but structured for the general population.

Findings of other studies conducted in United States of American revealed better levels of retention in care than what was obtained in this study.[26‑29] The discordance of findings between these studies could have cultural, healthcare system and gay right policy undertone as these important entities vary along the divides of the settings where the studies were conducted. More so in Nigeria, the negative impact of stigmatization and low level of acceptability of same-sex sexual orientation in retention in HIV care could be implicated. Furthermore, primary care represents the first level of healthcare accessible to the populace bring to light the utmost importance of the primary care physicians as key players in providing the needed information and treatment support to promoting retention in care particularly among the MSM and other key population, especially in settings where stigma and discrimination still exist towards the key affected population.

Awareness of male partners HIV status, financial buoyancy and awareness of death of a member of the MSM network who discontinued treatment were significant predictors of adequate retention in care. Others studies found a variety of predictors of HIV care retention such as access to relevant information on HIV, health insurance coverage, membership of HIV related organization, financial difficulty, availability social support, favourable experience with healthcare providers, younger age, receiving care at primary healthcare facility, World Health Organization stage of the disease, substance use, medication side effects, stigma and discrimination among others.[18,21,24‑28,31]

The diversity of predictors of HIV care retention among MSM as highlighted in our study and other related studies further corroborates the need to contextualize interventions targeted at improving retention in care within the socio-cultural and political systems of the settings. Additionally, this study was conducted within the network of MSM in the community, thereby limiting its ability to assess the contributions of health institutional factors to retention in HIV care thereby paving way for other studies to incorporate both end users (MSM) and health institutional components. The study has brought to light that the level of retention in HIV care among the MSM is far from the expected in achieving positive treatment outcomes while predictors such as awareness of male partner's HIV status and financial buoyancy identified. Therefore, institutionalization of evidence-based interventions targeted at improving retention in HIV care among MSM in this setting and globally would require the use of setting specific identified predictors as pillars upon which home-grown interventions should be hinged on.

Conclusions

A suboptimal level of retention in HIV care was demonstrated in the study with awareness of male partner's HIV status, financial buoyancy and awareness of demise of an HIV-infected member of the MSM network who discontinued treatment as its predictors.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Djomand D, Quaye S, Sullivan PS. HIV epidemic among key populations in West Africa. Curr Opin HIV AIDS 2014;9:506‑13.
2. Ramadhani HO, Ndemb N, Nowak RG, Ononaku U, Gwamna J, Ifeanyi Orazulike I, et al. Individual and network factors associated with HIV care continuum outcomes among Nigerian MSM accessing health care services. J Acquir Immune Defic Syndr 2018;79:e7‑16.
3. Ibilo O, Decroo T, Eyona N, Eze P, Agada P. Characteristics and early clinical outcomes of key populations attending comprehensive community-based HIV care: Experiences from Nasarawa State, Nigeria. PLoS One 2018;13:e0209477.
4. Baral S, Sifakis F, Cleghorn F, Beyrer C. Elevated risk for HIV infection among men who have sex with men in low- and middle-income countries 2000‑2006: A systematic review. PLoS Med 2007;4:e339.
5. Harper GW, Fernandez JM, Bruce D, Hosek SG, Jacobs RJ. The role of multiple identities in adherence to medical appointments among gay/bisexual male adolescents living with HIV. AIDS Behav 2013;17:213‑23.
6. Baral S, Holland CE, Shannon K, Logie C, Semugoma P,
Sithole B, et al. Enhancing benefits or increasing harms: Community responses for HIV among men who have sex with men, transgender women, sex workers, and people who inject drugs. J Acquir Immune Defic Syndr 2014;66(Suppl 3):S19-28.

7. Umeokonkwo CD, Onoka CA, Agu PA, Ossai EN, Balogun MS, Ugbonnaya LU. Retention in care and adherence to AIDS treatment in Anambra state Nigeria. BMC Infect Dis 2019;19:654.

8. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clin Infect Dis 2011;52:793-800.

9. National HIV Curriculum. Retention in HIV Care. Available from: https://www.hiv.uw.edu/go/basic-primary-care/retention-care/core-concept/all. [Last accessed 2009 May 18].

10. Babatunde OA, Ojo OJ, Atoyebi OA, Ekpo DS, Ogundana AO. Seven year review of retention in HIV care and treatment program in North Central Nigeria. J AIDS Clin Res 2018;9:756.

11. Rosen S, Fox MP, Gill CJ. Patient retention in antiretroviral therapy programs in Sub-Saharan Africa: A systematic review. PLoS Med 2007;4:e298.

12. Agaba PA, Genberg BL, Sagay AS, Agbaji OO, Meloni ST, Dadem NY. Retention in differentiated care: Multiple measures analysis for a decentralized HIV care and treatment program in North Central Nigeria. J AIDS Clin Res 2018;9:756.

13. MacAllister J, Sherwood J, Galjour J, Robbins S, Zhao J, Dam K, et al. A comprehensive review of available epidemiologic and HIV service data for female sex workers, men who have sex with men, and people who inject drugs in select West and Central African countries. J Acquir Immune Defic Syndr 2015;68 Suppl 2:883-90.

14. Mayer KH, Bekker LG, Stall R, Grulich AE, Colfax G, Lama JR. Comprehensive clinical care for men who have sex with men: An integrated approach. Lancet 2012;380:378-87.

15. Plateau State government: Background information. Available from: http://www.onlineNigeria.com. [Last accessed 2018 May 7].

16. National Bureau of Statistics Federal Republic of Nigeria: 2006 Population Census official Gazette FGP 71/52007/2,500(OL24); of the National and State Provisional Totals 2006 Census. Available from: http://www.nigerianstat.gov.ng/connection/Link Limited; 2009; p. 75.

17. Jekel JF, Katz DL, Emlor JC. Sample size, randomization and probability theory. Epidemiology, Biostatistics and Preventive Medicine. 2nd ed. Philadelphia, USA: W. B Saunders; 2001. p. 199.

18. Geng EH, Glidden DV, Bwana MB, Musinguzi N, Emenyonu N, Mayindike W, et al. Retention in care and connection to care among HIV-infected patients on antiretroviral therapy in Africa: Estimation via a sampling-based approach. PLoS One 2011;6:e21797.

19. Ibrahim T. Sample size determination. In Research Methodology and Dissertation Writing for Health and Allied Health Professionals. 1st ed. Abuja, Nigeria: Cress Global Link Limited; 2009; p. 75.

20. Federal Ministry of Health, Nigeria. HIV/STI Integrated Biological and Behavioural Surveillance Survey. 2014. Available from: http://www.moh.gov. [Last accessed 2018 May 15].

21. Nguroho A, Erasmus V, Coulter RW, Koirala S, Nampepo S, Malcolm W, et al. Driving Factors of retention in care among HIV-positive MSM and transwomen in Indonesia: Across-sectional study. PLoS One 2018;13:e0191255.

22. Guilamo-Ramos V, M. Thimm-Kaisar, A. Benzekri, and D. Futterman. 2019. Shifting the paradigm in HIV prevention and treatment service delivery toward differentiated care for youth. National Academy of Medicine. Washington, DC. https://doi.org/10.31478/201903. Available from https://nam.edu/shifting-the-paradigm-in-hiv-prevention-and-treatment-service-delivery-toward-differentiated-care-for-youth/. [Last accessed on 2020 Oct 20].

23. Patel H. "Addressing Social and Structural Determinants Affecting HIV Medical Care Among Adolescents Aged 13-24 in Georgia, 2013.” Thesis, Georgia State University, 2015. Available from: https://scholarworks.gsu.edu/iph_theses/404. [Last accessed 2018 May 31].

24. Ayala G, Makofane K, Santos GM, Arreola S, Hebert P, Thomann M, et al. HIV treatment cascades that leak: Correlates of drop-off from the HIV care continuum among men who have sex with men worldwide. J AIDS Clin Res 2014;5:331.

25. Fox MP, Rosen S. Patient retention in antiretroviral therapy programs up to three years on treatment in Sub-Saharan Africa, 2007-2009: Systematic review. Trop Med Int Health 2010;15(Suppl 1):1-15.

26. Singh S, Bradley H, Hu X, Skarbinski J, Hall HI, Lansky A. Centers for disease control and prevention (CDC). Men living with diagnosed HIV who have sex with men: Progress along the continuum of HIV care–United States, 2010. MMWR Morb Mortal Wkly Rep 2014;63:829-33.

27. Yehia BR, Stewart I, Momplaisir F, Mody A, Holtzman CW, Jacobs LM, et al. Barriers and facilitators to patient retention in HIV care. BMC Infect Dis 2015;15:246.

28. Chan PA, Mena L, Pate R, Oldenburg CE, Beauchamps L, Perez-Brumer AG, et al. Retention in care outcomes for HIV pre-exposure prophylaxis implementation programmes among men who have sex with men in three US cities. J Int AIDS Soc 2016;19:20903.

29. Ramachandran A, Kumar A, Koening H, Unanue AD, Sung C, Walsh J, et al. Predictive analytics for retention in care in an Urban HIV clinic. Sci Rep 2020;10:6421.

30. Barrington C, Knudston K, Bailey OA, Aguilar JM, Loya-Montiel MI, Morales-Miranda S. HIV diagnosis, linkage to care, and retention among men who have sex with men and transgender women in Guatemala City. J Health Care Poor Underserved 2016;27:1745-60.

31. Tang W, Huan X, Zhang Y, Mahapatra T, Li J, Liu X, Takarinda KC, Dzangare J, et al. Seven year review of retention in HIV care and treatment in federal medical centre Ido-Ekiti. Pan Afr Med J 2015:22:139.

32. Mater A, Bockting W, MacCrate C, Israel H, Mantell JE, Remien RH. Enhancing benefits or increasing harms: Retention, care/core-concept/all. [Last accessed 2009 May 18].

33. Makurumidze R, Mutasa-Apollo T, Decroo T, Choto RC, Bwecker RL, et al. Shifting the paradigm in HIV prevention and treatment service delivery toward differentiated care for youth. National Academy of Medicine. Washington, DC. https://doi.org/10.31478/201903. Available from https://nam.edu/shifting-the-paradigm-in-hiv-prevention-and-treatment-service-delivery-toward-differentiated-care-for-youth/. [Last accessed on 2020 Oct 20].

34. MacAllister J, Sherwood J, Galjour J, Robbins S, Zhao J, Dam K, et al. A comprehensive review of available epidemiologic and HIV service data for female sex workers, men who have sex with men, and people who inject drugs in select West and Central African countries. J Acquir Immune Defic Syndr 2015;68 Suppl 2:883-90.

35. Mayer KH, Bekker LG, Stall R, Grulich AE, Colfax G, Lama JR. Comprehensive clinical care for men who have sex with men: An integrated approach. Lancet 2012;380:378-87.

36. Plateau State government: Background information. Available from: http://www.onlineNigeria.com. [Last accessed 2019 May 7].

37. National Bureau of Statistics Federal Republic of Nigeria: 2006 Population Census official Gazette FGP 71/52007/2,500(OL24); Legal Notice on Publication of the Details of the boundaries of the National and State Provisional Totals 2006 Census. Available from: http://www.nigerianstat.gov.ng/connection/pop2006.pdf. [Last accessed 2018 May 23].

38. Jekel JF, Katz DL, Emlor JC. Sample size, randomization and probability theory. Epidemiology, Biostatistics and Preventive Medicine. 2nd ed. Philadelphia, USA: W. B Saunders; 2001. p. 199.

39. Geng EH, Glidden DV, Bwana MB, Musinguzi N, Emenyonu N, Mayindike W, et al. Retention in care and connection to care among HIV-infected patients on antiretroviral therapy in Africa: Estimation via a sampling-based approach. PLoS One 2011;6:e21797.

40. Ibrahim T. Sample size determination. In Research Methodology and Dissertation Writing for Health and Allied Health Professionals. 1st ed. Abuja, Nigeria: Cress Global Link Limited; 2009; p. 75.

41. Federal Ministry of Health, Nigeria. HIV/STI Integrated Biological and Behavioural Surveillance Survey. 2014. Available from: http://www.moh.gov. [Last accessed 2018 May 15].