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Uptake of Treatment as Prevention for HIV and Continuum of Care among HIV-positive Men who have Sex with Men in Nigeria

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Abstract

Background—Experimental evidence has shown treatment of HIV infection with antiretroviral therapy (ART) prevents heterosexual transmission of HIV to an uninfected partner. However, the “real world” application of this strategy to key populations such as men who have sex with men (MSM) has been limited. We report findings on acceptability of a treatment as prevention (TasP) strategy among HIV-infected MSM at a Trusted Community Center providing comprehensive HIV prevention and treatment services to MSM in Abuja, Nigeria.

Methodology—Using respondent driven sampling (RDS), MSM who were 16 years old and have engaged in either receptive or insertive anal intercourse within the previous 12 months were recruited into a prospective combination HIV prevention and treatment study (TRUST). Two weeks after enrollment, HIV testing and counseling was conducted. At each 3 month follow-up visits, HIV-infected individuals underwent clinical and laboratory evaluation, including CD4 count, plasma HIV viral load, immediate 3 weekly sessions of ART preparation, then ART initiation per TasP strategy irrespective of CD4 count. Reasons for not engaging in pre-TasP preparation and TasP were documented. Characteristics associated with TasP engagement and loss to follow-up were determined using logistic and Cox’s regression, respectively.

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Conflicts of interest:

None of the authors have conflicts of interest to declare.

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Results—Of 186 HIV positive MSM enrolled, 58 (31.2%) were on ART at the time of recruitment while 128 (68.8%) were ART-naïve and provided opportunity for engaging TasP. Of these, 70 (54.7%) engaged in TasP. Compared to MSM who did not engage in TasP, those who engaged had significantly lower mean CD4 count ($p=0.001$), were more likely to be Christian ($p=0.01$), and had disclosed being MSM to family ($p=0.02$) or health care providers ($p=0.02$). In multivariate models, disclosure of being MSM to health care providers remained significantly associated with uptake of TasP. Among individuals engaged in TasP, 10% were loss to follow-up in care at 18 months since enrollment. Being engaged in TasP (Relative Hazards [RH]=0.08, $p<0.001$) and on ART (RH=0.17, $p<0.001$) were associated with decreased risk of loss to follow-up.

Conclusions—Although, there was high acceptance of HIV testing and low loss to follow-up among individuals who were already on ART or engaged in TasP, a higher than expected proportion did not engage in TasP, suggesting the need for customized treatment preparation and an increase in enabling environments to support HIV treatment access with this key population.

Keywords

HIV; MSM; Nigeria; Treatment as Prevention

INTRODUCTION

The recent WHO guideline¹ released at the 2014 International AIDS Conference, calls on the need to “re-energize and strengthen HIV programs so that all key populations (KP) benefit from the ongoing advances in HIV treatment and scale-up.” These recommendations are made in response to the consistent data that have highlighted the disproportionate vulnerabilities for the acquisition and transmission of HIV among men who have sex with men (MSM)². Specifically, a recent review indicated that HIV prevalence among MSM in the Americas, South and South-East Asia and sub-Saharan Africa ranges from 14–18%³ and despite the decline in incidence among the general population, available data shows an increase in incidence and prevalence among gay, bisexual and other MSM globally³.

An impediment to progress towards an AIDS-free generation in Nigeria is its mixed epidemic. While the estimated national prevalence of HIV has decreased from 5.8% in 2001 to 4.1% in 2010⁴ and estimated to be 3.5% as at the end of 2012⁵, the HIV prevalence among MSM in Nigeria appears to have increased from 13.5% in 2007 to 17.4% in 2010⁴. In Abuja, the capital city of Nigeria, HIV prevalence among MSM was reported as 34.9% and HIV prevalence among MSM in 3 cities of Abuja, Ibadan, and Lagos was 4–10 times higher than the general population prevalence⁶. Female sex workers (FSW), people who inject drugs (PWID) and MSM alone constitute about 1% of the adult population, but 23% of all incident HIV infections appear to be among these men and women.

Despite this high burden of HIV among Nigerian MSM, there remains an absence of protective legislation ensuring the health and wellbeing of these men. Indeed, recent punitive legislation across several countries potentially threaten past successes in mitigating the spread of HIV and present obstacles to effective prevention, treatment, care and support for MSM⁷. In Nigeria in particular, the situation is currently compounded by the recent “Same

Sex Marriage Prohibition Act⁸.” Generally, among the MSM community, issues such as stigma, discrimination, and attitudes of healthcare workers are believed to limit access and uptake of essential HIV-related services such as HIV testing and counseling (HTC), condom distribution and use, antiretroviral therapy (ART), and sexually transmitted infections (STI) prevention and treatment^{9–11}. Therefore, most MSM find it difficult to self-identify as MSM and even when they are able to access healthcare services, they find it difficult to talk about their specific health-related issues when they visit public hospitals.

Although, available experimental evidence has shown that treatment of HIV infection with ART prevents heterosexual transmission of HIV to an uninfected partner¹², the “real world” application of this strategy to key populations such as MSM has been limited. Additionally, the findings from the HPTN 052 study are yet to be replicated in any large study involving MSM. Therefore, as part of efforts towards reversing the continued rise in the incidence of HIV among MSM, efforts at expanding this “treatment as prevention” (TasP) strategy to include MSM are needed. Supporting this group specifically will be significantly beneficial in minimizing HIV-related morbidity and mortality among these men and all people within their sexual networks. In this paper, we report risk factors associated with engagement of TasP and loss to follow-up (LFTU) among HIV-positive MSM recruited using respondent driven sampling (RDS) at a Trusted Community-based Center in Nigeria.

METHODS

Collaborating Institutions

This implementation science study is supported by the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) through the U.S. National Institutes of Health (NIH) as a joint collaboration between the Institute of Human Virology at the University of Maryland School of Medicine (IHV), Baltimore, the Johns Hopkins University Medical Institute (JHMI) and the Bloomberg School of Public Health (JHSPH), the U.S. Military HIV Research Program (MHRP), the Institute of Human Virology Nigeria (IHVN), the International Center for Advocacy and Rights to Health (ICARH) and the Population Council, Nigeria. The study was approved by the University of Maryland Baltimore Institutional Review Board (IRB), the Federal Capital Territory Health Research Ethics Committee, Abuja, Walter Reed Army Institute of Research IRB, and the National Health Research Ethics Committee, Nigeria.

Clinical Site

In collaboration with a local organization that is supportive of MSM, a community-based comprehensive HIV clinic was opened to provide combination HIV prevention, treatment, and care services to MSM and other key affected populations within Abuja under a friendly and trusted atmosphere. The clinic has a full complement of counselors, nurse case manager, pharmacist, physician, palliative care officer, and laboratory scientist, and operates Monday to Friday. In addition to standard training in HIV/STD diagnosis, care, and management, all care providers received training on culturally competent service delivery by the Fenway Institute’s (Boston, MA) Health Sector Intervention for MSM services Training (<http://www.lgbthealtheducation.org>) and by the Population Council Nigeria’s MSM-Sensitivity Training for Health Care Providers (<http://www.popcouncil.org/uploads/pdfs/>

[2012HIV_ENR-MARPsSensitization.pdf](#)). Topics of these training included: Integrated Model of Health Care Services; Medical, Social and Sexual History Taking of MSM; Skills Building Workshop; Physical Examination/Evaluation, STIs and HIV; MSM-What Puts Them At Risk: Biology and Behavior; HIV Prevention for MSM; Reducing Risk in MSM; and Role Playing: Supporting Your Patients; and Mental Health in MSM.

Patient Population and Recruitment

Between March 2013 and August 2014, we used respondent driven sampling (RDS) to recruit a sample of 706 MSM into comprehensive HIV medical and prevention services. RDS has become an important tool for effectively measuring HIV and other prevalent infections prevalence and associated risk behaviors affecting hard-to-reach populations¹³. RDS has been used in Nigeria for recruitment of MSM into studies^{6,14}. Briefly, seeds were recruited through community-based convenience sampling of 5 individuals who were well-connected within the target population. Enrollees were instructed to recruit up to three eligible peers through the use of coupons.

To be eligible for participation, each individual met the following inclusion criteria: born male, able to provide informed consent in English or Hausa, had a history of insertive or receptive anal intercourse in the previous 12 months, 16 years of age or older (under the age of 18 are considered emancipated minors to be exempt from parental consent for the purpose of this study), deemed by the study coordinator and physicians to be mentally competent in making the decision to participate in the study, presented a valid recruitment coupon, and willing to enroll and be followed up for the duration of the study and undergo study procedures including consent for HIV testing and counseling.

Medical Services

All individuals were seen at baseline (Visit 0), two weeks later (Visit 1) and then subsequently every 3 months for 5 additional visits (i.e. Visits 2 to 6). At baseline, all participants were screened for eligibility, those eligible were then enrolled, provided the informed consent, and administered the behavioral questionnaire. Two weeks after enrollment, HIV testing and counseling (HTC) was conducted. Those who were HIV-positive received the HIV standard of care clinical assessment. All individuals received STI clinical evaluation which included examination of the genitals and anal region while urine samples and anal swabs were collected for laboratory testing for gonorrhea and chlamydia infections. During every 3 month follow-up visit, all HIV-negative participants underwent repeat HTC while the HIV-positive participants continued to receive the standard of care.

All HIV-positive participants were offered ART irrespective of their clinical status and CD4 count as part of the TasP strategy. Before ART initiation, each HIV-positive participant underwent 3 sessions of pre-TasP preparation over a period of 3 to 4 weeks, although not all HIV-positive individuals attended the sessions. During these sessions, ART-related issues such as adherence, treatment monitoring, and side effects of medications were discussed. ART was initiated after completing this process indicating readiness to commit to ART. The reasons for non-engagement in pre-TasP or engagement in pre-TasP and ART initiation were obtained through interviews and documented. ART drugs were obtained through the

PEPFAR program. The recommended first-line regimen according to the Nigerian National ART Guidelines included Tenofovir (TDF), Emtricitabine (FTC) or Lamivudine (3TC), and Efavirenz (EFV). Other than the HIV-related services, all clients had access to additional healthcare services including malaria diagnosis and treatment and referral for tuberculosis diagnosis and treatment.

Laboratory Procedures

For HTC, blood samples were collected and tested for HIV using rapid test kits following the parallel testing algorithm for high-risk individuals¹⁵. All individuals received post-test counseling after which each individual followed the study process depending on their HIV status. Using Partec Cyflow, CD4 count was estimated at every visit and when needed for patients' clinical management while HIV-1 viral load (VL) assay was done by COBAS TaqMan (Roche Molecular Diagnostics, CA). HIV viral load suppression was defined as plasma VL<200 copies/mL. STIs were tested using Aptima Combo 2 for GC and CT (Gen-Probe, CA). Samples for hematology and chemistry were analyzed using a 3-Part differential hematology analyzer (Sysmex KX 21-N) and Vitros DT II 60 Clinical Chemistry analyzer respectively.

Statistical Analyses

At the time of enrollment, HIV-positive individuals were classified as already on ART or not on ART. For those not on ART, engagement in pre-TasP and ART initiation were determined. Engagement in pre-TasP was defined as attending at least the first two or all sessions of pre-TasP preparation while engagement in TasP is defined as initiation of ART. LTFU was defined as not having a visit within 3 months from the last visit at the time of this analysis¹⁶. Factors associated with TasP engagement were determined by Chi-square tests and by Logistic regression at the bivariate and multivariate analysis level, respectively. Time to LTFU was characterized using Kaplan-Meier estimates and differences in LTFU were determined by log-rank test and Cox regression for individuals already on ART, engaged in TasP, and not engaged in TasP. Factors associated at $p<0.05$ level with the outcome and known risk factors regardless of their level of significance were evaluated in multivariate models. To control for confounders, variables that altered any significant relative odds ratios or relative hazards by 20% were retained. Statistical analyses were performed using STATA (College Station, TX) and SAS (Cary, NC).

RESULTS

Characteristics of Enrollees

Of the 706 individuals enrolled at baseline and engaged in RDS, 393 (55.7%) returned for HIV testing. The study population included 186 (47.6%) patients who tested HIV-positive and are linked into TasP. Table 1 shows the detailed characteristics of all HIV-positive individuals. Majority of the study participants were below the age of 25 years (47.6%), mostly Christians (69.6%), and received at least senior secondary school or higher education (82.1%). Overall, 128 (68.8%) of 186 individuals self-identified as being bisexual.

Of 186 HIV-positive, 128 (68.4%) were not on ART at the time of enrollment and were offered TasP. Individuals who were not on ART at the time of enrollment were more likely to have not disclosed their sexual identity to health care providers (70.1% vs. 45.6%, $p<0.01$) and to have not discussed HIV with their closest friends (81.2% vs. 62.5%, $p=0.01$).

Engagement in pre-TasP and TasP

Within the context of TasP cascade (Figure 1), 102 (79.7% of the 128 individuals who were offered TasP) completed the 1st pre-TasP, 74 (72.5% of those who completed 1st pre-TasP) completed the 2nd pre-TasP, and 67 (90.4% of those who complete 2nd pre-TasP) completed the 3rd pre-TasP. A total of 70 individuals subsequently engaged TasP. The average time between HIV testing and ART initiation was 76.8 days. At the time of this analysis, 37 (80.4%) of 46 individuals who reached 6 months clinical milestone had undetectable VL (detection limit of <200 copies/ml), and 24 individuals were yet to reach the 6-month clinical milestone.

At the bivariate analysis (Table 2), individuals who engaged TasP were more likely to be Christian compared to Muslim or other (62.4% vs. 38.1, $p=0.01$), to have disclosed to family members about being MSM (77.3% vs. 49.5%, $p=0.02$), and to have disclosed to health care providers about being MSM (71.1% vs. 48.3%, $p=0.02$). Individuals who engaged in TasP had lower CD4+ T-lymphocyte counts ($p=0.001$) and more advanced WHO HIV disease stage at baseline (75.0% vs. 50.9%, $p=0.05$). In the multivariate regression model after adjusting for religion and CD4+ T cell counts (Table 3), disclosure to family members about being MSM alone was not associated with engagement in TasP. Disclosure to health care providers about being MSM remained significantly associated with engagement in TasP (OR=2.94, $p=0.02$). In a model where both disclosure variables are combined into one, having disclosed to both family and health care workers was associated with 8-fold increase in odds of engaging in TasP (OR=8.08, $p=0.06$) compared to no disclosure.

Of the 58 individuals who did not engage in pre-TasP or TasP, 37 did not want to be contacted by health care providers, 5 travelled away from the city, 9 denied their HIV status, 4 individuals expressed concern with side effects and stigma associated with HIV medications, and 3 were seeking HIV care elsewhere.

Loss to follow-up in HIV care

Cumulative incidence of LTFU among HIV-positive individuals was 23.6% at 6 months and 28.0% at 12 months since HIV testing. In Figure 2, individuals who engaged TasP had the lowest LTFU (10.0%) compared to those already on ART and those not engaged in TasP (20.7% and 56.9%, respectively). Risk factors associated with LTFU are shown in Table 4. In the adjusted Cox regression analysis after controlling for religion, CD4+ T cell counts, ART status, and disclosure to health care providers about being MSM, decreased risk of LTFU remained associated with engaging in TasP (RH=0.08, 95% CI: 0.03–0.19) and already on ART at the time of enrollment (RH=0.17, 95% CI: 0.08–0.35) compared to those who did not engage in TasP.

DISCUSSION

Through the use of RDS as a implementation tool to identify and enroll HIV-positive MSM into HIV medical and prevention services at trusted community centers, we demonstrate that engagement in TasP with low LTFU in HIV care services can be achieved in a setting where individual-level stigma and discrimination towards MSM is prevalent. To achieve viral suppression within the context of TasP, it is important that individuals with HIV know that they are living with HIV, link to and remain in HIV care, and adhere to treatment.

Disclosure of sexual orientation to health care providers was associated with being on ART at baseline and subsequent engagement in TasP but was not strongly associated with LTFU in care. This finding underscores the importance of improving and promoting discussions of risk behaviors between clinicians and MSM who have sex with both men and women as one potential approach to increase uptake of ART¹⁷. Effective risk assessment in the clinical setting requires not only the health care providers to inquire about patient attributes and behaviors, but also the patient to answer honestly and frankly. It is often the patient's expectation that the health care provider initiates this discussion; however, published data suggest that health care providers rarely do. While these discussions are clearly important within the context of initiating HIV treatment as prevention, it is as equally important to increase access to HIV testing regardless of disclosed risk behavior.

At the time of this analysis, 80% of individuals who engaged TasP achieved VL suppression at 6 months, and 24 individuals were yet to reach their 6-month visit milestone. This can translate to decreased morbidity, lower risk of opportunistic infections, improved survival, and reduced risk of disease transmission within the community. With a 10% LTFU rate and good adherence among those who engaged TasP, we anticipate that a majority of these individuals will achieve VL suppression resulting in greater than 80% VL suppression rate. Our findings support the feasibility of TasP in this mobile population. Culturally competent care and intensive case management are important strategies adopted by the TRUST intervention for engagement in care for MSM. Implementation science research should continue to identify best strategies to engage MSM who do not access care and those MSM lost from care. Qualitative work can identify the specific barriers for these subpopulations and help shape intervention development and subsequent quantitative evaluations.

Curbing the rise of new HIV infections amongst MSM requires the use of all of the most effective prevention tools available. Researchers have been calling for new innovations in HIV prevention for MSM¹⁸. TasP represents one such tool. There are, however, challenges in directly applying TasP, as suggested by the findings of the HPTN052 study, to MSM. Politch et al.¹⁹ recently observed that one-quarter of virologically suppressed HIV-infected MSM nonetheless had HIV in their semen. Sexual monogamy and awareness of partner's status were key behaviors that likely contributed to the HPTN052 study's success with TasP. Prevailing relationship practices among MSM such as concurrent sexual partners may undermine the potential preventive effect when attempting to utilize TasP to significantly curb the epidemic in this key population. It will be important to completely characterize the complexity of these networks within the context of HIV treatment coverage. High rates of sexual concurrency among HIV negative MSM in primary relationships could also decrease

the preventive effect of TasP. Further analyses are being undertaken in this study to evaluate the impact of TasP on HIV incidence rate and community viral load.

As a country with HIV epidemic defined by transmission in both concentrated population and general population with the epidemic sustained by both transmission streams, the MSM population must remain a key population for HIV prevention and treatment efforts in Nigeria. The lack of public health programs that support best strategies to link and retain MSM in care is concerning. Herein, we demonstrate that a model service delivery, that is formed in partnership between an existing local human rights non-governmental organization and local implementing partners through expert technical assistance, can provide MSM-friendly clinical and support services. Although this study was conducted among MSM in Nigeria, our findings reflect high uptake of HTC, feasibility of retaining HIV-infected MSM in care, and the possibility of achieving high rates of HIV viral suppression among this mobile population. While our findings are preliminary, the strategies used in this study could be adopted by providers in other parts of the world in order to generate more evidence to support the feasibility of providing comprehensive HIV care and treatment services to MSM.

Since the enactment of the Same Sex Marriage Prohibition Act in January 2014, MSM in Nigeria have reported increased discrimination and fear of seeking health care²⁰. In an environment where individuals are limited in their ability to disclose sexual risks and sexual health with care providers, it is especially difficult to appropriately serve a population known to have a high incidence of HIV throughout the world. Our study found that MSM who are open with their health care providers and family members about their sexuality were more engaged in TasP. Therefore, the present law that criminalizes same sex marriage in Nigeria has the potential of preventing MSM from openly discussing their sexuality with their health care providers and this in turn could prevent HIV-infected MSM from accessing life-saving care and treatment services. Additional evaluations on the long-term consequence of this law within the context of HIV prevention and treatment will be conducted using implementation outcomes from this study.

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References

1. WHO Consolidated Guidelines on HIV Prevention, Diagnosis, Treatment and Care for Key Populations. WHO; Geneva: 2014.

2. 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.* Dec. 2007 4(12):e339. [PubMed: 18052602]
3. Beyrer C, Baral SD, van Griensven F, et al. Global epidemiology of HIV infection in men who have sex with men. *Lancet.* Jul 28; 2012 380(9839):367–377. [PubMed: 22819660]
4. FMOH. HIV/STI Integrated Biological and Behavioral Surveillance Survey. Abuja, Nigeria: Nigerian Federal Ministry of Health; 2010.
5. UNAIDS. Epidemiologic Fact Sheet on HIV and AIDS - Nigeria - 2009 Update. Geneva: UNAIDS/WHO; 2010.
6. Vu L, Adebajo S, Tun W, et al. High HIV prevalence among men who have sex with men in Nigeria: implications for combination prevention. *J Acquir Immune Defic Syndr.* Jun 1; 2013 63(2):221–227. [PubMed: 23406978]
7. Beyrer C. Pushback: the current wave of anti-homosexuality laws and impacts on health. *PLoS Med.* Jun.2014 11(6):e1001658. [PubMed: 24959671]
8. Same Sex Marriage Prohibition Act. 2013. [http://www.placng.org/new/laws/SameSexMarriage\(Prohibition\)Act,2013.pdf](http://www.placng.org/new/laws/SameSexMarriage(Prohibition)Act,2013.pdf)
9. Risher K, Adams D, Sithole B, et al. Sexual stigma and discrimination as barriers to seeking appropriate healthcare among men who have sex with men in Swaziland. *J Int AIDS Soc.* 2013; 16(3 Suppl 2):18715. [PubMed: 24242263]
10. Baral S, Trapence G, Motimedi F, et al. HIV prevalence, risks for HIV infection, and human rights among men who have sex with men (MSM) in Malawi, Namibia, and Botswana. *PLoS One.* 2009; 4(3):e4997. [PubMed: 19325707]
11. Fay H, Baral SD, Trapence G, et al. Stigma, health care access, and HIV knowledge among men who have sex with men in Malawi, Namibia, and Botswana. *AIDS Behav.* Aug; 2011 15(6):1088–1097. [PubMed: 21153432]
12. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* Aug 11; 2011 365(6):493–505. [PubMed: 21767103]
13. Johnston LG, Whitehead S, Simic-Lawson M, Kendall C. Formative research to optimize respondent-driven sampling surveys among hard-to-reach populations in HIV behavioral and biological surveillance: lessons learned from four case studies. *AIDS Care.* Jun; 2010 22(6):784–792. [PubMed: 20467937]
14. Merrigan M, Azeez A, Afolabi B, et al. HIV prevalence and risk behaviours among men having sex with men in Nigeria. *Sex Transm Infect.* Feb; 2011 87(1):65–70. [PubMed: 20820061]
15. FMOH. Laboratory-Based HIV Rapid Test Validation in Nigeria. Abuja, Nigeria: Federal Ministry of Health; 2007.
16. PEPFAR Scientific Advisory Board Meeting; Office of the U.S. Global AIDS Coordinator; Oct 2–3. 2013
17. Global Forum on MSM & HIV (MSMGF) and Johns Hopkins University. Promoting the Health of Men who Have Sex with Men Worldwide: A Training Curriculum for Providers.
18. Jaffe HW, Valdiserri RO, De Cock KM. The reemerging HIV/AIDS epidemic in men who have sex with men. *JAMA.* Nov 28; 2007 298(20):2412–2414. [PubMed: 18042919]
19. Politch JA, Mayer KH, Welles SL, et al. Highly active antiretroviral therapy does not completely suppress HIV in semen of sexually active HIV-infected men who have sex with men. *AIDS.* Jul 31; 2012 26(12):1535–1543. [PubMed: 22441253]
20. Schwartz, S.; Orazulike, I.; Nowak, RG., et al. Assessment of the immediate HIV-related impact of the anti-gay law in Nigeria. Paper presented at: International AIDS Conference; 2014; Melbourne, Australia.

Figure 1.

Engagement in TasP cascade among HIV-positive Men who have Sex with Men (MSM) in Nigeria who were newly diagnosed (n=128). Mean time (in days) is shown between each step in the cascade.

Figure 2.
 Time to lost to follow-up among HIV-positive Men who have Sex with Men in Nigeria
 (n=186). Circles denote censored observations.

Demographics and HIV characteristics of HIV-positive Men who have Sex with Men (MSM) in Nigeria by their antiretroviral treatment (ART) status at enrollment.

Table 1

	<u>HIV Positive</u>		<u>ART</u>		<u>Non-ART</u>		<i>P</i>
	n	Col. %	n	Col. %	n	Col. %	
TOTAL	186	100.0	58	100.0	128	100.0	
Age, years							
16-20	25	13.5	4	7.0	21	16.4	0.06
21-25	63	34.1	16	28.1	47	36.7	
26-30	67	36.2	23	40.4	44	34.3	
31+	30	16.2	14	24.6	16	12.5	
Missing	1						
Education							
Never, Quranic, Primary	21	11.7	5	9.3	16	12.8	0.05
JSS	11	6.2	1	1.9	10	8.0	
SSS	77	43.0	19	35.2	58	46.4	
Higher SSS	70	39.1	29	53.7	41	32.8	
Missing	7						
Occupation							
Not Working	49	26.5	11	19.3	38	29.7	0.29
Student	112	60.5	39	68.4	73	57.0	
Working	24	13.0	7	12.3	17	13.3	
Missing	1						
Religion							
Christian	128	69.6	43	75.4	85	66.9	0.24
Muslim and other	56	30.4	14	24.6	42	33.1	
Missing	2						
Marital Status							
Married/Cohabiting with woman	23	12.5	8	14.0	15	11.7	0.34
Cohabiting with man	1	0.5	1	1.8	0	0.0	
Divorces, separated, widowed	12	6.5	2	3.5	10	7.8	
Single, never married	149	80.5	46	80.7	103	80.5	

	<u>HIV Positive</u>		<u>ART</u>		<u>Non-ART</u>		<i>P</i>
	n	Col. %	n	Col. %	n	Col. %	
TOTAL	186	100.0	58	100.0	128	100.0	
Missing	1						
Sexual Orientation							
Gay, Homosexual	57	31.0	20	35.7	37	28.9	0.36
Bisexual	127	69.0	36	64.3	91	71.1	
Missing	2						
Told family MSM Status							
No	148	80.4	43	75.4	105	82.7	0.25
Yes	36	19.6	14	24.6	22	17.3	
Missing	2						
Told health care worker MSM Status							
No	115	62.5	25	45.6	89	70.1	0.002
Yes	69	37.5	31	54.4	38	29.9	
Missing	2						
Disclosure of MSM status							
None	101	55.2	23	40.4	78	61.9	0.02
Family only	13	7.1	3	5.3	10	7.9	
Health care worker only	46	25.1	20	35.1	26	20.6	
Both	23	12.6	11	19.3	12	9.5	
Missing	3						
Discuss HIV with closest MSM friends (up to 5)							
At least once a week or month							
<40%	8	8.3	4	10.0	4	7.1	0.60
40–<80%	23	23.7	7	17.5	15	26.8	
80–100%	66	68.0	29	72.5	37	66.1	
Missing	89						
Never or <once a month							
<40%	6	5.1	5	15.6	1	1.2	0.01
40–<80%	23	19.5	7	21.9	15	17.7	
80–100%	89	75.4	19	62.5	69	81.2	

	<u>HIV Positive</u>		<u>ART</u>		<u>Non-ART</u>		<i>P</i>
	n	Col. %	n	Col. %	n	Col. %	
TOTAL	186	100.0	58	100.0	128	100.0	
Missing	68						
<u>HIV Characteristics at Baseline</u>							
CD4, cells/mL							
<200	35	19.8	8	14.0	27	22.5	0.02
200–349	66	37.3	16	28.1	50	41.7	
>350	76	43.9	32	57.9	43	35.8	
Mean	334.6		380		313		0.01
Missing	9						
Viral load, copies/mL							
<10,000	60	35.5	47	83.9	13	11.5	<0.0001
10,000–99,999	55	32.5	8	14.3	47	41.6	
>100,000	54	32.0	9	1.8	53	46.9	
Missing	17						
<u>WHO HIV Disease Stage</u>							
1	154	82.8	46	79.3	108	84.4	0.40
2	32	17.2	12	20.7	20	15.6	

Table 2

Characteristics and factors associated with engagement in TasP among HIV-positive Men who have Sex with Men (MSM) in Nigeria. Unadjusted odds ratios (OR) with 95% confidence interval (CI).

	Not Engaged in TasP		Engaged in TasP		P	Crude OR (95% CI)
	n	Row %	n	Row %		
TOTAL	58	45.3	70	54.7		
Age, years						
16-20	9	42.9	12	57.1	0.119	Ref.
21-25	27	57.5	20	42.6		0.56 (0.20, 1.57)
26-30	18	40.9	26	59.1		1.08 (0.38, 3.10)
31+	4	25.0	12	75.0		2.25 (0.54, 9.34)
Education						
Never, Quranic, Primary: <=primary	7	43.8	9	56.3	0.628	Ref.
JSS	4	40.0	6	60.0		1.17 (0.23, 5.81)
SSS	30	51.7	28	48.3		0.73 (0.24, 2.21)
Higher SSS	16	39.0	25	61.0		1.22 (0.38, 3.92)
Occupation						
Not Working	18	47.4	20	52.6	0.398	Ref.
Student	30	41.1	43	58.9		1.29 (0.59, 2.84)
Working	10	58.8	7	41.2		0.63 (0.20, 2.00)
Religion						
Christian	32	37.7	53	62.4	0.010	Ref.
Muslim & Other	26	63.4	16	38.1		0.37 (0.17, 0.80)
Marital Status						
Married/Cohabiting with woman	10	66.7	5	33.3	0.148	Ref.
Divorces, separated, widowed	3	30.0	7	70.0		4.67 (0.83, 26.23)
Single, never married	45	43.7	55	56.3		2.58 (0.82, 8.01)
Sexual Orientation						
Gay, Homosexual	14	37.8	23	61.2	0.279	Ref.
Bisexual	44	48.4	47	51.7		0.65 (0.30, 1.42)
Told family MSM Status						
No	53	50.5	52	49.5	0.018	Ref.

	Not Engaged in TasP		Engaged in TasP		P	Crude OR (95% CI)
	n	Row %	n	Row %		
TOTAL	58	45.3	70	54.7		
Yes	5	22.7	17	77.3		3.47 (1.19, 10.08)
Told health care worker MSM Status						
No	46	51.7	43	48.3	0.018	Ref.
Yes	11	29.0	27	71.1		2.63 (1.16, 5.93)
Disclosure of MSM status						
None	42	53.9	36	46.2	0.023	Ref.
Family only	4	40.0	6	60.0		1.75 (0.46, 6.69)
Health care worker only	10	38.5	16	61.5		1.87 (0.75, 4.62)
Both	1	8.3	11	91.7		12.83 (1.58, 104.26)
HIV Characteristics at Baseline						
CD4, cells/uL Binary						
<200	10	37.0	17	63.0	0.001	Ref.
200–349	16	32.0	33	68.0		1.25 (0.47, 3.34)
≥350	30	69.8	11	30.2		0.26 (0.09, 0.71)
Viral load, copies/ml						
<10,000	8	61.5	5	38.5	0.240	Ref.
10,000–99,999	23	48.9	23	51.1		1.67 (0.48, 5.85)
≥100,000	20	37.7	32	62.3		2.64 (0.76, 9.19)
WHO Stage						
1	53	49.1	55	50.9	0.047	Ref.
2	5	25.0	15	75.0		2.89 (0.98, 8.51)

Table 3

Multivariate regression models of characteristics and factors associated with engagement in TasP among HIV-positive Men who have Sex with Men (MSM) in Nigeria. Adjusted odds ratios (aOR) and 95% confidence interval (CI).

	aOR (95% CI)*	P
Model 1		
Told family MSM status		
No	Ref.	
Yes	2.09 (0.62, 7.08)	0.24
Model 2		
Told healthcare worker MSM status		
No	Ref.	
Yes	2.94 (1.17, 7.36)	0.02
Model 3		
Disclosure of MSM status		
None	Ref.	
Family only	1.01 (0.20, 5.10)	0.99
Health care worker only	2.43 (0.87, 6.80)	0.09
Both	8.08 (0.90, 72.27)	0.06

* each model adjusted for religion and baseline CD4+ T-cell counts

Table 4

Characteristics and factors associated with loss to follow-up among HIV-positive Men who have Sex with Men (MSM) in Nigeria. Unadjusted (RH) and adjusted relative hazards (aRH).

	N	n	Loss to follow-up		P	aRH (95% CI)*	P
			(%)	RH (95%CI)			
Total	187	53	28.3				
Age, years							
16–20	24	7	29.2	Ref.			
21–25	60	20	33.3	1.21 (0.51, 2.87)	0.66		
26–30	68	18	26.5	0.88 (0.37, 2.11)	0.78		
31+	29	8	27.6	0.85 (0.31, 2.35)	0.85		
Education							
Never, <=primary	21	6	28.6	Ref.			
JSS	11	3	27.3	0.98 (0.24, 3.90)	0.97		
SSS	77	23	29.9	1.04 (0.42, 2.56)	0.94		
Higher SSS	71	20	28.2	0.93 (0.37, 2.31)	0.87		
Occupation							
Not Working	48	18	37.5	Ref.			
Student	110	28	25.5	0.66 (0.37, 1.19)	0.16		
Working	23	7	30.4	0.86 (0.36, 2.05)	0.73		
Religion							
Christian	129	34	26.4	Ref.		Ref.	
Muslim & Other	56	19	33.9	1.94 (1.10, 3.42)	0.02	1.46 (0.81, 2.63)	0.21
Marital Status							
Married/Cohabiting w/woman	23	8	34.8	Ref.			
Divorced, separated, widowed	12	1	8.3	0.16 (0.02, 1.29)	0.09		
Single, never married	150	44	29.3	0.68 (0.32, 1.44)	0.31		
Sexual Orientation							
Gay, Homosexual	57	15	26.3	Ref.			
Bisexual	128	37	28.9	1.16 (0.64, 2.12)	0.62		
Told family MSM Status							

	Loss to follow-up				aRH (95% CI) *	P
	N	n	(%)	RH (95%CI)		
Total	187	53	28.3			
No	145	41	28.3	Ref.		
Yes	35	12	34.3	0.98 (0.51, 1.86)		0.94
Told health care worker MSM Status						
No	111	36	32.43	Ref.	Ref.	
Yes	69	17	24.64	0.58 (0.33, 1.04)	1.10 (0.57, 2.14)	0.77
Disclosure of MSM status						
None	98	31	31.6	Ref.		
Family only	12	5	41.7	1.17 (0.45, 3.00)		0.75
Health care worker only	46	10	21.7	0.55 (0.27, 1.12)		0.10
Both	23	7	30.4	0.66 (0.29, 1.51)		0.33
HIV Characteristics at Baseline						
CD4, cells/uL Binary						
<200	35	10	28.6	Ref.	Ref.	
200–349	67	18	26.9	0.86 (0.40, 1.86)	0.69 0.78 (0.36, 1.72)	0.54
350	81	24	29.6	1.05 (0.50, 2.19)	0.91 0.60 (0.28, 1.31)	0.20
WHO Stage						
1	154	46	29.9	Ref.		
2	32	6	18.8	0.45 (0.19, 1.07)		0.07
ART Status during follow-up						
Did not engage in TasP	58	33	56.9	Ref.	Ref.	
Engaged in TasP	70	7	10.0	0.08 (0.04, 0.19)	0.08 (0.03, 0.19)	<0.001
Already on ART	58	12	20.7	0.18 (0.09, 0.35)	0.17 (0.08, 0.35)	<0.001

* model include religion, disclosure of MSM status to health care workers, baseline CD4+ T-lymphocyte counts, and ART status during follow-up.