2011

Prevalence of sexually transmitted infections among men who have sex with men and injecting drug users and validation of audio computer-assisted self interview (ACASI) technique in Abuja, Lagos, and Ibadan, Nigeria: Technical report

Enhancing Nigeria's HIV/AIDS Response (ENR) Programme

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ENHANCING NIGERIA'S HIV/AIDS RESPONSE (ENR) PROGRAMME

Prevalence of Sexually Transmitted Infections among Men who have Sex with Men and Injecting Drug Users & Validation of Audio Computer-Assisted Self Interview (ACASI) Technique in Abuja, Lagos, and Ibadan, Nigeria

TECHNICAL REPORT

DFID Department for
International
Development

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Prevalence of Sexually Transmitted Infections
among Men who have Sex with Men and Injecting
Drug Users
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Validation of Audio Computer-Assisted Self
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ISBN: 978 978 50803-3-9

FORWARD

National programme and Donor-funded projects are working towards achieving a set of targets to curtail and mitigate the impact of HIV and AIDS epidemic in Nigeria. Measuring success and improving the management of these initiatives is predicated on strong monitoring and evaluation and surveillance system that produce quality data regarding programme implementation and the state of the HIV and AIDS epidemic.

The face-to-face interview has been in use for the collection of behavioural data especially in the National HIV/AIDS and Reproductive Health Survey, Behavioural Surveillance Survey and Integrated Biological and Behavioural Surveillance Survey IBBSS. However it has been demonstrated in some comparative studies that some responses received during a research activities that employed face-to-face interview may not been the same response if the same person were to answer the same questions using other method of data collection technique such as Audio Computer Assisted Self Interview (ACASI).

Evidence from other methods showed that responses to survey/study questions using ACASI tended to be more close to reality due to the level of privacy employed in ACASI.

It is hoped that this study will herald a new era in the collection of behavioural data and data for other studies that asks sensitive questions. More studies will also be needed to further calibrate the reliability of ACASI considering the level of literacy and our multicultural environment.

Prof. C O Onyebuchi Chukwu
Hon. Minister of Health

ACKNOWLEDGMENT

The Federal Ministry of Health acknowledges the efforts of all these who contributed to the successful conduct of the prevalence of sexually transmitted infection among Men who have sex with men (MSM), and injecting Drug users (IDU), in the validation study of the Audio Computer Assisted Self Interview (ACASI), as a useful tool in data collection, which was piloted in Nigeria at Ibadan, Lagos, and Abuja.

The Ministry extends its appreciation to the technical and logistic support of the Population Council and to the technical committee members for their immense contribution toward the successful conduct of this study. Special thanks to ENR of the UKAID for being the pillar behind the success of this study. It is our hope that this report will herald a new era in the data collection in behavioural studies in Nigeria.

Dr. Mansur Kabir
Head, Dept. of Public Health

TABLE OF CONTENTS

Acronyms	3
Summary.....	4
1.0 Background	7
1.1. Overview of Sexually Transmitted Infections in Nigeria	
1.2. Poor Management of STIs in Nigeria	
1.3. Need for Quality Behavioral Data	
2.0 Objectives.....	10
3.0 Methods.....	11
3.1. Study Populations and Study Sites	
3.2. Recruitment of Study Participants	
3.3. Visit Procedures	
3.4. Laboratory Procedures for STI Testing:	
3.5. Ethical Review and Protection of Human Participants	
3.6. Data Analysis	
4.0 Results	15
5.0 Discussion.....	27
6.0 Recommendations	32
7.0 Limitations.....	33
8.0 References	34
Appendix:	
Tables of Results	37

ACRONYMS

ACASI	Audio Computer Assisted Self Interview
AIDS	Acquired Immuno-Deficiency Syndrome
DIFD UK	Department for International Development
ENR	Expanded Nigerian Response
FMOH	Federal Ministry of Health
FTF	Face-to-Face
HBV	Hepatitis B Virus
HCT	HIV Counseling and Testing
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
IBBSS	Integrated Bio-Behavioral Surveillance Survey
IDU	Injection Drug User
MARPs	Most at Risk Population
MHN	Men's Health Network
MSM	Men who have Sex with Men
	National AIDS/STDs Control Program
NASCP	(Nigeria)
PCR	Polymerase Chain Reaction
RDS	Respondent Driven Sampling
RPR	Rapid Plasma Reagin
STI	Sexually Transmitted Infections
TPHA	Treponema palladium hemagglutination assay

SUMMARY

Background

Most-at-risk populations, including men who have sex with men (MSM), and injecting drug users (IDUs) represent only 1% of Nigeria's population, but account for a disproportionately high number of new HIV infections. Despite their elevated risk, MSM and IDUs are less likely than the general population to access HIV prevention and sexual health services because of stigmatization resulting from engagement in behaviors that are not only widely viewed as illicit but are criminalized. There is a dearth of data on prevalence of HIV and sexually transmitted infections (STI) among MSM and IDUs and their sexual and injecting risk behaviors because their behaviors make them difficult to be reached programmatically and engaged in research.

Having accurate and current STI prevalence data for MSM and IDUs is critical because many STIs are curable and STIs facilitate the transmission of HIV. While the need for HIV and STI prevalence data is clear, there is also a need to improve the quality and reliability of behavioral data collected for national surveillance, where these stigmatized populations may underreport sensitive behaviors that put them most at risk.

This study sought to 1) determine the prevalence of HIV and STIs and sexual and injecting risk behaviors in MSM and male IDUs; and 2) determine if ACASI (Audio Computer Assisted Self Interview) provides higher and more accurate reporting of risk behaviors than face-to-face (FTF) interviewing.

Methods

A cross-sectional study was conducted in Abuja, Ibadan, and Lagos with a total of 712 MSM and 328 IDU participants recruited through respondent driven sampling (RDS) [MSM were recruited for all three sites while IDUs were recruited only for Lagos]. Biological samples were obtained to test for HIV and STI - syphilis, HBV, HCV, Chlamydia, and gonorrhea. A behavioral interview was also administered to participants who were randomized to be interviewed via face-to-face or ACASI method. Adjusted prevalence estimates generated in RDSAT software are reported.

Results

Characteristics of MSM and IDU: Most MSM were between the ages of 18 and 25, had completed a secondary school education, were single and not living with a partner, and of Christian denomination. In Abuja, a little more than half of MSM self-identified as homosexual; while in Lagos and Abuja a little more than half of MSM self-identified as bisexual. The majority of MSM were either employed part-time or not earning an income.

IDUs in Lagos were predominantly over the age of 30, had a least secondary school education, were single and of Christian denomination. About a third of MSM were married and the majority were unemployed or worked part-time.

HIV: MSM in Abuja had the highest HIV prevalence in (34.9%) followed by MSM in Lagos and Ibadan MSM (15.2% and 11.3%). IDUs in Lagos had the lowest HIV prevalence (1.8%). For MSM, HIV status was significantly associated with older age, higher education, being single, sexual identity (homosexual identity in Abuja and bisexual identity in Ibadan) and having unprotected anal sex.

STIs: MSM and IDUs had a low prevalence of syphilis, ranging from 0.4-1.9%. Gonorrhea was also found to be low, with MSM in Ibadan and Lagos having the highest prevalence (8.9% and 4.2% respectively). There was a high prevalence of Chlamydia among MSM in Ibadan (34.5%). About one-fifth of MSM in Abuja and Ibadan had HBV (21.9% and 21.4%); fewer MSM and IDU in Lagos had HBV (6.5% and 7.8% respectively). HCV prevalence among MSM and IDUs ranged from 3.3 - 7.7%, with the highest prevalence among IDUs in Lagos.

HIV Risk Behaviors: About 60% of MSM in Ibadan and Lagos considered themselves bisexual. The majority of MSM reported ever having had sex with women. Roughly, one-half of MSM had sex with women and one-third reported having multiple female sex partners in the past two months. Among those who had sex with women, 40% reported having anal sex. Of those who had anal sex with women, two-thirds (67%) reported their last anal sex act with women was unprotected. MSM also reported a high proportion of unprotected sex with men (38%) and a high proportion of multiple male anal sex partners in the past two months (62%). One-third (35%) of MSM reported their last sex partner was a commercial sex worker; half of these MSM reported being paid for sex (money, gifts or favor) in the past 6 months.

Approximately half of MSM have never been tested for HIV; 31% had at least one symptom of STIs in the past 12 months; and 8% reported using drugs in the past 12 months.

Most IDUs had been injecting for 1-5 years and injected drugs within the past month. Less than 10% of IDU reported sometimes or ever sharing needles and most procured new needles from the chemist shop. Fewer than half of IDUs had sex in the past 6 months and only about 40% had ever tested for HIV.

Reporting of Sensitive Behavior via ACASI or FTF: The following indicators reported by MSM demonstrated statistically significant differences ($p<0.05$): having more than two female sex partners, having 2 or more male anal sex partners, having anal sex with women, having unprotected anal sex with women, having unprotected anal sex with men [in the past two months], homosexual self-identity, selling sex in the past 6 months, drug use and having had an STI symptom in the past 12 months.

IDUs had fewer statistically significant differences reporting on sensitive injection related indicators via ACASI or FTF. However, IDUs did report experiencing an STI symptom in the last 12 months and sharing needles more often with ACASI ($p<0.05$).

Discussion

HIV prevalence among MSM is high; approximately five to ten times higher than the HIV prevalence in Nigeria's general population (3.6%). MSM reported high levels of unprotected sex with both men and women; and many engaged in transactional sex. In addition, about one half of MSM have never been tested for HIV. These findings underscore the need for targeted interventions towards MSM and programs need to increase access to HIV testing and HIV-risk reduction messages.

Overall, STI prevalence among MSM was low; however MSM in Ibadan had a high prevalence of Chlamydia which may be explained by bisexual concurrency and lack of accessible treatment. A notable prevalence of HBV among MSM was found in both Ibadan and Abuja indicating a strong need for increasing access to the HBV vaccine. The HIV prevalence among IDUs in Lagos was low; likely resulting from the low proportion of IDUs who were sexually active and shared injection equipment. However, programs may need to address the higher HBV and HCV prevalence in IDUs.

The findings of this study also suggest that the ACASI method of interviewing was favorable to MSM who reported a higher proportion of sensitive behaviors related to sexual behavior and sexual identity, compared with those who had a FTF interview. The ACASI method did not demonstrate the same effectiveness in reducing social desirability bias for many sensitive injecting related behaviors among IDUs, although sharing needles and experiencing STI symptoms were reported more frequently. Overall, these findings indicate that ACASI is better at eliciting sensitive behavioral data from MSM that pertain to sex, identity, and drug use versus eliciting injecting behaviors that may not be viewed by the IDU participants as highly stigmatized or socially undesirable in the context of a face-to face-interview.

1.0 BACKGROUND

Most-at-risk populations (MARPs), including men who have sex with men (MSM), and injecting drug users (IDUs) comprise just 1% of Nigeria's population, yet account for a disproportionately high number of new HIV infections. The 2009 Modes of Transmission study (NACA et al., 2009) projected that 38% of new HIV infections occur among MARPs and the 2007 Integrated Biological and Behavioral Surveillance Survey (FMOH, 2008b) found HIV prevalence rates of 14% among MSM and 6% among IDUs much higher than the overall prevalence in Nigeria's general population which is 3.6% (FMOH, 2008a). Despite their elevated risk of HIV infection, MSM and IDUs are less likely than the general population to access HIV prevention and sexual health services because they engage in 'illicit', criminalized, and stigmatized behavior, and service providers often discriminate against them. Due to stigma and discrimination, these sub-populations are driven underground making it particularly hard to engage them in research and collect data on their sexual and injecting behavior. With the limited data that exist on MSM and IDUs risk behaviors, innovative methods are needed to improve the quality of data collected.

Prior to the 2007 IBBSS, information on most-at-risk populations (MARPs) was derived from program data and sentinel surveillance, neither of which provided time-series prevalence or behavioral data on representative samples of these populations. The 2007 IBBSS used probability sampling methods to estimate national HIV and syphilis prevalence and provide indicators of risk behaviors and intervention exposure among IDUs, female sex workers (FSW), transport workers (TW), uniformed service men (USM) (i.e. the military and police) and MSM. Key findings showed high prevalence of HIV of 13.5% and 5.6% among MSM and IDUs, respectively. Additionally, a high proportion of MSM reported also having sex with women (50%), a high proportion of IDUs reported sexual encounters with female sex workers (20%), and condom use was less than 50% among both MSM and IDUs. This research contributes to a better understanding of STI prevalence and behavioral risk factors for HIV and STIs among MSM and IDUs in Nigeria.

1.1. Overview of Sexually Transmitted Infections in Nigeria

Having accurate and current STI prevalence data for MSM and IDUs is critical to understanding and curbing the HIV epidemic in Nigeria. Studies have shown that STIs can facilitate sexual transmission of HIV among non-HIV infected persons due to shedding in the genital tract. There is also evidence that HIV infected persons are more likely to acquire STIs compared to HIV uninfected persons (Wasserheit, 1992). Wasserheit (1992) reviewed 150 studies looking at the interaction between HIV and STIs and found that ulcerative and non-ulcerative STIs increase the risk of HIV transmission by approximately 3 to 5-fold. If co-infection with HIV prolongs or augments the infectiousness of individuals with STIs, and if the same STIs facilitate transmission of HIV, these infections may greatly amplify one another. In Nigeria, Kehinde and Lawoyin (2005) found a high STI/HIV co-infection rate among male and female patients who attended an STI clinic in Ibadan and 30% of those who had STIs were also infected with HIV.

Overall, little is known about the prevalence of STIs in the general population and among high-risk groups in Nigeria, including MSM and IDUs. Nationally published data on STI prevalence is limited to syphilis only, which was measured in sentinel surveys (FMOH 2003, 2005) and the first 2007 Integrated Biological and Behavioral Surveillance Survey (IBBSS). While biological surveillance data on STIs remain minimal, one study exclusively among young Nigerian males (Fatusi and Wang 2009) found that 7% reported having symptoms of STIs.

While this report of STI symptoms among young men is moderate, previous research conducted in Nigeria shows the prevalence of syphilis to be low, with a 2005 sentinel surveillance estimating the syphilis prevalence at 1.5% (FMOH 2005). The 2007 IBBSS also found low syphilis prevalence in MSM, IDUs and other most-at-risk populations (0.8%) (FMOH, 2008b). Due to these findings of low syphilis prevalence, the 2010 IBBSS did not include syphilis as part of the biological tests for surveillance. However, several reasons may account for the low prevalence of syphilis. Low prevalence may result from antibiotics that are available over the counter (FMOH, 2008b). Additionally, the IBBSS survey may not have captured those most at risk for STI infection (FMOH, 2008b). Nonetheless, surveillance of syphilis and other STIs in MSM and IDUs must be ongoing to detect even small changes in prevalence in order to devise appropriate responses at the local and national level.

1.2. Poor Management of STIs in Nigeria

STIs are seldom diagnosed or adequately treated in Nigeria (Lawoyin et al., 2004). Currently, there are national guidelines for syndromic management of STIs. However, syndromic algorithms must incorporate local data on STI prevalence, antibiotic resistance and drug availability to be rendered effective (WHO, 2003). Without access to these local data, these guidelines cannot be implemented to their full potential by providers and healthcare workers.

1.3. Need for Quality Behavioral Data

While the need for relevant national and local STI prevalence data is clear, there is also a need to improve the quality and reliability of behavioral data, particularly for MSM and IDUs. In Nigeria, same sex sexual behaviors are criminalized (Human Rights Watch, 2007; UNAIDS, 2005; Onyango-Ouma, 2005) and highly stigmatized. In addition, injecting drug use is illegal and a rising phenomenon. It is likely that MSM and IDUs participating in the IBBSS under-report these criminalized and highly sensitive behaviors that are critical to targeted program development.

Computer-based interviewing systems are becoming an accepted alternative to face-to-face interview; providing an efficient and replicable research tool for collecting sensitive behavioral data. Studies in the U.S. and elsewhere show that using computerized self-interviews can significantly reduce social desirability biases in surveys (Hewett et al. 2004; Mensch et al. 2003; Murphy et al., 2000) providing more accurate and reliable behavioral data. Audio Computer Assisted Self Interviews (ACASI) have demonstrated increased consistency of reported sensitive behaviors (Jarlais et al. 1999), while improving privacy and confidentiality in literate and illiterate populations (Wijgert et al. 2000). With each question asked in exactly the same way, ACASI has the potential to remove interview biases, thus, improving data quality. ACASI may also be a cost-effective alternative; reducing the cost of training and staff needed to conduct behavioral surveillance. However, additional research is needed to determine if ACASI is an appropriate or improved alternative to face- to-face interviews with MSM and IDUs in low income settings such as Nigeria.

This study aimed to provide critical epidemiological and methodological information for the Government of Nigeria's HIV and STI programs targeting MSM and IDUs. By providing STI prevalence data and validating ACASI among MSM and IDUs, the results of this research directly respond to ENR's mandate as well as Nigeria's pressing need for targeted, evidence-based sexual health and HIV prevention program planning.

2.0 OBJECTIVES

Study Goal

The overall goal of this research was to provide evidence that supports the need for: a) improved surveillance, diagnosis, and management of STIs; and b) improved methods for collecting sensitive information from MSM and IDUs in Nigeria.

Research Objectives

1. To determine the prevalence of HIV and STIs in MSM and male IDUs.
2. To determine if ACASI provides higher and more accurate reporting of risk behaviors than face-to-face (FTF) interviewing.

3.0 METHODS

A cross-sectional study design was deployed with participants recruited through the respondent driven sampling (RDS). Behavioral data were collected via the administration of face-to-face interviews and audio computer assisted self-interview (ACASI). Biological HIV and STI data were obtained through the collection of blood, urine, and urethral swab samples.

Objective 1 was accomplished by STI testing of participants enrolled into this study.

Objective 2 was accomplished by comparing reported risk behaviors between ACASI and FTF interview methods. Participants were randomized into 2 groups: one group completed the questionnaire using face-to-face interview and the other group completed the questionnaire using ACASI. This allowed for comparison of responses administered through the two different interview modes. Correlations between the responses to the behavior questions using the two modes of interviewing, and the STI biomarkers were assessed.

3.1. Study Populations and Study Sites

MSM included in the study were men who reported sexual activity (manual, oral or anal) with another man at least once in the last 12 months. IDUs included in the study were men who reported injecting drugs recreationally at least once in the last 12 months. Both MSM and IDU participants were aged 18 years or over; able and willing to provide written informed consent to take part in the survey and able and willing to have laboratory specimens collected and tested for STIs. Participants who were mentally impaired from alcohol or drug use were not enrolled into the study.

Study activities with MSM were conducted at 3 existing MHNN (Men's Health Network, Nigeria) clinics located in Abuja, Lagos, and Ibadan. Population Council's (PC) MHNN is a clinic-based service delivery intervention that provides HIV counseling & testing (HCT), syndromic management of sexually transmitted infections (STI-SM), and condom/lubricant distribution for men, with a special focus on high-risk men. The only IDU study site was in Lagos at a local NGO facility [National Youth AID Program (NYAP)] well known to the IDU community.

3.2. Recruitment of Study Participants

Participants for this study were recruited through respondent-driven sampling (RDS), which is an adaption of snowball or chain referral sampling where peers recruit their peers into the study. This sampling strategy is typically used to recruit hard-to-reach populations such as IDUs and MSM. A diverse set of seed participants were selected and asked to recruit 3 of their peers who belong to the same target population (i.e., IDUs recruit IDUs and MSM recruit MSM). Recruiters and their recruits were linked using numbered coupons. The network size and recruitment patterns of each sub-population (MSM and IDUs) were adjusted for using the RDSAT software to obtain probability estimates (Heckathorn 1997;2002).

Participants were randomized to either the ACASI or face-to-face interview arms. Randomization was determined by a set of random numbers generated from *S software*. Participants were offered HIV counseling and testing. STI syndromic diagnosis and management was administered according to the Nigerian national standards and current MHNN clinic standards of procedure. Participants who went through the STI syndromic management

and had symptoms were offered free treatment at the MHNN clinic. Biological samples were collected for laboratory testing for HIV, syphilis, HBV, HCV, chlamydia, and gonorrhea.

Seven hundred and twelve MSM (712) were recruited and 328 IDUs over a 6-week period between August and September 2010. Details of the sample size are described in Figure 1.

Table 1: Recruitment of MSM and IDUs by site

Population	Target Recruitment	Recruitment Achieved	Seeds and maximum number of coupons
Abuja MSM	300	194	7 seeds; max 4 coupons
Ibadan MSM	300	210	4 seeds; max 3 coupons
Lagos MSM	300	308	3 seeds; 3 coupons (1 unlinked participant ¹)
Lagos IDUs	400	328	8 seeds; 3 coupons (1 unlinked participant ¹)

3.3. Visit Procedures

Behavioral Survey: FTF interviews were administered in private by trained and sensitized interviewers with each interview taking approximately 35 minutes to complete. Respondents assigned to the ACASI arm of the study were administered behavioral questions identical to those in the face-to-face questionnaire to determine if ACASI elicits more accurate and higher reporting of sensitive behaviors. Each respondent was given a short orientation to ensure that they were able to use the ACASI system using non-sensitive practice questions. Each round of ACASI interview took approximately 40-45 minutes to complete depending on the respondent's pace. Personal mini laptops were used for the ACASI survey administered in privacy using headphones.

HIV Counseling and Testing: Following completion of the behavioral interview, HIV counseling and testing (using rapid HIV test) was offered to study participants who elected to be tested. Results from the rapid HIV test were given to respondents at the end of the study visit with post-test counseling. Respondents who tested positive were referred to government ART clinics for confirmatory test and further management.

Syndromic STI Treatment: Participants were asked questions about STI symptoms and offered an optional brief physical examination if they were experiencing STI symptoms. Participants received free treatment for syphilis, gonorrhea, and chlamydia based on the national STI syndromic treatment guidelines. Participants who tested positive for HBV and HCV were referred for further diagnosis and management.

(a) ¹ Unlinked participants were walk-in participants who did not have a valid coupon from another participant, but who were also not selected by study staff as a new seed.

3.4. Laboratory Procedures for STI Testing:

HIV: Blood samples were tested using the serial algorithm for screening of HIV infection. Those who tested positive were referred to government clinics for confirmatory test and further management.

Syphilis: Rapid plasma reagent (RPR) was used for screening and Treponema palladium hemagglutination assay (TPHA) test was used for all positive RPR tests for confirmation. This is the standardized procedure applied in epidemiological studies for syphilis screening.

Hepatitis B (HBV): An ELISA test manufactured by DIALAB was used to detect HBV surface antigen (HBsAg).

Hepatitis C (HCV): Similarly, an ELISA test manufactured by CLINOTECH was used to detect HCV antibody. **Chlamydia Trachomatis and N. Gonorrhea:** The rapid immunochromatographic assay manufactured by CLINOTECH was used for the detection of antigens in urethral swab for chlamydia and urine for gonorrhea. These tests are documented as having high sensitivity (98%) and specificity (95-98%) compared to the traditional standardized test (Becton Dickinson ProbeTec Assay).

3.5. Ethical Review and Protection of Human Participants

Due to the sensitivity of the study, special precautions were taken in conducting the study procedures to maximize the safety and confidentiality of participants. Ethical approvals were obtained from both the Institutional Review Boards (IRB) of the Population Council and the Nigerian Institute of Medical Research (NIMR).

Participation in the study was voluntary and did not in any way compromise participant's access to services offered by MHNN or other service providers. Participants had the option of receiving laboratory tests for STIs offered free-of-charge to diagnose syphilis, gonorrhea, chlamydia, HBV and HCV. Free condoms and lubricants were also provided to participants.

Compensation: Participants were compensated NGN 500 for participating in the first visit of this study and an additional NGN500 at their follow-up visit for each additional eligible peer they successfully recruited into the study. The total amount of compensation was between NGN 1,000 (USD 6.6) and NGN 2,000 (USD 13.3) depending on the number of peers each participant was able to recruit.

Informed Consent: Prior to conducting all the study procedures including administration of the questionnaire, written consent was obtained from all participants.

3.6 Data Analysis

Data were analyzed using RDSAT software version 5.6 [for adjusted prevalence of HIV and STI, and HIV risk behaviors] and STATA 11.0 statistical software [for unadjusted analysis and for comparison between ACASI and FTF behavioral interview data]. RDSAT is a software package specifically developed to analyze data collected through RDS (www.respondentdrivensampling.org). We report 95% confidence intervals (CIs) for all population-based estimates.

Descriptive characteristics and HIV risk-behaviors were analyzed and reported separately for each site (MSM in Abuja, Lagos, and Ibadan; and IDUs in Lagos). Bivariate analyses were conducted with our primary outcome, HIV serostatus, to determine significant ($p < 0.05$) associations with socioeconomic characteristics and HIV risk-behaviors using chi-square statistical test. . To compare the reporting of sensitive information by interview modes, bivariate analyses were also conducted. For the purpose of the analysis comparing reported information by interview mode, MSM were pooled across sites and IDUs were analyzed and reported separately.

A subset of ACASI participants was asked questions on their preferred interviewing mode (either ACASI or FTF) in addition to general feedback about the use of ACASI.

4.0 RESULTS ²

Descriptive characteristics of MSM

Descriptive characteristics of MSM and IDUs are reported in Tables 2a and 2b.³ In Abuja, Ibadan, and Lagos, the majority of MSM surveyed were under the age of 30years, with less than 15% over the age of 30years,. The median age for MSM participants in Abuja, Ibadan, and Lagos [min-max] was 25years [18-52], 23years [18-43], and 21years [18-45] respectively. In all three sites, most MSM surveyed were between the ages of 21-25 years (approximately 40-50%).

Figure 1: Age Distribution of Participants

Slightly over half of the MSM in Abuja had completed their secondary school education (56.8%) and about one-third were not earning an income (35.4%). In Ibadan, 67.3% of MSM had completed secondary education; however, over one-third were not earning income (43.2%). In Lagos 83.5% of MSM had completed secondary education, approximately one-third were not earning income. Compared to MSM in Abuja and Ibadan, a high proportion were working part-time (38.2%). Over one-half of all MSM participants in Abuja and Ibadan were living in a rented dwelling (51.5% and 55.0% respectively); and a high proportion were also living with their parents (33.1%, 35.9%). In contrast, over one-half (61.9%) of MSM in Lagos were living with their parents and just 28.9% were living in a rented house.

(b) ²Adjusted prevalence estimates generated in RDSAT are reported unless otherwise specified.

(c) ³95% confidence intervals (CIs) are reported in the tables, but not in text for descriptive statistics

Figure 2: Distribution by Education

In Abuja, Ibadan and Lagos, the majority of MSM participants were single and not living with a partner (79.1%, 65.8% and 57.0% respectively); however in Lagos almost one-third were single and living with a male partner (28.7%) compared to only 10.2% and 13.2% in Abuja and Ibadan respectively. In Ibadan, 18.9% of MSM were married, compared to just over 2% in Abuja and Lagos.

Roughly three-quarter of MSM participants in all three sites were Christian and the remaining one-quarter were Muslim. A little over one-half of all MSM had been away from home for more than a month in the past year (Abuja 58.8%; Ibadan 54.1%; Lagos 52.9%).

In Abuja, about one-half of MSM participants self-identified as gay or homosexual (52.3%) and 44.0% bisexual. In Ibadan, a higher proportion of men self-identified as bisexual (58.0%). In contrast, in Lagos 63.5% of MSM identified as bisexual and only 35.1% identified as gay or homosexual. Only a few MSM across all the sites identified themselves as straight [3.7% in Abuja; 2.3% in Ibadan, and 1.5% in Lagos]. Although there was no significant difference in how often the MSM used the internet, a higher proportion of MSM in Abuja (29.3%) used the internet almost everyday compared with 17.5% in Ibadan and 21.0% in Lagos. Also all MSM in the study reported owning a mobile phone.

Figure 3: Distribution by Sexual Identity

Descriptive Characteristics of IDUs

The majority of IDU participants were over the age of 30 (86.4%; *unadjusted*) with a median age of 40 years [range 18-50]. IDUs were significantly older than MSM participants ($p < 0.05$; *results not shown*). Slightly less than one-half had completed secondary school education (46.7%) and a little more than one-quarter had completed some tertiary or higher level education (26.4%). About one-third of the IDUs did not have any source of income (35.0%) or were self-employed (30.3%). Sixty-one percent of IDUs were single; 32.5% were married to a woman; 30.9% rented a place to live and 36.0% lived in their parent's house. Similar to MSM, 74.0% of IDUs were Christian, with the remaining mostly Muslim (23.3%). In contrast to the MSM population, few IDUs had left home for more than 1 month in the past year (27.5%). Unlike the MSM population, only 3.7% of IDUs reported using the internet almost everyday.

Figure 4: Distribution by Marital Status

HIV prevalence

HIV seroprevalence among MSM and IDUs by site is reported in Table 2 and shown in Figure 5, while HIV seroprevalence by socioeconomic characteristics and HIV-risk behaviours are reported in Table 4 and 5. The unadjusted HIV prevalence of MSM pooled across sites is 22.6% (150 positive/665 total; *data not shown*). Although MSM in Abuja had the highest HIV prevalence of 34.9% [95% CI: 25.5-45.9%], seroprevalence was still significantly high in Lagos 15.2 (9.7 – 21.2) and Ibadan 11.3 (5.1-16.8).

Figure 5: Adjusted HIV Prevalence

In Abuja, HIV serostatus was significantly associated with age, self-reported sexual identity, and unprotected anal sex. Specifically, over one-half of MSM participants over the age of 31 years compared with less than one-third of MSM participants 25 years of age or younger were HIV positive ($p < 0.05$). While 50.0% of men who self-identified as homosexual tested positive, 34.2% of bisexual men tested positive for HIV ($p < 0.05$). Lastly, having unprotected anal sex was significantly associated with being HIV positive; where 54.6% of MSM who had unprotected anal sex in the last 2 months were HIV positive ($p < 0.05$) compared to 37.3% of MSM who did not have unprotected anal sex.

In Lagos, age, education and marital status were significantly associated with HIV seropositivity. The youngest age group (18-20 years) had the lowest HIV prevalence (10.8%) compared with MSM older than 20 who had HIV prevalence ranging from 22.4% to 45.7% ($p < 0.001$). Thirty-three percent (33.3%) of those who had tertiary education were HIV positive compared with 26.7% of those with primary education and 17.3% with secondary education ($p < 0.05$). While 30.3% of those who were married and 27.1% of those who were single tested positive for HIV, about 10% of those who were single and living with a male or female partner were HIV positive ($p < 0.01$). In Ibadan, sexual identity and unprotected anal sex were significantly associated with HIV seropositivity ($p < 0.01$). A higher percentage of those who self identified as bisexual or straight tested positive (13.5%) compared to homosexually self-identified MSM (2.7%).

STI Prevalence

Table 3 and figure 6 present the results of STI laboratory testing in MSM and IDUs .

Syphilis: Prevalence of syphilis among MSM was 1.9% [95% CI: .4-4.0%] in Lagos, [0.5%; 95% CIs: 0.1-1.4%] in Abuja and [0.4%; 95% CI: 0.4-1.6%] in Ibadan. Among IDUs in Lagos, prevalence of syphilis was 1.9% [95% CI: 0-2.6%].

Gonorrhea: MSM in Ibadan had the highest prevalence of gonorrhea [8.9%; 95% CIs: 4.7-13.6%], followed by MSM in Lagos [4.2%; 95% CI: 1.8-7.0]. Neither MSM in Abuja, nor IDUs in Lagos tested positive for gonorrhea.

Chlamydia: Compared to Lagos and Ibadan where the prevalence of chlamydia among MSM was low 4.2% (*unadjusted*) or non-existent 0% respectively, prevalence was very high in Ibadan 34.5% [95% CI: 26.4-42.8]; Among IDUs, the prevalence was [3.7%; 95% CI: 0-6.0%].

HBV and HCV: MSM in Abuja had the highest prevalence of HBV [21.9%; 95% CI: 14.7-31.6%], followed by MSM in Ibadan [21.4%; 95% CI:15.1-27.3%], and lastly Lagos [6.5%; 95% CI: 3.3-10.3%]. HCV among MSM was 3.3% in Lagos [95% CI: 0.9-6.4%], 4.1% in Abuja [95%CI: 0.6-9.7%], and 4.4% in Ibadan [95% CI: 0.5-4.6%]. IDUs in Lagos had an HBV prevalence of 7.8% [95% CI: 4.3-11.7%] and an HCV prevalence of 7.7% [95% CI: 4.3-11.7%].

Figure 6: STI Prevalence

HIV Risk Behaviors for MSM

HIV risk behaviors among MSM are reported in Table 5 confidence intervals are shown for adjusted prevalence estimates.

Sex with both men and women

Most MSM, 55.5% [95% CI: 46.7-67.7%] in Abuja, 82.6% [95%CI: 76.5-88.2%] in Ibadan and 79.7% [95% CI: 73.6-85.5%] in Lagos reported having sex with a woman.

In Ibadan and Lagos about half of MSM reported having sex with women in the last 2 months (*data not shown*); and in Abuja about one-third reported sex with women in the last 2 months (*data not shown*). Of those who reported having sex with a woman in the last 2 months, 41.6% [95% CI: 19.4-73.7%] in Abuja, 41.4% of in Ibadan, and 35.5% [95% CI: 24.1-50.6%] in Lagos, said they had unprotected sex with a woman in the last 2 months. About one-third of MSM in Abuja had sex with both men and women in the last 2 months [27.8%; 95% CI: 18.3-37.0%], while a significantly higher proportion of MSM were having sex with both men and women in Ibadan [39.0%; 95% CI: 30.7-47.2%] and Lagos [45.8%; 95% CI: 38.2-53.3%].

Unprotected anal sex

In total, 92.9% of MSM in Abuja, 83.5% of MSM in Ibadan, and 85.5% of MSM in Lagos reported having anal sex with other men in the past 2 months (*data not shown*). MSM in Lagos and Ibadan reported having higher levels of unprotected anal sex with their male partners during their last sex; 43.5% [95% CI: 35.5-53.5%] and 49.8% [95% CI: 39.1-59.7%] compared to Abuja [31.1%; 95% CI: 21.2-41.0%]. In Abuja, Ibadan, and Lagos about one-third of men in each site reported having sex without a condom in the past 2 months equally for both receptive [32.9%; 24.9%; 35.6% respectively] and insertive anal sex with male partners [34.8%; 37.2%; 35.2%] respectively (*see table for 95% CIs*).

Overall, 40% of men reported having anal sex with women [among those who had sex with women, n=451]. Of those who had anal sex with women [n=181], 72% did not use a condom the last time they had sex with their female partners [Table 5].

MSM in Abuja who did not use a condom during their last sex reported not doing so because they trusted their partner (36.7%; *unadjusted*); while MSM in Ibadan and Lagos reported not using a condom because they didn't like it (45.0% and 36.5% respectively; *unadjusted*).

Lubricant and female condom use

The majority of MSM in Lagos [66.7%; 95% CI: 59.2-75.1%] and Abuja [76.3%; 95% CI: 68.9-87.4%] used lubricant during their last sex with a male partner; in contrast less than half of MSM in Ibadan used lubricant during their last sex with a male partner [46.2%; 95% CI: 39.4-56.4%]. A small proportion of men in Abuja 14.5 [95% CI: 5.6-21.5]; Ibadan 12.7% [95% CI: 6.6-19.3%]; and Lagos 18.0% [95% CI: 10.7-25.7%] used a female condom for anal sex in the last 6 months.

Selling sex to men

Over half of MSM in Lagos sold sex in the past 6 months [54.5; 95% CI: 46.3-62.9] with 44.3% [95% CI: 35.6-52.4%] selling sex to more than one man. In Ibadan and Abuja 51.0% [95% CI: 42.6-59.8%] and 38.0% [95% CI: 29.3-48.0%] respectively sold sex, with 32.8% [95% CI: 26.0-41.3%] and 32.2% [95% CI: 24.0-41.35%] of these men selling sex to more than one man respectively. A higher proportion of MSM in Lagos reported having sex with commercial partners at last sex [35.6%; 95% CI: 28.1-43.2%] compared to Abuja [11.9%; 95% CI: 6.5-18.4%] and Ibadan [16.0%; 95% CI: 10.2-22.0%].

Types of Sex Partner

In Abuja, 44.1% [95% CI: 36.1-53.9%] of MSM had sex with a casual sex partner during their last sex compared with 30.6% [95% CI: 23.2-38.5%] and 33.9% [95% CI: 26.4-42.2%] in Ibadan and Lagos respectively.

Figure 7: Types of Sex Partner

HIV testing

Table 5 shows that a significant proportion of MSM in Ibadan [68.2%; 95% CI: 58.7-76.0%], Lagos [61.7%; 95% CI: 52.8-68.4] and Abuja [44.2%; 95% CI 32.6-55.9] had never been tested for HIV. Of those who had ever been tested for HIV, their most recent test was at MHNN clinic (39%); government clinic (32%) and private clinic (25%) [Table 9].

STI symptoms

About one-quarter of MSM in Abuja and Ibadan reported at least one symptom of STI in the past 12 months, [27.5%; 95% CI: 18.1-37.5%] and [23.7%; 95% CI: 17.5-30.0%]; while over one-third of MSM in Lagos reported symptoms of STI [37.1%; 95% CI: 28.5-45.1%].

Figure 8: Adjusted Prevalence of MSM Sexual Risk Behavior

Injecting Risk Behaviors of IDUs

Table 6 presents data on HIV risk behaviors among IDUs. The median age at which IDUs started injecting drugs was 28.5 years [range:8-48]. The majority of IDUs had used heroin (87.9%) and cocaine (80.6%) (*unadjusted; data not shown*). About one-half of IDUs had been injecting drugs for 1-5 years [46.0%; 95% CI: 39.6-53.3%] and about one-quarter had been injecting for 6-10 years [26.1%; 95% CI: 20.5-31.8%]. Three-quarters of IDUs injected in the last month [74.1%; 95% CI: 67.2-80.2] and most injected either 2-6 times per week [36.9%; 95% CI: 28.2-47.0%] or once per week [28.5%; 95% CI: 20.3-36.6%]. Most IDUs denied sharing needle or syringes in the past month [91.5; 95% CI: 86.1-95.9%], and had never injected with a pre-filled syringe [96.0%; 95% CI: 92.1-99.4%]. About two-thirds (67%) of IDUs reported re-using their own needles and syringes in the past month. About half of those who reported sharing needles cleaned them before reusing (57.1%, *unadjusted*). The majority of IDUs injected at home [45.9%; 95% CI: 39.0-54.8%] or at the location of their dealer [38.9%; 95% CI: 31.2-46.9%]. Most IDUs procured their needles at the chemist shop (87.5%, *unadjusted*).

Sexual Risk Behaviors of IDUs

Less than half of IDUs had sex in the last 6 months [40.8%; 95% CI: 32.6-51.2%] and a little less than one-half had unprotected sex during their last sex [41.7%; 95% CI: 29.0-61.0%].

Figure 9: IDUs risk behaviors

Approximately one-half of IDU's last sex partners were steady [58.7%; 95% CI: 38.9-78.1%]; however 20.5% of their last sex partners were commercial sex workers [95% CI: 9.0-38.6%]. Over one-half of the participants who injected drugs had never been tested for HIV [58.5%; 95% CI: 51.6-66.1%]. Few IDUs experienced STI symptoms in the past 12 months [7.3%; 95% CI: 4.3-10.9].

Figure 10: STI Symptoms in the past 12 months

MSM Reporting of Sensitive Information by Interview Modes (ACASI and FTF)

A comparison of sensitive information as reported by participants using ACASI and FTF interview methods is presented in Table 7. There was no statistical difference in age between MSM participants who completed the interview FTF and those who completed the interview via ACASI; however there was a statistically significant difference in education. For MSM, the two modes of interviewing demonstrated no statistically significant difference in reporting on ever having sex with women, type of sex partner during last sex, and having tested for HIV in the last 12 months.

We found higher reporting of all sensitive behaviors through ACASI interviewing compared to FTF interviewing. The following indicators demonstrated statistically significant differences as reported by MSM who were administered ACASI versus a FTF interview. When asked how many women MSM had sex with in the last 2 months, a higher proportion of MSM interviewed via the ACASI method (69.9%) reported having more than two partners compared to FTF interviews (54.0%; $p < 0.01$). A higher proportion of MSM interviewed via ACASI reported having 2 or more anal male sex partners in the last 2 months compared to FTF (57.3% versus 49.5%; $p < 0.01$) and a higher proportion also reported their last anal sex with male was unprotected (67.1% versus 57.8%; $p < 0.05$). A much higher proportion of men reported having anal sex with women in the past 2 months (72%) in ACASI compared to FTF (21%) ($p < 0.001$). The same pattern was observed for having unprotected sex with women: 72% among ACASI compared to 57% among FTF ($p < 0.05$). A higher proportion of MSM self-identified as homosexual when administered the question via ACASI compared to FTF (55.5% versus 28.8%; $p < 0.001$). A higher proportion of MSM reported selling sex when administered the question with ACASI compared to FTF (54.4% versus 46.0%; $p < 0.05$). There were also statistically significant differences between ACASI and FTF group's reporting of drug use in the last 12 months (16.0% versus 0.6%; $p < 0.001$) and having had an STI symptom in the last 12 months (42.7% versus 20.5%; $p < 0.001$).

Figure 11: MSM reporting of sensitive behaviors

IDUs Reporting of Sensitive Information by Interview Modes (ACASI and FTF)

A comparison of sensitive information as reported by IDU participants using ACASI and FTF interview methods is presented in Table 8. For the majority of indicators, IDUs had no statistically significant differences in their reporting by FTF and ACASI interview modes. There were no significant differences found in the reporting of the following indicators: age, education, injected drugs in the past 1 month, frequency of drug injection, number of times they injected drugs on the last day, having injected with a pre-filled syringe, having had unprotected sex, their number of sex partners in the last two months, and having ever tested for HIV.

IDUs using ACASI reported injecting drugs for less than a year more often than those responding via FTF (3.1 versus 12.4; $p < 0.01$). A higher proportion of IDUs administered the interview via ACASI reported sharing needles almost always/every time compared to FTF (3.5% versus 0.0%; $p < 0.05$) and sometimes sharing needles (9.7% versus 6.0%; $p < 0.05$). Similar to MSM, the proportion of IDUs who reported a symptom of an STI in the last 12 months was higher in the ACASI group compared to FTF (11.1% versus 4.9%; $p < 0.05$).

MSM Health-Seeking Behavior, HIV testing and Verbal Insults

MSM health-seeking behaviors and data on verbal insults are reported in Table 9. About 40% of MSM sought advice or treatment for genital or anal discharge in the past 12 months. The majority sought advice or treatment from private clinics or hospitals (35.2%), pharmacies (25.0%), or gay and lesbian clinics (24.3%). Over a one-half of MSM seeking these services did not disclose having sex with men to their health providers (58.9%). Over half of all MSM said they would feel comfortable seeking STI services from a government clinic (55.7%), private clinics (40.6%), yet only 19.4% said they would feel comfortable seeking these services from a gay and lesbian clinic. Only 42.9% of all MSM had sought medical services from a clinic in the past 12 month. Additionally the majority of MSM (62.7%) experienced some form of verbal insult in the past 12 months.

A notable proportion of MSM (44.2%) in Abuja, 68.2% in Ibadan; and 61.7% in Lagos had never been tested for HIV [Table 5; see table for 95% CIs]. Among those ever-tested for HIV, 44.6% from Abuja, 22.9% from Ibadan, and 28.8% from Lagos were tested within the past 1 year [Table 5; see table for 95% CIs].

The highest proportion of MSM had their most recent HIV test at MHNN clinics (39.4%), with 31.7% having tested at a government clinic; and 24.5% having tested at a private clinic. Of those having been tested for HIV in the past 2 years 30.5% of MSM tested once, 26.8% tested twice, 18.3% tested three times, and 24.4% tested four or more times. MSM felt most comfortable getting an HIV test conducted at MHNN clinics (50.1%), private clinics (43.8%) or a government clinic (40.8%); however only 28.4% had visited MHNN clinics. The majority of MSM respondents had not participated in the 2010 IBBSS (68.1%) nor visited the MNHH clinic (71.6%).

Figure 12: Participants who had never had an HIV test

Computer Use and ACASI Acceptability

Tables 2a and 2b show the frequency of MSM and IDUs internet use. The majority of IDUs in Lagos used the computer less than once per week [87.2%; 95% CI: 79.2-91.3%]. Overall, MSM used the internet more frequently. About one-third of MSM in Abuja used the internet every day [29.3%; 95% CI: 21.7-41.6%], while only 17.5% of MSM in Ibadan [95% CI: 11.2-24.8] and 21.0% in Lagos [95% CI: 15.0-26.9] used the internet with the same frequency. Most MSM in Lagos [41.3; 95% CI: 33.9-49.2] and Ibadan [43.2%; 95% CI: 30.2-51.5%] used the internet 1-3 times a week.

Table 10 shows participant's opinions about using the ACASI laptop for the behavioral interview. Most participants who were administered the ACASI interview used the computer everyday or almost every day (42.5%) or 1-2 times per week (23.4%). Almost all participants felt very comfortable (80.9%) or comfortable (18.1%); and few found ACASI very or somewhat difficult to use (16.0%; data not shown). When asked to rate the ACASI on a scale of 1-5 with 5 being "they liked the ACASI very much", most participants rated the ACASI a five. Participants reported that they liked the ACASI because it was more private (46.8%) and that it was clearer because they could read and listen to the questions as often as they desired (30.9%). Of those who had completed a FTF interview in the past (75.5%), most preferred the ACASI (64.5%) or had no preference for interview mode (26.3%). The majority of ACASI participants said they would like to use the computer in the future to answer questions.

5.0 DISCUSSION

Overview of MSM

HIV and Factors associated with HIV

The prevalence of HIV among MSM describes three distinct epidemics in Abuja, Ibadan, and Lagos. After adjusting for network size and homophily in RDSAT, HIV prevalence among MSM in Abuja and Lagos was very high (34.9% and 15.2% respectively). This is approximately five to ten times higher than the HIV prevalence in Nigeria's general population (3.6%). This indicates a more mature and concentrated epidemic among MSM in Abuja and Lagos. HIV prevalence estimates in these two cities are corroborated by the 2010 IBBSS, where MSM had 37.6% prevalence in Abuja and 15.8% prevalence in Lagos (*adjusted*; IBBSS 2010 Report). In contrast to these two cities, HIV prevalence among MSM in Ibadan was the lowest (9.6% [95% CI]). This may indicate a more recent epidemic or that higher risk MSM have migrated to larger cities like Abuja and Lagos where there are more opportunities to meet other MSM. The high prevalence of HIV among MSM indicates that MSM are disproportionately affected by the epidemic in all three cities.

In Abuja and Lagos, age was significantly associated with positive HIV status where a higher proportion of older MSM were HIV positive. This was most prominent in Abuja (68%), where a higher proportion of those 31 and older were HIV positive. Age is a predisposing factor, indicating the increased risk MSM bears over time. Studies have shown that, in general, age is associated with an increase in number of sexual partners and increased sexual exposure to HIV (NPC, 2009; FMOH, 2008a). Many MSM will be infected with HIV over time if they are not reached with prevention interventions. While many MSM prevention programs target younger individuals who are more comfortable and open about their sexual identity, increasing programmatic attention should be given to MSM who are over age 30, particularly programs for PLHIVs.

Sexual identity was associated with HIV status in both Abuja and Ibadan. However in Abuja a higher proportion of men who self-identified as homosexual or gay were HIV positive; while in Ibadan a higher proportion of those who identified as bisexual or straight were HIV positive. While there was little difference between the overall proportion of respondents who identified as straight, bisexual, or homosexual/gay, the risk profile for gay identified and non-gay identified MSM in these populations may differ for several reasons. The characteristics of MSM in Ibadan and Abuja are different. Self-identified bisexual or straight men in Ibadan, a more conservative community compared to Abuja, may be those who are uncomfortable with their sexuality and have the least access to HIV prevention information for MSM. Discomfort with self sexual identity could prevent men from accessing health care services. Studies have found that men who are uncomfortable with their sexual identity often have low self-efficacy for condom use and are more likely to be infected with HIV (Huebner, Davis et al. 2002; Ross, Rosser et al. 2008; Newcomb and Mustanski 2009). It may also be that MSM in Ibadan who self-identify as bisexual or straight are more likely to be HIV positive because a higher proportion engage in sex with women and may be exposed to HIV from their female partners. In contrast, homosexual self-identified MSM in the urban center of Abuja may have more opportunities to have sex with other MSM and may also engage in riskier sexual behaviors. Further analyses should be conducted to explore risk factors related to sexual identity in Nigeria.

STIs

For the most part, there were low rates of STIs among MSM. Syphilis prevalence ranged from a weighted prevalence of 0.5% to 1.9%. This finding is consistent with finding from the IBBSS 2007 (FMOH, 2008b). Additionally, prevalence of gonorrhea was also quite low in all three cities, with an adjusted prevalence estimates ranging from 0 to a high of 8.9% in Ibadan. Compared to Abuja and Lagos, where there was virtually no chlamydia, MSM in Ibadan had a high prevalence, with 34.5% testing positive. The overall low prevalence of STIs in Abuja and Lagos may result from the increased availability of treatment for general STI symptoms at pharmacies (IBBSS Report 2007). While Ibadan MSM did not report any notable differences in risk behavior compared to MSM in Abuja and Lagos, a high proportion of men (over 50%) had sex with a female partner in the last 2 months which may have been a contributing factor. In addition, lack of access to or availability of over-the-counter STIs medications in Ibadan could also explain the high prevalence of chlamydia in the city.

We found a notable prevalence of HBV among MSM in Ibadan and Abuja, with over 20% testing positive compared to prevalence of about 7% in Lagos. This indicates a need for vaccination because MSM are at higher risk of HBV infection; co-infection of HBV and HIV would severely affect their health.

Risk Behaviors

A large proportion of MSM in all three cities had sex with a female partner in the last 2 months (36.1% in Abuja, 53.7% in Ibadan, and 53.0% in Lagos; *data not shown*); and a large proportion of MSM in all three cities had sex with both men and women in the last 2 months. Across the three cities, MSM also reported engaging in high risk sex where a high proportion of last sex acts with both men and women were unprotected. In Ibadan, almost half of MSM reported their last anal sex act as unprotected. This highlights a growing need for targeted HIV prevention interventions to be implemented across all states irrespective of whether it is a lower or higher prevalence setting. While the proportion of MSM engaging in unprotected anal sex in Abuja and Lagos was not as high as Ibadan, these cities still had extremely high proportions of unprotected last anal sex (31.1% and 43.5% respectively).

A very high proportion of MSM also reported being paid for sex in the past 6 months. Most of these men reported being paid for sex by more than two different partners, indicating that these MSM engage in commercial sex work regularly. Transactional sex occurred most frequently in Lagos and Ibadan, where a little over half of MSM engaged in transactional sex in the last 6 months. Given that male commercial sex work is not systematically addressed, this behavior should be taken into account in prevention programming for MSM.

Overview of IDUs

HIV and STI prevalence

Overall, the prevalence of HIV and STI's among IDUs in Lagos was low. Contrary to expectation, IDUs had low prevalence of HCV and HBV. With high rates of transmission resulting from blood-to-blood transmission by sharing needles, prevalence among Lagos IDUs was very low compared to some other IDU populations in Africa. This is most likely because most IDUs did not report sharing needle or syringes (only about 8.6% stated they always or sometimes shared needles with other injectors). Low levels of needle and syringe sharing are likely due to easy access to low-cost sterile needles through pharmacies. New syringes can be procured for NGN10 (< USD 0.06) or less. Approximately 80% of IDUs reported buying needles and syringes from the chemist shop. Since the low prevalence of needle sharing and correspondingly low prevalence of HBV/HCV/HIV are dependent on the availability of sterile injection equipment, local programs must regularly assess the availability of these materials to IDUs.

Risk Behaviors

Most IDUs injected once a week or more. While there was little sharing of injection equipment between IDUs, many used their own needles several times before discarding and about 20% reported never cleaned their needle/ syringe prior to re-use. While this would not lead to an increase in transmission of viruses such as HIV and HBV/HCV between IDUs, it may lead to a greater number of other health problems such as bacterial infections and abscesses. Although a fairly high proportion of IDUs were not sexually active (59%), a notable proportion of IDUs did report engaging in sexual behaviors such as having sex with a commercial sex worker (20%) or with a casual partner (21%).

Additionally, the majority of IDUs have never been tested for HIV (59%). As expected with their reduced sexual activity, a low proportion of IDUs reported having STI symptoms (7%).

Reporting of Sensitive Behaviors by Interview Mode

The IDU comparison groups for the ACASI and FTF interview modes were similar in both age and education (the indicators used to determine their comparability). However, for MSM, age was similar, but education was not.

MSM

We predicted that risk behaviors would be reported more frequently by Nigerian MSM participating in the ACASI group because they would feel more comfortable reporting sensitive behaviors to a computer compared to an interviewer. The findings from the ACASI and STI comparison support our hypothesis. Indicators that had statistically significant differences between the two methods included the following: number of women who the respondent had sex with in the last 2 months, number of male anal sex partners in the last 2 months, unprotected anal sex at last sex, sexual identity, being paid for sex in the last 6 months, having an STI symptom in the last 12 months, and drug use in the last 12 months.

All behavioral indicators that were found significant were also found to be significant in the predicted direction (ie ACASI elicited responses that equated to higher risk behavior and FTF interview elicited responses that equated to lower risk behavior). A higher proportion of MSM in the FTF group reported having fewer male anal sex partners in the last 2 months compared to the ACASI group; and a higher proportion of those in the ACASI group also reported having

unprotected anal sex during their last sex. MSM also reported having a greater number of sex partners when using the ACASI method. These findings demonstrate that the reporting of sensitive sexual behaviors by this population is influenced by the interview method.

Homosexual self-identity was also reported more frequently by MSM in the ACASI group and bisexual identity reported more frequently in the FTF group. This finding suggests that reporting bisexual self identity to others in a FTF interview is viewed as more culturally acceptable by MSM participants; perhaps because engaging in homosexual behavior is highly stigmatized in Nigeria. This finding also supports the hypothesis that MSM feel more comfortable reporting a homosexual or gay self identity via ACASI method.

As predicted, MSM also reported having anal sex with women, having unprotected anal sex with women, selling sex, having an STI symptom, and using drugs more frequently in the ACASI group. Given that the ACASI group consistently reported sensitive risk behaviors more frequently; this has many implications for research done with Nigerian MSM or other high risk sexually active populations in the future. Additionally, these findings bring into question the accuracy of sensitive behavioral data collected via FTF interview method with this sensitive population.

IDUs

While we found strong evidence that sensitive sexual behaviors were reported more frequently by MSM who were interviewed via ACASI, there was less evidence that ACASI was a more effective method of collecting data from IDUs on sensitive drug use behaviors. Significant differences in sensitive injecting behaviors were found in only two behavioral indicators: number of years IDUs injected and frequency of sharing needles. IDUs actually reported injecting for a fewer number of years when answering via ACASI. This could indicate that the groups were not comparable in the number of years they had injected drugs; or it could indicate the presence of some other social desirability bias. For example, IDUs may want to impress interviewers with the length of time they have been injecting. Additional research is necessary to explore this nuanced finding. IDUs did however report sharing needles more often when they were asked via the ACASI, indicating that sharing needles may be a more sensitive behavior for IDUs. Similar to the MSM group, IDUs also reported having had symptoms of an STI more frequently in the ACASI group.

Overall, these findings suggest that ACASI may be better at eliciting sensitive behavioral data from MSM that pertains to sex, identity, and drug use versus eliciting injecting behaviors that may not be viewed by the IDU participants as highly stigmatized or socially undesirable in the context of a face-to face-interview. Interestingly, both MSM and IDUs reported having previously had an STI symptom with greater frequency in the ACASI group, which may point to more cultural sensitivity around sexual behavior and health in Nigeria.

When asked about the acceptability of ACASI, the majority of respondents found using it very comfortable and not at all difficult to use. In addition, users who liked the ACASI said it was primarily due to the increase in privacy, which likely led to the increase in reporting of sensitive sexual behaviors. Thus, ACASI also seems to be a feasible and viable alternative to conducting FTF interviews with this population.

MSM Health Seeking Behavior and Verbal Insults

A large proportion of MSM reported being symptomatic of at least one STI in the last 12 months (31.2%). Of the 52% (*data not shown*) that sought treatment, only about half disclosed that they had sex with men to their provider.

This is a critical entry point for further screening of STIs specific to MSM that may facilitate transmission of HIV in this population.

There is a high proportion (45%) of MSM that have never tested for HIV, indicating either there is unmet need regarding HIV testing for MSM or MSM don't feel comfortable seeking HIV testing because they are afraid of a positive test result. MSM may also fear that their sexual identity is revealed. The findings show that the proportion of MSM who experienced verbal insults was high and disclosure to providers about sexual orientation was fairly low.

6.0 RECOMMENDATIONS

Based on the findings of this study, we hereby recommend the following:

1. HIV prevalence is alarmingly high among MSM in Nigeria [5 to 10 times higher than HIV prevalence among the general population], indicating that more resources and targeted interventions are needed for this population.
2. MSM are at high risk for being infected with HIV and for transmitting HIV to others because a high proportion have multiple sex partners, and sex with both men and women; and they engage in unprotected sex.
3. There may be a high level of unmet need regarding HIV testing and intervention services for MSM. About one-half of MSM have never been tested for HIV while engaging in extremely risky sexual behaviors with both men and women. Programs need to focus on increasing access to HIV testing and risk reduction messages.
4. In Abuja, where a large number of MSM are positive, services targeting MSM should focus on testing and linkages to services for PLHIVs; Positive Health, Dignity and Prevention programs must be available for MSM PLHIV.
5. In Abuja, there is a need to target self-identified homosexual/gay community with tailored prevention messages. In Ibadan, there is a need to target the self-identified bisexual/straight identified MSM with prevention messages and services.
6. Given that having unprotected anal sex at last sex was associated with HIV positive status in both Abuja and Ibadan, programs targeting those who recently tested positive should be linked to PHDP programs, to reduce further transmission.
7. Programs need to address the internalized homophobia of MSM that may make MSM feel ashamed of their sexual identity and reduce their access to prevention services and materials.
8. Male commercial sex work must be integrated into prevention programs targeting MSM and/or commercial sex workers.
9. The ACASI method for interviewing should be implemented among MSM to improve data collected on sensitive sexual behaviors.
10. Further studies may be necessary to explore why HIV prevalence among IDUs is low.
11. Studies using RDS need a flexible time-frame in order to reach a large and diverse sample of MSM.

7.0 LIMITATIONS

We did not include female IDUs. This is a much smaller group relative to the male IDU population in Nigeria. In addition, they may have different risk behaviors (such as being more prone to selling sex for drugs) than male IDUs. Given that they are also hidden and even harder to reach, we propose formative research in the form of qualitative interviews would be the most appropriate approach for collecting information on female IDUs risk behaviors and their sexual health needs.

Study staff faced challenges recruiting MSM in Abuja. This may have been because the city of Abuja is more spread out than Lagos with more limited transportation options to reach the study site. Additionally, MSM in Abuja may have been of higher education and economic position; those who obtain health services such as HIV testing in the private sector may not have felt comfortable being identified as an MSM in a public location, such as the MHNN study site.

The prevalence of both HIV and chlamydia should be interpreted with caution because the samples for the STIs were not as large as the recruited study population. A high proportion of study participants declined undergoing the HIV test and the urethral swab for chlamydia testing. The sample size for HIV testing follows (ie. *# tested/total sample size*): Abuja=174/194; Ibadan=194/210; Lagos MSM=297/308; and Lagos IDUs=326/328. Approximately 10% of participants in Abuja declined HIV testing. And for chlamydia the sample size follows: Abuja=163/194; Ibadan=203/210; Lagos MSM=71/308; and Lagos IDUs=110/328. In Lagos, only 23% of MSM and 34% of IDUs agreed to the urethral swab for chlamydia. This is a very high refusal rate and should be considered when determining whether to use a urethral swab for any STI testing with these populations.

We used rapid tests to test for HIV and no confirmation test was conducted. However, given high sensitivity and high specificity of the rapid HIV test (Unigold), we believe that possible false positive and negative results were minimal.

One limitation in the design of the ACASI and FTF comparison was that participants could not serve as their own control in the interview due to the potential for recall bias (ie participants would attempt to recall what they previously answered on the survey and not the actual experience). To control for that, we postulated having a week lag time for the interviews; however this would have also changed their window for answering questions and the survey could then not be directly compared. Because of these limitations, we randomized participants into the two groups (ACASI and FTF). The IDU groups are similar in both age and education; the indicators we are using to determine their comparability. For MSM, age was similar, but education was not found to be similar.

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APPENDIX: TABLES OF RESULTS

Table 2a: Descriptive characteristics of the study populations

Characteristics	Abuja MSM		Ibadan MSM	
	Unadjusted % (n)	Adjusted % (95% CI)	Unadjusted % (n)	Adjusted % (95% CI)
Age [median; min-max]	25 (18-52)	n/a	23 (18-43)	n/a
Age (yrs)				
18-20	13.0 (24)	19.1 (10.1-27.7)	22.9 (48)	29.8 (20.8-39.1)
21-25	48.1 (89)	48.5 (35.4-59.2)	43.3 (91)	43.7 (35.1-52.8)
26-30	25.4 (47)	22.3 (14.7-34.1)	19.5 (41)	15.3 (9.2-21.5)
31	13.5 (25)	10.2 (5.1-16.5)	14.3 (30)	11.2 (0.6-17.4)
Education				
Primary	9.3 (18)	8.9 (4.5-14.0)	6.2 (13)	9.0 (4.1-14.4)
Secondary	47.9 (93)	56.8 (47.2-66.1)	61.0 (128)	67.3 (58.5-75.0)
Tertiary	42.8 (83)	34.3 (24.7-44.1)	32.8 (69)	23.7 (16.7-32.4)
Job				
Not earning	30.9 (60)	35.4 (25.6-44.0)	39.5 (83)	43.2 (34.0-50.8)
Part-time	20.6 (32)	19.8 (12.4-28.0)	24.8 (52)	24.2 (18.3-31.6)
Self-employed	18.6 (36)	20.2 (11.6-28.2)	24.3 (51)	21.5 (14.8-29.1)
Fulltime	29.9 (58)	24.6 (18.7-33.9)	11.4 (24)	11.2 (6.9-16.3)
Type of dwelling				
Own	8.8 (17)	8.7 (3.7-14.6)	6.7 (14)	3.8 (2.3-9.3)
Rent	57.2 (111)	51.5 (41.5-61.8)	53.3 (112)	55.0 (44.0-64.4)
Parents' house	25.8 (50)	33.1 (23.3-42.9)	36.7 (77)	35.9 (27.3-45.3)
Other	8.3 (16)	6.7 (3.2-11.0)	3.3 (7)	5.3 (1.0-7.7)
Marital status				
Single	80.0 (152)	79.1 (70.9-88.5)	69.5 (146)	65.8 (56.8-74.5)
Single living w/ female partner	5.6 (11)	8.7 (3.5-18.6)	2.4 (5)	2.1 (0.3-4.6)
Single living w/ male partner	10.5 (20)	10.2 (4.3-12.3)	14.8 (31)	13.2 (7.8-19.1)
Married to a woman	3.7 (7)	2.0 (0.2-2.7)	13.3 (28)	18.9 (10.4-28.5)
Religion				
Christian	75.9 (145)	76.8 (66.9-86.3)	70.3 (147)	59.6 (52.3-71.5)
Muslim	23.0 (44)	22.8 (13.3-32.8)	28.2 (59)	38.0 (27.3-46.7)
Other	1.0 (2)	--	1.4 (3)	--
Away from home for 1 month (past year)				
Yes	57.2 (111)	58.8 (48.9-68.7)	55.2 (116)	54.1 (46.6-62.2)
No	42.8 (83)	41.2 (31.3-51.1)	44.8 (94)	45.9 (37.8-53.4)
Self-reported sexual identity				
Straight	5.1 (9)	3.7 (0.4-7.8)	2.6 (5)	2.3 (0.3-4.9)
Bisexual	46.0 (81)	44.0 (33.8-55.1)	56.7 (110)	58.0 (48.7-68.0)
Gay (homosexual)	48.9 (86)	52.3 (41.5-62.6)	40.7 (79)	39.7 (29.5-49.3)
How often you use internet				
Almost everyday	31.7 (50)	29.3 (21.7-41.6)	20.6 (36)	17.5 (11.2-24.8)
1-3 times/week	35.4 (60)	33.6 (21.6-42.4)	38.9 (68)	43.2 (30.2-51.5)
Less than once /week	32.9 (52)	37.1 (26.1-48.6)	40/6 (71)	39.3 (32.5-51.5)
Total sample (N)	194		210	

Table 2b: Descriptive characteristics of the study populations (continued)

<i>Characteristics</i>	<i>Lagos MSM</i>		<i>Lagos IDU</i>	
	<i>Unadjusted % (n)</i>	<i>Adjusted % (95% CI)</i>	<i>Unadjusted % (n)</i>	<i>Adjusted % (95% CI)</i>
Age [median; min-max]	21 (18-45)		40 (18-50)	
Age (yrs)				
18-20	43.9 (133)	49.5 (41.2-56.5)	0.3 (1)	n/a
21-25	40.3 (122)	39.7 (32.7-47.4)	3.4 (11)	
26-30	12.2 (37)	9.5 (6.2-14.6)	9.9 (32)	
31	11.0 (3.6)	1.3 (0.4-2.4)	86.4 (280)	
Education				
Primary	4.9 (15)	4.7 (1.7-7.9)	26.8 (88)	26.9 (20.9-33.4)
Secondary	78.2 (241)	83.5 (77.9-88.4)	44.8 (147)	46.7 (39.3-53.9)
Tertiary	16.9 (52)	11.8 (8.0-16.5)	28.4 (93)	26.4 (20.0-32.7)
Job				
Not earning	30.8 (95)	34.0 (27.3-41.5)	34.5 (113)	35.0 (28.5-43.0)
Part-time	37.7 (116)	38.2 (30.6-45.5)	27.1 (89)	27.6 (21.2-32.9)
Self-employed	15.9 (49)	12.4 (8.2-17.2)	32.0 (105)	30.3 (23.2-38.2)
Fulltime	15.6 (48)	15.4 (9.8-22.1)	6.4 (21)	7.1 (3.9-10.6)
Type of dwelling				
Own	7.8 (24)	5.8 (3.0-8.6)	5.5 (18)	4.5 (2.0-6.9)
Rent	30.5 (94)	28.9 (22.4-35.3)	29.9 (98)	30.9 (24.9-38.1)
Parents' house	57.1 (176)	61.9 (55.7-68.9)	34.2 (112)	36.0 (29.2-43.5)
Other	4.6 (14)	34.0 (14.0-59.0)	30.5 (100)	28.6 (22.0-34.8)
Marital status				
Single	56.5 (174)	57.0 (48.2-63.7)	60.1 (182)	60.9 (54.2-
Single living w/ female partner	10.1 (31)	11.0 (7.1-15.8)	4.6 (14)	5.4 (2.7-8.2)
Single living w/ male partner	30.2 (93)	28.7 (22.3-36.0)	0.7 (2)	0.5 (0-1.3)
Married to a woman	3.3 (10)	3.2 (1.1-6.2)	34.0 (103)	32.5 (24.0-38.6)
Religion				
Christian	73.7 (227)	72.6 (63.3-81.2)	70.3 (277)	74.0 (69.5-80.9)
Muslim	25.7 (79)	27.2 (18.6-36.5)	27.9 (90)	23.3 (17.2-28.4)
Other	0.7 (2)	--	1.8 (6)	--
Away from home for 1 month (past year)				
Yes	55.2 (170)	52.9 (45.7-60.5)	29.3 (96)	27.5 (21.6-33.4)
No	44.8 (138)	47.1 (39.5-54.3)	70.7 (232)	72.5 (66.6-78.4)
Self-reported sexual identity ⁴				
Straight	3.2 (9)	1.5 (0.4-3.0)	n/a	n/a
Bisexual	60.4 (172)	63.5 (55.2-70.7)		
Gay (homosexual)	36.5 (104)	35.1 (27.6-43.5)		
How often you use internet				
Almost everyday	25.6 (78)	21.0 (15.0-26.9)	3.7 (9)	3.7 (1.3-7.5)
1-3 times/week	40.7 (124)	41.3(33.9-49.2)	9.8 (24)	9.1 (5.2-16.7)
Less than once /week	30.8 (103)	37.7 (30.1-45.6)	86.6 (213)	87.2 (79.2-91.3)
Total sample (N)	308		328	

(d) ⁴ Only 5 IDUs reported having sex with men and self-identified as bi/homosexual

Table 3: Unweighted and weighted seroprevalence of HIV and STIs among MSM and IDUs, by site

<i>Site</i>		<i>HIV</i>	<i>Syphilis</i>	<i>Gonorrhea</i>	<i>Chlamydia</i>	<i>HBV</i>	<i>HCV</i>
Abuja MSM	Unweighted % (n)	42.0 (73)	1.6 (3)	0	0	24.6 (46)	3.2 (6)
	RDSAT weighted % (95% CI)	34.9 (25.5-45.9)	0.5 (0.1-1.4)	0	0	21.9 (14.7-31.6)	4.1 (0.6-9.7)
Ibadan MSM	Unweighted % (n)	8.8 (17)	0.5 (1)	7.9 (16)	34.0 (69)	19.9 (40)	2.9 (6)
	RDSAT weighted % (95% CI)	11.3 (5.1-16.8)	0.4 (0.4-1.6)	8.9 (4.7-13.6)	34.5 (26.4-42.8)	21.4 (15.1-27.3)	4.4 (0.5-4.6)
Lagos MSM	Unweighted % (n)	20.2 (60)	2.3 (7)	5.9 (18)	4.2 (3)	7.3 (22)	3.4 (10)
	RDSAT weighted % (95% CI)	15.2 (9.7-21.2)	1.9 (0.4-4.0)	4.2 (1.8-7.0)	0	6.5 (3.3-10.3)	3.3 (0.9-6.4)
Lagos IDU	Unweighted % (n)	1.8 (6)	0.6 (2)	0	0.9 (1)	6.8 (22)	5.9 (19)
	RDSAT weighted % (95% CI)	0.9 (0.2-2.0)	1.9 (0-2.6)	0	3.7 (0-6.0)	7.8 (4.3-11.7)	7.7 (3.5-12.7)

Table 4: HIV seroprevalence by socioeconomic characteristics and HIV - risk behaviors⁵

<i>Characteristics</i>	<i>Abuja MSM</i>	<i>Ibadan MSM</i>	<i>Lagos MSM</i>
	% (n)	% (n)	% (n)
Age (yrs)			
18-20	30.4 (7)*	10.6 (5)	10.8 (14)***
21-25	36.3 (29)	9.4 (8)	22.4 (26)
26-30	50.0 (20)	0 (0)	45.7 (16)
31	68.2 (15)	15.4 (4)	27.3 (3)
Education			
Primary	55.6 (10)	23.0 (3)	26.7 (4)*
Secondary	43.0 (37)	8.1 (10)	17.3 (41)
Tertiary	37.1 (26)	6.9 (4)	33.3 (15)
Marital status			
Single	42.9 (3)	12.0 (16)	27.1 (45)**
Single living w/female partner	50.0 (5)	0 (0)	10.3 (3)
Single living w/male partner	64.7 (11)	0 (0)	9.8 (9)
Married to a woman	39.0 (53)	3.9 (1)	30.0 (3)
Religion			
Christian	38.9 (51)	7.4 (10)	22.8 (50)
Muslim	51.2 (22)	12.1 (7)	12.8 (10)
Away from home for 1 months			
Yes	37.8 (37)	10.1 (11)	19.6 (32)
No	47.2 (34)	7.0 (6)	21.0 (28)
Self-reported sexual identity			
Homosexual	50.0 (37)*	2.7 (2)	20.2 (35)
Bisexual/straight	34.2 (28)	13.5 (14)**	21.0 (21)
Unprotected anal sex with men (last sex)			
Yes	54.6 (24)*	16.2 (12)**	21.9 (35)
No	37.3 (41)	3.0 (3)	18.8 (22)
Multiple male sex partners past 2 months			
No	42.6 (40)	10.4 (11)	19.1 (18)
Yes	41.3 (33)	6.8 (6)	20.9 (39)
Male sex work			
Yes	47.3 (35)	6.5 (6)	23.4 (39)
No	38.0 (38)	10.9 (11)	16.2 (21)
Type of sex partner			
Steady	46.7 (35)	9.6 (10)	25.5 (27)
Casual	37.3 (28)	3.5 (1)	16.7 (16)
Commercial sex	41.7 (10)	9.8 (6)	17.9 (17)
Injected drug past 12 months			
Yes	33.3 (8)	0	3.6 (1)
No	43.3 (68)	9.5 (17)	22.1 (57)

*: significant at $p < 0.05$; **: significant at $p < 0.01$; ***: significant at $p < 0.001$

(e) ⁵ The HIV seroprevalence among IDUs is too low (1.8%) to stratify the analysis.

Table 5: HIV risk among MSM

Characteristics	Abuja MSM		Ibadan MSM		Lagos MSM	
	% (n) ^a	% (95% CI) ^b	% (n) ^a	% (95% CI) ^b	% (n) ^a	% (95% CI) ^b
Self-reported sexual identity						
Gay (homosexual)	51.1 (90)	51.4 (40.8-62.2)	40.7 (79)	39.7 (29.8-49.5)	37.2 (106)	35.1 (27.8-43.6)
Bisexual	48.9 (86)	48.6 (37.8-59.2)	59.3 (115)	60.3 (50.5-70.2)	62.8 (179)	64.9 (56.4-72.2)
Ever had sex with women?						
Yes	63.7 (121)	55.5 (46.7-67.7)	82.4 (173)	82.6 (76.5-88.2)	80.2 (247)	79.7 (73.6-85.5)
No	36.3 (69)	44.5 (32.3-53.3)	17.6 (37)	17.4 (11.8-23.5)	19.8 (61)	20.3 (14.5-26.4)
Number Female sex partners (past 2 months)						
0	64.4 (125)	63.8 (53.6-73.6)	50.0 (105)	46.3 (37.7-54.7)	48.7 (150)	47.0 (39.6-54.9)
1	13.9 (27)	13.7 (7.3-21.0)	22.4 (47)	23.8 (16.8-31.6)	14.9 (46)	18.0 (11.4-25.6)
2	21.7 (42)	22.4 (14.1-31.3)	27.6 (58)	29.9 (22.2-37.7)	36.4 (112)	35.0 (27.9-42.1)
Number of male anal sex partners (past 2 months)						
0	10.3 (23)	7.1 (3.9-11.7)	25.7 (54)	16.5 (10.4-23.6)	12.7 (39)	14.5 (9.6-19.2)
1	31.4 (61)	39.7 (29.8-50.3)	28.6 (60)	31.0 (23.2-39.2)	18.5 (57)	24.5 (17.4-32.4)
2	58.3 (113)	53.2 (42.1-63.6)	45.7 (96)	52.5 (43.4-61.3)	68.8 (212)	61.0 (52.9-69.0)
Had sex with both men and women (past 2 months)						
Yes	27.8 (54)	27.7 (18.3-37.0)	37.1 (78)	39.0 (30.7-47.2)	44.2 (136)	45.8 (38.2-53.3)
No	72.2 (140)	72.3 (63.0-81.7)	62.9 (132)	61.0 (52.8-69.3)	55.8 (172)	54.2 (46.7-61.8)
Unprotected anal sex with men (last sex)						
Yes	28.3 (49)	31.1 (21.2-41.0)	42.8 (80)	49.8 (39.1-59.7)	40.5 (117)	43.5 (35.5-53.5)
No	71.7 (124)	68.9 (59.0-78.8)	57.2 (107)	50.2 (40.3-60.9)	59.5 (172)	56.5 (46.5-64.5)
Unprotected vaginal sex with women (last 2 month sex)						
Yes	40.9 (27)	41.6 (19.4-73.7)	41.4 (46)	41.1 (28.0-52.7)	34.0 (63)	35.5 (24.1-50.6)
No	59.1 (39)	58.4 (26.3-80.6)	58.6 (65)	58.9 (46.5-71.1)	66.0 (122)	64.5 (49.4-75.9)
Unprotected receptive anal sex						
Yes	30.4 (59)	32.9 (23.7-42.3)	24.3 (51)	24.9 (17.5-32.5)	38.0 (117)	35.6 (28.2-42.9)
No	69.6 (135)	67.1 (57.7-76.3)	75.7 (159)	75.1 (67.5-82.5)	62.0 (191)	64.4 (57.1-71.8)
Unprotected insertive anal sex with men						
Yes	35.6 (69)	34.8 (25.2-44.4)	33.8 (71)	37.2 (29.0-45.3)	38.6 (119)	35.2 (28.3-42.8)
No	64.4 (125)	65.2 (55.6-74.8)	66.2 (139)	62.8 (54.7-71.0)	61.4 (189)	64.8 (57.2-71.7)
Used lubricant (last sex)						
Yes	80.9 (140)	76.3 (68.9-87.4)	54.1 (99)	46.2 (39.4-56.4)	71.0 (203)	66.7 (59.2-75.1)
No	19.1 (33)	23.7 (12.0-30.2)	45.9 (84)	53.8 (42.4-59.9)	29.0 (83)	33.3 (22.8-38.6)
Used female condom for anal sex with men (last 6 months)						
Yes	10.6 (18)	14.5 (5.6-21.5)	11.4 (22)	12.7 (6.6-19.3)	15.9 (46)	18.0 (10.7-25.7)
No	89.4 (152)	85.5 (78.2-94.1)	88.6 (171)	87.3 (80.7-93.4)	84.1 (243)	82.0 (74.3-89.3)
Being paid for sex past 6 months						
Yes	43.3 (84)	38.0 (29.3-48.0)	48.1 (101)	51.0 (42.6-59.8)	55.5 (171)	54.5 (46.3-62.9)
No	56.7 (110)	62.0 (52.0-70.7)	51.9 (109)	49.0 (40.2-57.4)	44.5 (137)	45.5 (37.1-53.7)

Number of men paid you for sex past 6 months						
0	56.7 (110)	61.5 (51.7-70.5)	51.9 (109)	49.5 (40.6-57.5)	44.5 (137)	45.5 (37.5-53.9)
1	7.2 (14)	6.2 (2.8-10.6)	15.2 (32)	17.7 (11.6-24.2)	8.2 (25)	10.2 (5.3-15.9)
2	36.1 (70)	32.2 (24.0-41.3)	32.9 (69)	32.8 (26.0-41.3)	47.4 (146)	44.3 (35.6-52.4)
Type of sex partners						
Steady	43.8 (85)	44.0 (34.3-51.9)	53.3 (112)	53.5 (45.1-61.6)	36.3 (112)	30.5 (24.0-37.9)
Casual	43.3 (84)	44.1 (36.1-53.9)	31.4 (66)	30.6 (23.2-38.5)	31.8 (98)	33.9 (26.4-42.2)
Commercial sex	12.9 (25)	11.9 (6.5-18.4)	15.2 (32)	16.0 (10.2-22.0)	31.8 (98)	35.6 (28.1-43.2)
Used drug past 12 months						
Yes	6.7 (13)	8.3 (3.4-14.8)	6.7 (14)	5.3 (2.3-9.4)	9.1 (28)	7.5 (4.7-12.0)
No	93.1 (176)	91.7 (85.2-96.6)	93.3 (195)	94.7 (90.6-97.7)	90.9 (280)	92.5 (88.0-95.3)
Reasons for not using condom (male sex partner)						
Condom not available	26.5 (13)	n/a	16.7 (13)	n/a	33.9 (39)	n/a
Trusted partner	36.7 (18)		19.2 (15)		22.6 (26)	
Heat of the moment	8.2 (4)		19.2 (15)		7.0 (8)	
Don't like condom/other	28.5 (14)		45.0 (35)		36.5 (42)	
Ever been tested for HIV						
Yes	68.4 (130)	55.8 (44.1-67.4)	46.7 (98)	31.8 (24.0-41.3)	52.3 (161)	38.3 (31.6-47.2)
No	31.6 (60)	44.2 (32.6-55.9)	53.3 (112)	68.2 (58.7-76.0)	47.7 (147)	61.7 (52.8-68.4)
Frequency of HIV test						
Not tested past 2 year	33.0 (64)	45.2 (34.5-55.5)	53.3 (112)	68.9 (59.8-76.7)	47.7 (147)	61.2 (51.6-67.7)
Tested within the past 1-2 yrs	12.9 (25)	10.2 (5.0-16.5)	10.0 (21)	8.2 (4.9-12.9)	8.8 (27)	10.0 (6.3-16.7)
Tested within past 1 year	54.1 (105)	44.6 (34.6-54.5)	36.7 (77)	22.9 (15.7-31.1)	43.5 (134)	28.8 (22.1-36.6)
Had STI symptoms in the past 12 months						
Yes	29.4 (57)	27.5 (18.1-37.5)	25.2 (53)	23.6 (17.5-30.0)	36.4 (112)	37.1 (28.5-45.1)
No	70.6 (137)	72.5 (62.5-81.9)	74.8 (157)	76.4 (70.0-82.5)	63.6 (196)	62.9 (54.9-71.5)

Notes: a= un-weighted results; b=weighted results

Table 6: HIV risk among Lagos IDUs

Characteristics	Lagos IDU	
	Un-weighted % (n)	Weighted % (95% CI)
Age first injected drug (median/range)	28.5 (8-48)	n/a
Years of injecting drugs		
<1 year	7.7 (25)	8.9 (5.2-12.5)
1-5 years	41.2 (134)	46.0 (39.6-53.3)
6-10 years	29.2 (95)	26.1 (20.5-31.8)
> 10 years	21.9 (71)	19.0 (13.8-24.1)
Injected drug past 1 months		
Yes,	75.7 (237)	74.1 (67.2-80.2)
No	24.3 (76)	25.9 (19.8-32.8)
Frequency of drug injection (past month)		
Only one	20.8 (49)	23.7 (15.7-31.2)
One a week	29.7 (70)	28.5 (20.3-36.6)
2-6 times/week	39.4 (93)	36.9 (28.2-47.0)
One a day	5.1 (12)	6.9 (3.4-13.5)
More than one a day	5.1 (12)	4.0 (1.0-6.3)
Used your own needle and syringe over again in the last one month		
Yes	33.0 (79)	21.1 (15.6-26.6)
No	67.0 (160)	78.9 (73.4-84.4)
Used needle or syringe that has been used by others (past month)		
Almost/every time	1.7 (4)	2.4 (0.5-5.5)
Sometimes	7.2 (17)	6.2 (2.5-11.0)
Never	91.1 (215)	91.5 (86.1-95.9)
Injected with pre-filled syringe		
Yes	5.9 (14)	4.0 (0.6-7.9)
No	94.1 (224)	96.0 (92.1-99.4)
Cleaned needle/syringes that has been previously used^a		
Almost/every	57.1 (12)	n/a
Sometime	23.8 (5)	
Never	19.1 (4)	
Common location for injection		
Home	47.1 (146)	45.9 (39.0-54.8)
Friend's house	10.0 (31)	9.0 (5.0-11.5)
Dealer	36.8 (114)	38.9 (31.2-46.9)
Public place	6.1 (19)	6.1 (2.8-9.8)
Where to get new syringe/needle		
Needle exchange	0.3 (1)	0.3 (0-0.9)
Chemist's shop	87.5 (273)	86.6 (82.8-91.7)
Dealer	8.7 (27)	9.5 (5.7-13.3)
Health worker	1.3 (4)	1.3 (0.1-2.5)
Friend	2.2 (7)	2.4 (0.5-3.9)
Aware of HIV intervention targeted IDU?		
Yes	65.8 (204)	64.3 (57.8-72.1)
No	34.2 (106)	35.7 (27.9-42.2)

Notes: ^a only among those who shared needle & syringes

Had sex in the past 6 months		
Yes	41.0 (118)	40.8 (32.6-51.2)
No	59.0 (170)	59.2 (48.8-67.4)
Had unprotected sex (last sex within the past 6 months)		
No	53.5 (62)	58.3 (39.0-71.0)
Yes	46.5 (54)	41.7 (29.0-61.0)
Type of sex partner (those had sex with in the past 6 months)		
Steady	70.7 (82)	58.7 (38.9-78.1)
Casual	16.4 (19)	20.9 (7.1-29.9)
Commercial sex	12.9 (15)	20.5 (9.0-38.6)
Number of female sex partners past 2 months		
Did not have sex with women	67.3 (193)	67.4 (58.9-74.5)
1 partner	13.2 (38)	15.0 (9.9-21.3)
2 partners	19.5 (56)	17.5 (12.5-23.3)
Ever been tested for HIV		
Yes	41.6 (134)	41.5 (33.9-48.4)
No	58.4 (188)	58.5 (51.6-66.1)
Frequency of HIV test		
Not tested past 2 year	58.5 (192)	56.3 (49.0-63.2)
Tested within past 1 -2 years	9.8 (32)	9.2 (5.3-13.8)
Tested within past 1 year	31.7 (104)	34.5 (27.8-41.5)
Had any STI symptoms past 12 months		
Yes	7.9 (26)	7.3 (4.3-10.9)
No	92.1 (302)	92.7 (89.1-95.7)

Table 7: MSM reporting of sensitive information by interview modes (n=712, all 3 MSM sites)

Characteristics	Face to Face % (n)	ACASI % (n)	Total % (n)
Age (years)			
18-20	29.9 (109)	28.8 (96)	29.4 (205)
21-25	44.1 (161)	42.3 (141)	43.3 (302)
26-30	16.4 (60)	19.5 (65)	17.9 (125)
31	9.6 (35)	9.3 (31)	9.4 (66)
Education			
Primary	8.4 (31)	4.4 (15)**	6.5 (46)
Secondary	67.0 (248)	62.6 (214)	64.9 (462)
Tertiary	24.6 (91)	33.0 (113)	28.7 (204)
Ever had sex with women			
Yes	79.0 (289)	73.7 (252)	76.4 (541)
No	21.0 (77)	26.3 (90)	23.6 (167)
Number of women you had vaginal sex with past 2 months			
0	57.0 (211)	49.4 (169)**	53.4 (380)
1	18.4 (68)	15.2 (52)	16.9 (120)
2	24.6 (91)	35.4 (121)	29.8 (212)
Had anal sex with women last 2 months (for those who had sex with women, n= 451)			
Yes	21.3 (60)	71.6 (121)***	40.1 (181)
No	78.7 (222)	28.4 (48)	59.9 (270)
Had unprotected anal sex with women last 2 months (for those who had anal sex with women, n=183)			
Yes	57.1 (36)	71.7 (86)*	66.7 (122)
No	42.9 (27)	28.3 (34)	33.3 (61)
Number of male anal sex partners past 2 months			
0	15.7 (58)	10.8 (37)**	13.3 (95)
1	30.3 (112)	19.3 (66)	25.0 (178)
2	54.0 (200)	69.9 (239)	61.7 (439)
Unprotected anal sex (both insertive and receptive at last sex with men)			
Yes	57.8 (203)	67.1 (200)*	62.1 (403)
No	42.2 (148)	32.9 (98)	37.9 (246)
Unprotected insertive anal sex with men			
Yes	34.9 (129)	38.0 (130)	38.0 (130)
No	65.1 (241)	62.0 (212)	63.6 (453)
Unprotected receptive anal sex			
Yes	24.3 (90)	48.0 (342)***	31.9 (227)
No	75.7 (280)	59.9 (205)	68.1 (485)
Type of sex partners			
Steady	42.7 (158)	44.2 (151)	43.4 (309)
Casual	23.2 (86)	20.2 (69)	21.8 (155)
Commercial sex	34.1 (126)	35.7 (122)	34.8 (248)
Sexual identity			
Homosexual	28.8 (102)	55.5 (167)***	41.1 (269)
Bisexual	69.5 (246)	38.9 (117)	55.4 (363)
Straight	1.7 (6)	5.7 (17)	3.5 (23)
Being paid for sex past 6 months			
Yes	46.0 (170)	54.4 (186)*	50.0 (356)
No	54.0 (200)	45.6 (156)	50.0 (356)

Had any STI symptoms in the past 12 months			
Yes	20.5 (76)	42.7 (146)***	31.2 (222)
No	79.5 (294)	57.3 (196)	68.8 (490)
Used drug past 12 months			
Yes	0.6 (2)	16.0 (53)***	7.9 (55)
No	99.4 (360)	84.0 (279)	92.1 (639)
Ever been tested for HIV			
Yes	52.2 (191)	57.9 (198)	54.9 (389)
No	47.8 (175)	42.1 (144)	45.1 (319)

*: significant at $p < 0.05$; **: significant at $p < 0.01$; ***: significant at $p < 0.001$

Table8: IDUs reporting of sensitive information by interview modes

Characteristics	Face to Face % (n)	ACASI % (n)	Total % (n)
Age (years)			
18-25	1.8 (3)	5.6 (9)	3.7 (12)
36-30	10.4 (17)	9.3 (15)	9.9 (32)
31	87.7 (143)	85.1 (137)	86.4 (280)
Education			
Primary	30.7 (51)	22.8 (37)	26.8 (88)
Secondary	45.2 (75)	44.4 (72)	44.8 (147)
Tertiary	24.1 (40)	32.7 (53)	28.4 (93)
Years of injecting drugs			
Less than a year	3.1 (5)	12.4 (20)**	7.7 (25)
1-5 years	41.7 (68)	40.7 (66)	41.2 (134)
6-10 years	29.5 (48)	29.0 (47)	29.2 (95)
10 > years	25.8 (42)	17.9 (29)	21.9 (71)
Injected drug past 1 months			
Yes,	75.8 (122)	75.7 (115)	75.7 (237)
No	24.2 (39)	24.3 (37)	24.3 (76)
Frequency of drug injection (past month)			
Only one	27.3 (33)	13.9 (16)	20.8 (49)
One a week	24.8 (30)	34.8 (40)	29.7 (70)
2-6 times/week	38.8 (47)	40.0 (46)	39.4 (93)
One a day	4.1 (5)	6.1 (7)	5.1 (12)
More than one a day	5.0 (6)	5.2 (6)	5.1 (12)
Number of times injected drug on the last day			
1	55.9 (90)	55.0 (83)	55.4 (173)
2	31.7 (51)	35.1 (53)	33.3 (104)
3	12.4 (20)	9.9 (15)	11.2 (35)
Frequency of sharing needle & syringe			
Almost/every	0 (0)	3.5 (4)*	1.7 (4)
Sometime	6 (4.9)	9.7 (11)	7.2 (17)
Never	95.1 (117)	86.7 (98)	91.1 (215)
Injected with pre - filled syringe			
Yes	4.9 (6)	7.0 (8)	5.9 (14)
No	95.1 (117)	93.0 (107)	94.1 (224)
Unprotected sex (last sex)			
Yes	54.0 (34)	52.8 (28)	53.5 (62)
No	46.0 (29)	47.2 (25)	46.6 (54)
Number of sex partner past 2 months			
0	68.3 (97)	66.2 (96)	67.3 (193)
1	11.3 (16)	15.2 (22)	13.2 (38)
2	20.4 (29)	18.6 (27)	19.5 (56)
Had any STI symptoms in the past 12 months			
Yes	4.9 (8)	11.1 (18)*	8.0 (26)
No	95.1 (155)	88.9 (144)	92.0 (299)
Ever been tested for HIV			
Yes	47.2 (76)	36.0 (58)	41.6 (134)
No	52.8 (85)	64.0 (103)	58.4 (188)

*: significant at p<0.05; **: significant at p<0.01; ***: significant at p<0.001

Table 9: MSM health seeking behaviors and verbal insults (n=712, all 3 MSM sites)

	% (n)
Sought advice/treatment for genital/ anal discharge (past 12 months)	
Yes	42.9 (303)
No	57.1 (403)
Where did you seek advice/ treatment?	
Government clinics/hospitals	14.9 (15)
Private clinics/hospitals	35.2 (37)
Gay/lesbian clinics	24.3 (25)
Pharmacy	25.0 (25)
Traditional healer	5.9 (6)
Medicine from shop	8.1 (8)
Did you reveal your sexual orientation to the health care providers (at last treatment for STI)?	
Yes	41.1 (46)
No	58.9 (66)
Place that you would feel comfortable seeking care for your STI symptoms	
Government clinics	55.7 (342)
Private clinics	40.6 (251)
Gay/lesbian clinics	19.4 (111)
Pharmacy	43.2 (252)
Sought medical services from a clinic past 12 months	
Yes	42.9 (303)
No	57.1 (403)
When was the last time you got tested for HIV?	
Less than 3 months ago	42.7 (166)
3-6 months	27.5 (107)
6-12 months	11.1 (43)
More than a years	14.1 (55)
Refused	4.6 (18)
Place most recently tested for HIV	
Government clinic	31.7 (123)
Private clinics	24.5 (95)
MHNN clinic	39.4 (153)
Other	4.4 (17)
Frequency of HIV testing (past 2 years)	
1	30.5 (115)
2	26.8 (101)
3	18.3 (69)
4	24.4 (92)
Place you would feel comfortable having HIV test	
Your general practitioner	22.9 (128)
Government clinics	40.8 (263)
Private clinics	43.8 (287)
A community gay organization	30.0 (185)
A gay/gay friendly club	17.5 (108)
MHNN clinics	50.1 (314)
Ever visited the MHNN clinic?	
Yes	28.4 (201)
No	71.6 (506)

Completed the IBBSS 2010

Yes	27.4 (192)
No	68.1 (477)
Don't know	4.6 (32)

Experienced verbal insults (past 12 months)

Yes	62.7 (425)
No	37.3 (253)

Table 10: Participant's opinions about using ACASI laptop to answer survey questions (n=94)

	% (n)
How often you use computer?	
Everyday/almost everyday	42.5 (40)
Once/twice a week	23.4 (22)
Once/ twice a month	19.2 (18)
Almost never	14.9 (14)
How comfortable were you using the ACASI?	
Very comfortable	80.9 (76)
Comfortable	18.1 (17)
Uncomfortable	1.1 (1)
How difficult in using the ACASI?	
Very difficult	3.2 (3)
Somewhat difficult	12.8 (12)
Not at all	84.0 (79)
How did you rate the ACASI?⁶	
1	3.2 (3)
2	2.1 (2)
3	12.8 (12)
4	13.8 (13)
5	68.1 (64)
What did you like most about using computer?	
More fun	17.0 (16)
More private	46.8 (44)
Clearer because I can read and listen to the questions	30.9 (29)
Nothing	5.3 (5)
Have you done a FTF interview before?	
Yes	75.5 (71)
No	24.5 (23)
Which type of interview did you like?	
ACASI	64.5 (49)
FTF	9.2 (7)
Both equally	26.3 (20)
Would like to use computer in the future to answer questions	
Yes	96.8 (90)
No	3.2 (3)

(f) ⁶ 1= did not like it at all, 5= liked it very much

Resource Persons

IBADAN MSM SITE

■ Kayode fasusi	Coupon manager
■ Oluwafemi	AsuniMobilizer
■ Akintunde Olaolu	Interviewer
■ Obayomi Victor	Interviewer

LAGOS MSM SITE

■ Grace Hygie- Enwerem	Interviewer
■ Nwanguma Samuel	Interviewer
■ Oluwagbemi Orekoya	Mobilizer

LAGOS IDU SITE

■ Marcaulay, Rebecca. E	Interviewer
■ Eucharia Onwughara	Nurse
■ Asuquo Elizabeth	Counselor
■ Luyiola Stephen	Coupon Manager
■ Grace Mbagwu	Interviewer
■ Itah Godwin	Interviewer
■ Jolaosho Ayomipo	Laboratory Scientist

LAGOS UNIVERSITY TEACHING HOSPITAL LABORATORY TEAM

■ Prof. Sade Ogunsola	Laboratory Director
■ Adeola Awolola	Laboratory Manager
■ Anthony Ani	Laboratory scientist
■ Vanji Osho	Laboratory scientist
■ Augustina Nwosu	Laboratory scientist

ABUJA MSM SITE

■ Oliver Anene	Coupon manager
■ Temilade	Mobilizer
■ Ganiyu Dirisu	Interviewer
■ Toyin Talabi	Interviewer
■ Emmanuel Godwin	Doctor
■ Adams Freid	Counselor
■ Sylvia Isigbo	Laboratory Scientist

MAITAMA HOSPITAL LABORATORY TEAM

■ Joseph Salifu	Laboratory manager
■ Joseph Drisu	Laboratory Technician
■ Susan Umeh	Laboratory Scientist

The content of this report is the responsibility of ENR and does not necessarily reflect the view of the United Kingdom Department for International Development (DFID).

The Enhancing Nigeria's Response to HIV/AIDS (ENR) Programme is funded and supported by UKAID through the Department for International Development (DFID). Population Council and other stakeholders provided technical support in planning, implementation, data processing, analysis and report writing.