

Integrated Behavioral and Biological  
Surveillance Survey among Men who have  
Sex with Men, 2010

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### **Funding and institutional involvement**

This study was funded by the Global Fund through the Mauritius National AIDS Secretariat of the Prime Minister's Office.

### **Technical Working Group for Most at Risk Populations (MARPs)**

The MARPs Technical Working Group provides oversight and technical guidance in survey design, implementation, analysis and dissemination, and advises on stakeholder engagement and collaborations throughout the study. The group consists of nine members, including investigators, drawn from research and academic institutions with specific relevant technical expertise.

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Data were managed and entered under the supervision of Mr. J. Larhubarbe, Health Statistician, MOH & QL and analyzed by Dr. Lisa G. Johnston. The final report was prepared by Lisa G. Johnston with funding from the Global Fund.

## **ACKNOWLEDGEMENTS**

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## ABBREVIATIONS/ACRONYMS

ART	Antiretroviral Therapy
IBBS	Integrated behavioral and biological surveillance
DEFF	Design Effect
FSW	Female Sex Worker
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
IDU	Injection Drug Use
IDUS	Injection Drug Users
IAS	Insertive Anal Sex
LGBT	Lesbian, Gay, Bisexual and Transgenders
MARP	Most at risk population
MAT	Medication-Assisted therapy
MOH & QL	Ministry of Health and Quality of Life
NGO	Non-Governmental Organization
RAS	Receptive Anal Sex
RDS	Respondent Driven Sampling
RDSAT	Respondent Driven Sampling Analysis Tool
STI	Sexually Transmitted Infection
TB	Tuberculosis
TWG	Technical Working Group
UNODC	United Nations Office of Drug Crime
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

## EXECUTIVE SUMMARY

This report presents findings of the first round of an integrated behavioral and biological surveillance (IBBS) survey conducted among men who have sex with men (MSM) in Mauritius during the months of July and August 2010. The primary objective of this survey was to provide information on the prevalence of HIV infection and associated risk factors among MSM to inform programmatic and policy responses and provide a baseline from which to monitor epidemic trends. The prevalence of HIV infection in Mauritius remains just under 1% in the general population according to estimates using the Estimation and Projection Package (EPP) developed by UNAIDS.<sup>1</sup>

The 2010 MSM HIV IBBS survey was implemented by the AIDS Unit of the Mauritius Ministry of Health and Quality of Life (MOH&QL) based in Port Louis, Mauritius. Funding for the study was provided by the Global Fund and Technical Assistance was provided by Lisa Johnston, PhD, private consultant.

This surveillance survey used respondent-driven sampling (RDS) to obtain a sample of 362 males who reported having anal or oral sex with another male in the previous three months, aged 15 years and older, and living in Mauritius. RDS is a chain-referral sampling method specifically designed to obtain probability-based samples of 'hidden' and hard-to-reach populations. After providing informed consent, respondents completed an interview and provided blood specimens to be tested for HIV, Hepatitis B (HBV), Hepatitis C (HCV) and syphilis. Proportion estimates adjusted for participants' probability of recruitment were calculated using RDS Analysis Tool (RDSAT) Version 6.0.

The findings from this survey will identify gaps in existing programs and help inform the development of long-term intervention and prevention strategies responsive to the needs of MSM in Mauritius.

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<sup>1</sup> UNAIDS. Estimation and Projection Package (EPP). Access at: [http://www.unaids.org/en/KnowledgeCentre/HIVData/Epidemiology/epi\\_software2007.asp](http://www.unaids.org/en/KnowledgeCentre/HIVData/Epidemiology/epi_software2007.asp)

## Key Findings

Eight percent of MSM were HIV sero-positive, 14.2% tested positive for HCV and 5% tested positive for syphilis. No participant tested positive for HBV. Sixty four percent of MSM who tested positive for HIV were also infected with HCV, whereas only 6.4% of those who tested positive for HIV were also infected with Syphilis. The highest prevalence of HIV was found among MSM in the districts of Port-Louis (50.7%) and Plaines Wilhems (34.5%) and among MSM who self identified as Homosexual (51.3%) or bi-sexual (18%) versus those who reported being heterosexual, Gay or transsexual.

### MSM Biological Results

- HIV prevalence is 8.1%.
- HCV prevalence is 14.2%.
- Syphilis prevalence is 5.0%
- No one tested positive for HBV
- Among MSM who tested positive for HIV, 64% also tested positive for HCV infection.
- HIV prevalence is highest in Port Louis and Plaines Wilhems

*High-risk sexual behaviors:* Almost all men reported having anal sex in the previous three months; the majority reported having multiple sexual partnerships and inconsistent condom use. High percentages of men who reported having two or more male anal sex partners or being in a group sex situation in the past three months were HIV sero-positive. Roughly 30% reported generally practicing receptive anal sex, which carries with it a higher risk of HIV infection (if sex is unprotected) compared to insertive anal sex. Although less than one quarter of MSM reported having sexual intercourse with a female partner in the past three months, more than three quarters of those who reported doing so reported having multiple female sexual partners. Furthermore, all men who tested positive for HIV and reported having a female sexual partner also reported not using a condom at last penetrative vaginal sex.

*High-risk injection drug use practices:* Only 3.3% of MSM reported using injection drugs in the past three months. However, among those who tested positive for HCV, 100% reported ever injecting drugs giving strong evidence of HCV exposure through needle and/or drug equipment sharing.

*HIV transmission and STI knowledge:* Forty four percent of MSM were able to correctly describe any signs or symptoms of STIs in men and 48.8% had correct knowledge about

HIV transmission. Given that this population is involved in several high risk sex behaviors, education and awareness about STI and HIV risk and transmission is needed.

*HIV testing:* Forty one percent of MSM do not know where to go to be tested for HIV and only 42% have ever been tested. Among those who were tested, just over one quarter of them did not get their test results. Improved HIV testing awareness is vital among this population. In addition, testing services should include staff trained to address the needs of MSM and be accessible in locations comfortable for this population.

*Respondent driven sampling is recommended for future IBBS of MSM.* Given the success of RDS to recruit a diverse sample of MSM in Mauritius, it is recommended that ongoing IBBS be conducted among this population using the same methodology. This will also ensure that findings can be compared over time across studies.

## BACKGROUND

### The HIV Epidemic in the Republic of Mauritius

The HIV/AIDS epidemic in Mauritius is classified as 'concentrated' whereby HIV prevalence is estimated to be below 1% among women tested at antenatal clinics and above 5% among Most At Risk Populations (MARPs),<sup>2</sup> which comprise Injecting Drug Users (IDUs), Female Sex Workers (FSWs), and Men having Sex with Men (MSM). National HIV prevalence is 0.97% based on 2010 estimates using the Estimation and Projection Package (EPP) developed by UNAIDS (around 12,000 people in the 15-49 population) in 2008<sup>3</sup>.

HIV transmission within male to male sexual relationships is of growing concern in Mauritius. HIV studies of MSM in other African countries demonstrate that unprotected anal intercourse is common. A recent study of MSM in Zanzibar using a probability based sampling method found HIV prevalence to be 12.3% and Hepatitis C (HCV) prevalence to be 14.7%<sup>4</sup>. This same study found MSM to practice several risky behaviors including injection drug use, unprotected anal intercourse with men and unprotected vaginal intercourse with females. Other quantitative studies conducted in several African countries using probability and non-probability sampling methods have found HIV prevalence among MSM to range from 8% to 36%<sup>5</sup>, substantially higher than in the general population. Most African countries do not include MSM in their HIV surveillance systems; however, conducting surveillance in this population is critical for monitoring emerging trends and setting national prevention priorities for this population.

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<sup>2</sup> UNAIDS. Estimation and Projection Package (EPP). Access at: [http://www.unaids.org/en/KnowledgeCentre/HIVData/Epidemiology/epi\\_software2007.asp](http://www.unaids.org/en/KnowledgeCentre/HIVData/Epidemiology/epi_software2007.asp).

<sup>3</sup> UNAIDS. Accessed on 27 December 2009 at:

[http://data.unaids.org/pub/Report/2008/mauritius\\_2008\\_country\\_progress\\_report\\_en.pdf](http://data.unaids.org/pub/Report/2008/mauritius_2008_country_progress_report_en.pdf).

<sup>4</sup> Dahoma, M et al. (2009) HIV, viral hepatitis, syphilis and associated risk behaviors among men who have sex with men in Zanzibar, Tanzania. *AIDS and Behavior*. E-Pub ahead of publication. December 08, 2009.

<sup>5</sup> Angala, P et al (2006). Men who have sex with men as presented in VCT data in Kenya. Abstract MOPE0581. XVI International AIDS Conference. 13–18 August, Toronto; Baral, S et al. HIV prevalence, risks for HIV infection, and human rights among men who have sex with men (MSM) in Malawi, Namibia, and Botswana. *PLoS ONE*. 2009; 4(3):e4997. Epub 2009 Mar 26; Elrasheid, S. (2006). Prevalence, knowledge and related sexual behaviors of HIV/AIDS among receptive men who have sex with men. Abstract TUPE0509. XVI International AIDS Conference. 13-18 August, Toronto; Sanders, E. Jet al. (2007) HIV-1 infection in high risk men who have sex with men in Mombasa, Kenya. *AIDS*. 21(18), 2513-2520; Smith, A et al. (2009) Men who have sex with men and HIV/AIDS in sub-Saharan Africa. *The Lancet*, 374 (9687); 416-422; Wade A.S et al. (2005) HIV infection and sexually transmitted infections among men who have sex with men in Senegal. *AIDS*, 19:2133-2140.

Homosexuality is tolerated in Mauritius. However, similar to many countries, MSM remain 'hidden' and are difficult to reach for research purposes due to social stigma and discrimination. Many MSM often feel the need to hide their same-sex relations from friends and family, thereby increasing their vulnerability to HIV and other infections. In addition, stigma and discrimination towards MSM foster an environment whereby MSM marry and have sexual relationships with females in order to maintain a heterosexual persona. Males, who feel the need to hide their sexual preference for male sexual partners to appear heterosexual, not only increase their own vulnerability for HIV infection, but also increase the risk of HIV transmission to their female sexual partners.

To date, efforts to address the needs of MSM in Mauritius have been limited. In 2000, the AIDS Unit of the Mauritius Ministry of Health and Quality of Life (MOH&QL) developed a network of Gay, Bisexual and Transgenders (GBT), to promote awareness sessions, HIV testing and condom distribution. In 2006, in spite of opposition from various segments of the Mauritian Society, a non-governmental organization, "Collectif Arc en Ciel" was launched to promote the rights for Lesbian, Gay, Bisexual and Transgenders (LGBT). Other programs to serve the LGBT and MSM communities are being planned.

Although HIV surveillance of MSM has been mentioned as a priority in the national HIV/AIDS strategic frameworks from 2007 to 2011<sup>6</sup>, there are no representative data to describe the HIV prevalence and associated risk behaviors among this population. Nor are there any accurate data on the size of the MSM population in Mauritius. Currently, the HIV prevalence among MSM in Mauritius is estimated to be 0.9% based on detected cases only. Obtaining representative data about the prevalence of HIV and other infections and associated sexual risk behaviors is essential to planning and implementing programmatic and policy responses for these populations and for providing a baseline from which to monitor epidemic trends.

The first attempt by Mauritius to study a HIV high-risk and hard-to-reach population was in late 2009, whereby the MOH&QL conducted an integrated behavioral and biological surveillance (IBBS) study among IDUs using respondent driven sampling (RDS). RDS is a chain-referral sampling method specifically designed to obtain probability-based

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<sup>6</sup> Mauritius MoHQoL. Mauritius National HIV/AIDS Strategic Framework 2007-2011.

samples of 'hidden' populations. This study began with six eligible participants who initiated the recruitment process. After providing informed consent, eligible respondents completed an interview about their injecting and sexual risk behaviors, access to and use of IDU and HIV services, HIV transmission and sexually transmitted infection (STI) signs and symptoms and knowledge and a measurement of their social network size. The interview also included questions about IDUs' visits to services which were used to estimate the size of the IDU population using several multipliers. Once the interview was completed, participants received HIV pre-test counseling and provided blood specimens to be tested for HIV, Hepatitis B (HBV), HCV and syphilis. Participants were provided test results with post-test counseling two weeks after their enrollment and those who had positive test results were referred for treatment and/or for further management at a local health facility. A diverse mix of 511 IDUs from all parts of Mauritius were recruited and tested over the course of six weeks. Data from the 2009 IBBS survey are currently being used to improve HIV and harm reduction program planning for and service delivery to IDUs.

Given the successful recruitment of IDUs using RDS in Mauritius, the MOH&QL decided to utilize this methodology and the IDU IBBS protocol plan and implement a similar study among MSM. With funding from the Global Fund to fight HIV/AIDS, tuberculosis, and malaria, the MOH&QL recruited 362 MSM over the course of six weeks in July and August, 2010. Males were eligible for the survey if they reported having sex with another male in the previous three months, aged 15 years and older, and living in Mauritius. This report provides survey findings and offers some recommendations on how to use these data to respond to the HIV prevention and intervention needs of MSM in Mauritius.

## **RATIONALE AND OBJECTIVES**

In 2010, the Government of Mauritius conducted an IBBS survey among MSM in Mauritius.

### **Specific Objectives**

Specific objectives were to determine the prevalence of HIV, HBV, HCV, and syphilis among MSM in Mauritius and to provide a baseline for monitoring trends in HIV and sexually and non-sexually transmitted infections prevalence.

- To assess sexual and other risk behaviours associated with HIV and STI transmission among MSM.
- To assess health seeking behaviours, including harm reduction, condom access and voluntary counselling and testing (VCT), among MSM.
- To describe demographic characteristics of MSM and the nature of their high risk behaviours in Mauritius
- To estimate the population size of MSM in Mauritius using a variety of multiplier methods.
- To develop capacity in Mauritius to strengthen national HIV/STI surveillance systems for MSM.
- To provide information about MSM to policy makers and services providers and thereby assist the Government of Mauritius and stakeholders in HIV and other infections strategic planning.

## METHODS

### Respondent Driven Sampling (RDS)

This survey used respondent-driven sampling (RDS) to recruit MSM from throughout Mauritius (not including the sister island of Rodrigues). RDS is a variant of a chain referral sampling method which, when implemented and analyzed properly, yields data representative of the populations from which the samples were gathered<sup>7</sup>. Several theoretical and mathematical techniques borrowed from various disciplines (e.g., social network theory, physics, statistics, etc.) are used to develop a sampling frame and to mitigate several well known biases generally associated with chain referral methods. RDS is specifically designed to sample hard-to-reach and hidden populations such as MSM and has also been successfully used among other HIV high risk populations, including IDUs (including in Mauritius in 2009) and FSWs<sup>8</sup>.

Recruitment in RDS is initiated with a number of purposefully selected members of the study population referred to as “seeds”. Each seed is given a fixed amount (usually no more than three) of uniquely numbered coupons with which to recruit peers (other eligible MSM) into the survey. These recruited peers who enroll in the survey are considered the first wave of participants. Each participant in the first wave who completes the survey is then provided a fixed number of coupons with which to recruit their peers into the survey. Successive waves of recruitment continue until the sample size is reached.

Each participant is asked their social network size which is directly tied to the eligibility criteria and sets up the probability of each recruit’s selection into the sample. The self reported social network size is considered the sampling frame which is used to produce weights for deriving estimates. Furthermore, each participant is monitored through the unique numbers on their coupons which are used to calculate who recruited whom; an essential element for analyzing data gathered with RDS methods. The unique coupon

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<sup>7</sup> Heckathorn DD. (1997) Respondent-driven sampling: A new approach to the study of hidden populations. *Sociological Problems*. 44 (2),174-199; Heckathorn, DD. (2002). Respondent driven sampling II: deriving valid population estimates from Chain-Referral samples of hidden populations. *Sociological Problems*, 49(1), 11-34.

<sup>8</sup> Malekinejad M, Johnston LG, Kendall C, Kerr L, Rifkin M, Rutherford G: Using respondent-driven sampling methodology for HIV biological and behavioural surveillance in international settings: a systematic review. *AIDS and Behavior*, 2008, 12(suppl. 1), 105-130.

numbers also ensure participants' anonymity by linking each participant to their questionnaire and biological test results, thereby avoiding the need to collect names or addresses.

## Sample Size Calculation

The sample size was calculated by the MoH&QL using the following formula:

$$n = DEFF * z\alpha^2 * pq/d^2$$

The following terms were defined as:

N	sample size
DEFF	design effect for RDS surveys. The design effect helps to mitigate biases associated with the sampling technique and to account for common random biases such as participants enrolling in a study more than one time and interviewer and response biases.
$z\alpha$	1.96 (standard error associated with a level of confidence of 95%)
q	85%
P	estimated percent in the MSM population based on the finding of HIV prevalence among MSM in Zanzibar of approximately 15%.

$$(p*q) = 1275$$

The resulting calculation was  $2*3.8416*1275/25 = 391.84$ . However, given that this population has never been sampled before, it was uncertain whether this sample size would be reached

## Data collection

In Mauritius, two survey sites were used, one in Curepipe (in the center of the island) and the other in Belle Rose, in order to increase accessibility by MSM and to ensure a wider geographic spread of participants throughout the Island. Nine seeds (initial recruits) were identified through key contacts and were selected to reflect diversity on a number of key characteristics, including geographic residence, age, HIV status and place of residence.

Seeds identified for this study population were each given three uniquely coded coupons with which to recruit their peers into the survey. Participants who presented a valid recruitment coupon to one of the survey sites were screened for eligibility and provided informed consent for a face-to-face interview, HIV pre-test counseling and a blood extraction for HIV, HCV, HBC and syphilis testing. Interviews were conducted in Creole by trained interviewers and took approximately 45 minutes to complete. The questionnaire collected data on socio-demographic characteristics, sexual and drug risk behaviors, HIV transmission and STI signs and symptoms and HIV knowledge, information on participants' social network sizes, as well as access and utilization of HIV and IDU related services. Following the interview, each participant was provided a set number of coupons with which to use to recruit eligible peers.

Participants received a primary compensation for completing the survey Rs 500 (~ USD 17) and an additional secondary compensation of Rs 100 (~USD 7) for each recruit who was eligible and consented to participate in the survey. After specimen collection, participants received a uniquely numbered voucher to return to the interview site after two weeks to receive their test results with post-test counseling. Those with positive test results for HIV, HCV, HBV and/or syphilis infection were referred for treatment and/or for further management. No personal identifying information was collected. To ensure confidentiality, participants' questionnaires and biological tests were identified using a unique study identification number provided on the recruitment coupons.

### **Tools development and staff training**

The MSM IBBS protocol and final questionnaire were developed by the MOH&QL with input from the RDS MSM IBBS technical working group (TWG). The protocol and questionnaire were submitted for ethical review and approval to the MOH&QL in May 2010. Once the protocol and questionnaire were approved, all materials were finalized and the survey was planned to start in July 2010.

Field staff, including interviewers, peer leaders, screeners, supervisors and nurses were trained in July, 2010, on participant recruitment, ethical consent, coupon and participant tracking, the incentive process, administration of the behavioral questionnaire, collection of biological samples, biological sample processing and transport, specimen testing, and

provision of biological test results and referrals to the MOH&QL. The survey commenced in Belle Rose on July 5, 2010, and in Curepipe on the following day.

### **Laboratory procedures**

Five milliliters (5 ml) of venous blood was collected from participants using venepuncture, was transferred every day from the survey site to the Virology Department, Central Laboratory, in Candos where specimens were tested for HIV, HBV, HCV and syphilis.

The detection of HIV P24 Antigen and antibodies to HIV1 and HIV2 using an enzyme immunoassay, Genscreen Ultra HIV Ag-Ab (Manufacturer: BIORAD, France). Reactive specimens were confirmed by Western Blot Assay using HIV Blot 2.2 MP Diagnostics (Singapore). Hepatitis B surface antigen (HBsAg) was detected using MONOLISA HBs Ag Ultra (Manufacturer: BIORAD, France) and antibodies to HCV were detected using Murex anti-HCV (Manufacturer: ABBOTT, Murex, South Africa). Syphilis infection was tested with IMMUTREP TPHA (Manufacturer: Omega Diagnostics, UK), a haemagglutination test for Treponema Pallidum antibodies (IgG and IgM) in serum. Reactive specimens for TPHA were also tested by IMMUTREP carbon antigen (Manufacturer: Omega Diagnostics, UK)

### **Data management and analysis**

Data were entered into EpiInfo. Single entry procedures, data cleaning and quality control were performed at the MOH&QL, Health Statistics Unit. Final datasets were converted to SPSS (version 13.0). Consistency checks and frequencies were performed to check validity and logic of all variables in the datasets. Hard copies of completed questionnaires were stored at the MOH&QL and referred to in order to correct any discrepancies.

Data management conducted in SPSS (version 13.0) and final recoding for this report was conducted in SPSS (version 18.0). Datasets were then converted to Microsoft Excel for final formatting before being downloaded into the RDS Analysis Tool 6.0 (RDSAT). Estimates and 95% confidence intervals (CI) were calculated using RDSAT.

## **Ethical considerations**

In order to minimize any social risks, consultations were held prior to the start of the survey with ministry officials and key representatives from local NGOs, UNAIDS, and with members of the RDS TWG. The background, purpose, and procedures of the survey, the measures taken by the investigators to ensure confidentiality and privacy of the participants, and applicability of study findings were discussed and agreed upon at these meetings. The outcomes of these discussions were used to adjust and guide the implementation of the survey. The Research proposal was also submitted to the Ethical Committee of the MOH and QL for approval.

Study participation was voluntary and participants were informed that they were free to withdraw from the study at any time during the survey process. Following careful explanation of the survey, study staff gave eligible participants the consent form to read or, if necessary, the consent form was read to the participant by a staff member. All participants verbally stated that they understood and agreed to all of the items contained in the consent and signed the informed consent form in order to enroll in the survey. Participants were given the option to complete the interview only and decline the biological tests.

To minimize any discomfort due to the sensitive nature of the questions asked, the questionnaire was administered in a private and confidential setting. Participants could refuse to answer any specific question. All participants were provided the name and telephone number of the local survey coordinator should they have any questions about the survey or if they believed they had been injured or mistreated as the result of their involvement in the survey.

All study data including behavioral and laboratory information were kept in a confidential manner. The survey team did not record names, addresses or other personal identifiers on the survey questionnaires nor on any of the laboratory specimens and results. In this survey, coupon identification numbers were assigned to each participant and used to link questionnaire responses to management forms and laboratory test results. After data collection, questionnaires, forms and test results were kept in a secure location in the MOH&QL offices in Port Louis.

## Limitations

This survey was subject to several limitations. Because behavioral data were self-reported, social desirability bias may have resulted in the underreporting of risky sexual practices and drug use behaviors. In addition, respondents were asked to recall periods of up to twelve months when reporting on sexual and drug use behaviors; therefore, the accuracy of responses may have been affected by recall bias. Finally, there were some limitations with the survey instrument that may have led to some measurement errors. It is suggested that a thorough review of the current survey instrument be conducted with persons who have expertise in survey design and data analysis and that a more extensive piloting be conducted before this instrument is used in any future IBBS.

Compensation for participants is a crucial element of recruitment in RDS but it can be challenging to determine the appropriate amount for each population in a given country. If the compensation offered is too high, there is a risk of double-enrollment or of encouraging recruits to fake eligibility requirements. If the amount is too low, recruitment will not be successful. For these surveys, compensation amounts were set based on meetings with the MSM IBBS RDS TWG and some formative research with and feedback from the study population. In order to prevent double-enrollment and ensure all participants met eligibility criteria, recruits attending the survey sites were screened by a trained screener with assistance from a peer leader.

Although the estimates presented here may be considered representative of the populations from which respondents were recruited, the small number of values for certain variables may limit our ability to detect statistically significant differences between groups. In some cases, confidence intervals are too wide for meaningful interpretation. Further, as analysis in RDSAT depends on the integrity of recruitment chains to determine and adjust estimates for probability of recruitment, missing values may distort adjusted proportion estimates. We have attempted to correct for this in the analysis by taking special care to include missing values in the denominator for prevalence estimates when appropriate.

## RESULTS

This section presents the behavioral findings and biological results from the HIV IBBS survey among MSM in Mauritius. Data are presented in the following order:

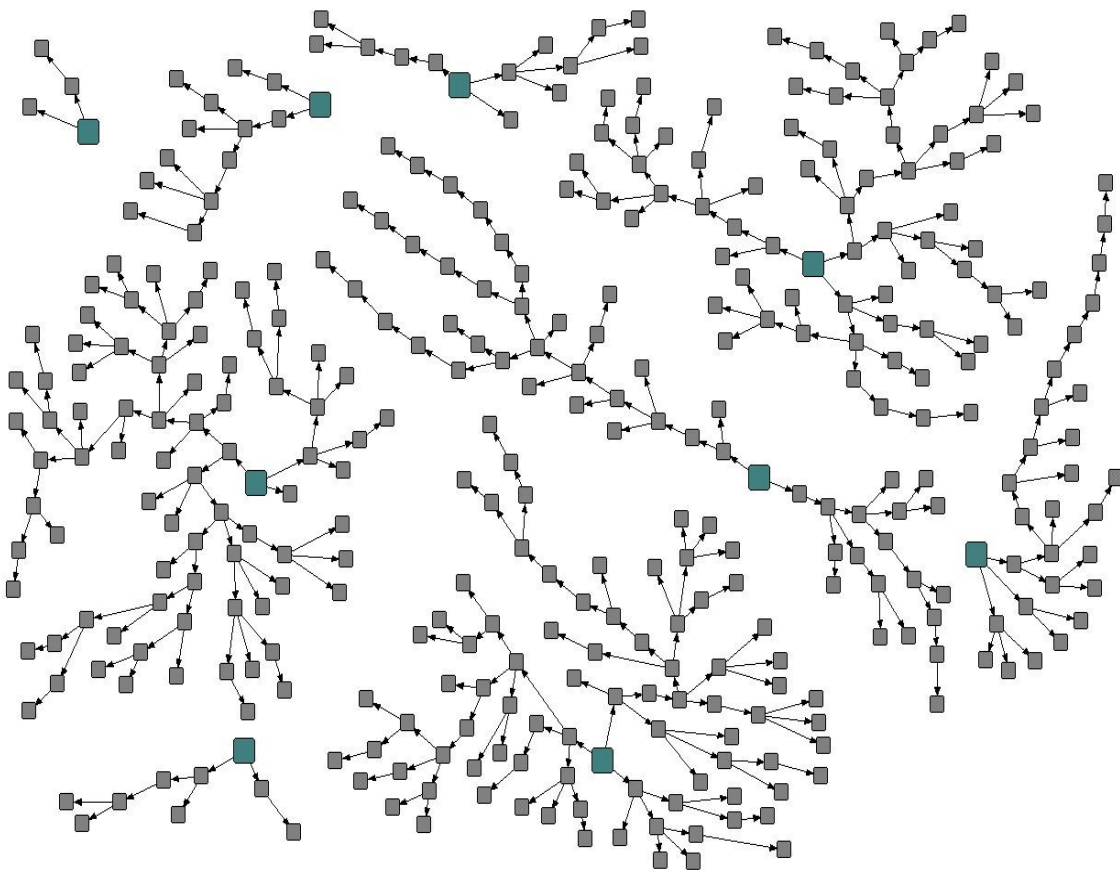
- i) Socio-demographic characteristics (page 18);
  
- ii) Sexual risk behaviors (page 20);
  - General sexual history and behaviors (page 20)
  - Sexual partner types and frequency (page 21)
  - Condom usage and accessibility (page 23)
  - Lubricant Use (page 26)
  - Group sex (page 27)
  
- iii) Substance use (page 28);
  
- iv) Stigma, discrimination and violence (page 29);
  
- v) HIV and sexually transmitted infections (STIs) (page 30);
  - STI knowledge and signs and symptoms (page 30)
  - HIV knowledge and testing (page 30)
  - Sources of HIV information (page 32)
  
- vi) HIV, HBV, HCV and syphilis prevalence (page 33);
  
- vii) HIV prevalence by select risk behaviors (page 33);
  
- viii) Population size estimation (page 36).

The text and figures provide the weighted proportion estimates as percentages, while tables additionally show the number of respondents and 95% confidence intervals around each weighted proportion estimate.

## Men who have sex with men (MSM) in Mauritius

Over the course of six weeks, from July to August 2010, 362 (including nine seeds) MSM enrolled in the HIV IBBS survey. The maximum number of waves reached in the nine recruitment chains was 13 (see recruitment graph, figure 1). Recruitment was initiated with three seeds in Curepipe and six seeds in Belle Rose. Seeds are identified in the recruitment graph as larger squares and only have arrow leading away from them rather than towards them. One hundred and fifty three (excluding the six seeds) participants were enrolled in the Curepipe survey site and the remainder (excluding the six seeds) were enrolled in the Belle Rose survey site.

**Figure 1. Recruitment graph of the MSM sample (n=362), with nine recruitment chains\*, Mauritius, 2010.**



*\*The single large square in each recruitment chain indicates a seed.*

## Seed Characteristics

Table 1 displays some basic characteristics of each seed, as well as each seeds recruitment effort. In brief, three seeds were from Curepipe and six from Belle Rose (see table 1, seed characteristics). The youngest seed was 22 years of age and the oldest seed was 49 years. All but one seed was HIV negative and most of the seeds (four) resided in Plaines-Wilhems. Seed 4 recruited the most participants (84), comprising 23.5% of the sample, whereas seed 7 produced the longest recruitment chain (13 waves).

**Table 1. Characteristics of MSM Seeds, Mauritius, 2010**

	<b>Survey Location</b>	<b>Age</b>	<b>HIV Status</b>	<b>Place of residence</b>	<b>Maximum number of recruits♦</b>	<b>Maximum number of waves♦</b>	<b>Percent of sample♦</b>
<b>Seed 1</b>	Belle Rose	49	positive	Port Louis	71	9	19.9%
<b>Seed 2</b>	Belle Rose	41	negative	Plaines Wilhems	13	4	3.9%
<b>Seed 3</b>	Belle Rose	22	negative	Pamplemousses	8	4	2.5%
<b>Seed 4</b>	Belle Rose	43	negative	Plaines Wilhems	84	12	23.5%
<b>Seed 5</b>	Belle Rose	23	negative	Plaines Wilhems	28	12	8.0%
<b>Seed 6</b>	Belle Rose	45	negative	Port Louis	3	2	1.1%
<b>Seed 7</b>	Curepipe	41	negative	Plaines Wilhems	53	13	14.9%
<b>Seed 8</b>	Curepipe	34	negative	Savanne	80	9	22.4%
<b>Seed 9</b>	Curepipe	48	negative	Savanne	13	6	3.9%

♦Excluding seeds

## Socio-demographic characteristics

Table 2 presents findings on select socio-demographic characteristics of MSM. The median age of MSM was 26 years (Minimum=16 and Maximum=59) and most MSM were in the age category of between 20 and 24 years (28.1%). More than half of MSM were under the age of 29 years. Fifty one percent of MSM reported their occupation as 'blue collar' and just under a quarter reported their occupation as 'white collar' (19.1%). The majority of MSM reported completing SC (school certificate) and above (44.6%). The largest percentage of MSM reported being single (88.6%) and few reported 'living in common' or being married. Most MSM reported themselves as being identified as 'homosexual' (37.9%) or 'bi-sexual' (34.7%) and few self-identified as either 'heterosexual' (1.3%) or transsexual (4.7%).

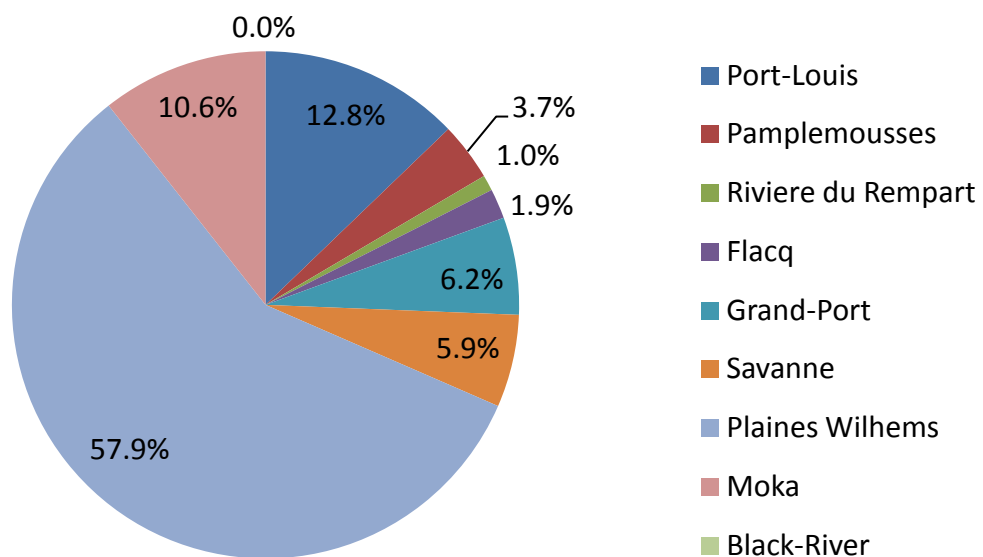
**Table 2. Socio-demographic characteristics of MSMs, Mauritius, 2010**

	<b>N</b>	<b>%</b>	<b>95% CI</b>
<b>Age</b>			
15-19	63	19.7	13.5, 27.9
20-24	93	28.1	21.6, 34.6
25-29	70	17.5	13, 23.6
30-34	45	10.5	6.2, 15.2
35-39	20	5.0	1.9, 8.4
40-44	36	11.2	6.0, 16.1
45-49	19	3.7	1.5, 6.6
≥ 50	16	4.3	1.4, 7.4
Median min., max. age in years	26 years (Min. 16–Max. 59)		
<b>Education</b>			
Incomplete Primary	15	5.0	1.6, 9.1
Complete Primary	67	21.7	15.6, 28.9
Incomplete Secondary	117	28.7	2.2, 35.2
SC & above	163	44.6	36.4, 53.0
<b>Occupation</b>			
Student	46	13.7	8.2, 20.2
Unemployed	48	13.5	8.6, 18.8
Self employed	17	2.8	0.9, 5.5
White collar	73	19.1	13.1, 25.7
Blue collar	178	50.9	43.3, 58.6
<b>Marital status</b>			
Single	332	88.6	82.6, 93.7
Living in common	14	5.4	2.2, 9.2
Married	16	6.1	2.6, 10.3

Self reported sexual identity			
Homosexual	142	37.9	30.1, 46.1
Bi-sexual	103	34.7	26.8, 42.8
Heterosexual	3	1.3	0.0, 3.5
Gay	80	21.4	14.9, 28.5
Trans	34	4.7	2.4, 7.5

The sample consisted of recruits from all districts except from Blackriver (Figure 2). The majority of MSM reported residing in Plaines-Wilhems (57.8%), followed by Port-Louis (12.8%) and Moka (10.6%).

**Figure 2. Districts in Mauritius where MSM Reported Residing**



## Sexual Risk Behaviors

### General sexual history and behaviors

Table 3 presents estimates on general sexual behaviors among MSM. Eighty percent of MSM reported their age of sexual debut with any partner male or female to be between 14 and 19 years median 16 years. Most MSM reported their age of sexual debut with a male partner to also be between 14 and 19 years (72.4%); the median years of age was the same for first sex with a male 16 years as with any partner.

When asked the type of anal sex generally practiced by MSM, most participants reported practicing both insertive and receptive anal sex (44.1%) and similar proportions generally practiced either insertive (28.6%) or receptive (27.3%). Just under half of MSM (47.2%) reported having two to four male oral and/or anal sexual partners in the previous three months. All MSM except for three reported engaging in anal sex with a male in the last three months (i.e., only three MSM reported exclusive oral sex with a man in the past three months). Of those who had anal sex with a man in the past three months n=359, 68.4% reported doing so with two or more male sexual partners. Most (86.7%) men reported having oral sex with another man in the past three months.

**Table 3. General sexual behaviors among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Age at first sexual intercourse with any partner</b>			
<14	64	14.4	9.8, 19.5
14-19	280	79.9	74.1, 85.2
≥ 20	18	5.6	2.4, 9.6
Median (min., max) age at first sexual intercourse with any partner	16 years (min. 7 – max. 30)		
<b>Age at first sexual intercourse with a male partner</b>			
<14	53	11.5	7.1, 16.4
14-19	271	72.4	65.4, 79.6
≥ 20	38	16.1	10.1, 21.9
Median min., max age at first sexual intercourse with a male partner	16 years (min. 7 – max. 34)		
<b>Type of anal sex practiced generally (no time frame)</b>			
Exclusively insertive	92	28.6	21.3, 35.1
Exclusively receptive	118	27.3	21.1, 34.2
Both insertive and receptive	152	44.1	36.7, 52.6

Number of male sexual partners oral or anal in the past three months			
1	103	32.2	24.5, 39.2
2-4	154	47.2	39.9, 54.2
≥5	102	20.6	15.5, 26.3
Number of male anal sex partners in the past three months among those who reported anal sex partners, n=359			
1	103	31.6	24.5, 38.9
≥2	256	68.4	61.1, 75.5
Median (min., max) number of male anal sex partners in the past three months		3 partners (min. 1 – max. 100)	
Oral sex with a man in the past three months			
Yes	327	86.7	80.9, 91.8
No	35	13.3	8.2, 19.1

### Sexual partner types and frequency

This survey asked MSM about their sexual practices with the following five different types of sexual partners: non-paid male ‘regular’ sexual partners, non-paid male ‘occasional’ or casual sexual partners, male partners to whom participants paid for sex (paid partner), male partners from whom MSM sold sex (paying partners) and female sexual partners. The majority (Figure 3) of MSM reported regular (80.9%) and occasional sexual partners (57.7%). Few MSM reported paying (18.2%) or paid sex partners (2.2%) in the past three months. Fifteen percent of MSM reported having a female sexual partner in the past three months.

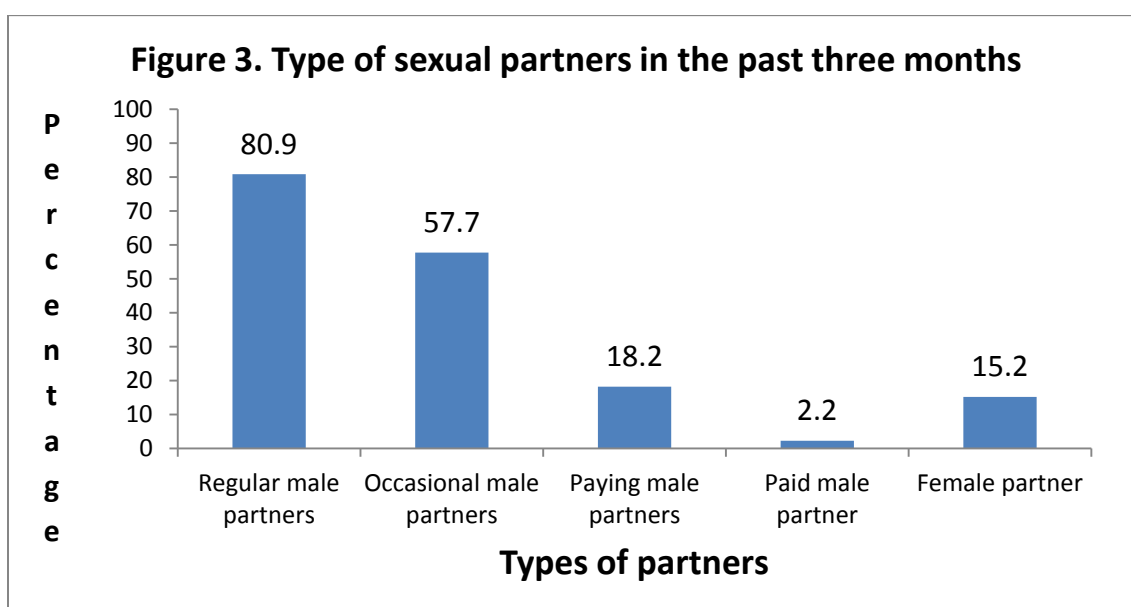


Table 4 provides data about the frequency of sexual partners by partner type. With the exception of regular male sexual partners, the majority of MSM reported having two or more sexual partners. Sixty six percent of MSM reported having two or more occasional (median 2 partners) and 64.2% reported having two or more paying (median 3 partners) male sexual partners in the past three months. There was insufficient data to calculate the frequency of paid male sexual partners. Among those men who reported having sexual intercourse with a female partner in the past three months, 77.5% reported doing so with two or more females (median 2 partners).

**Table 4. Frequency of sexual partners by partner type among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Number of regular male sex partners in the past three months among those who reported regular partners</b>			
1	215	75.3	67.2, 81.7
≥2	78	24.7	18.3, 32.8
Median (max., min.) number of regular male sex partners in the past three months	1 partner (min. 1 – max. 7)		
<b>Number of occasional male sex partners in the past three months among those who reported occasional partners</b>			
1	62	34.2	25.8, 43.4
≥2	147	65.8	56.6, 74.2
Median (max., min.) number of occasional male sex partners in the past three months	2 partners (min. 1 – max. 49)		
<b>Number of paying male sex partners in the past three months among those who reported receiving money for sex</b>			
1	14	35.8	16.4, 52.7
≥2	52	64.2	47.3, 83.6
Median (max., min.) number of paying male sex partners in the past three months	3 partners (min. 1 – max. >200)		
<b>Number of female sexual partners in the past three months among those who reported having penetrative vaginal sex with a female</b>			
1	17	22.5	5.7, 39.4
≥2	44	77.5	60.7, 94.3
Median (max., min.) number of female sex partners in the past three months	2 partners (min. 1 – max. 45)		

## Condom usage and accessibility

Table 5, below, provides findings on condom use at last sexual intercourse by partner types, who suggested using a condom at last sexual intercourse, frequency of negotiating condom use before sex, responses to partners' refusal to use condoms, condom use during oral sex with a man and condom use with female partners. Condom use was lowest with female partners (36.8%) compared to any male sexual partner (46.2%) and male commercial sexual partners (55.2%).

More than half (51.8%) of MSM reported having to 'always' negotiate condom use before having sex with any partner, whereas 18.8% reported 'never' having to negotiate condom use before having sex with any partner. Among those who used a condom with any male sex partner at last sexual intercourse, just under half of MSM reported that they suggested using a condom (47.9%) rather than condom use being suggested by their partner (2.5%) or by a joint decision between the participant and his partner (27.1%). Almost all MSM (97%) reported that they, rather than their sex partner (3%), were responsible for suggesting condom use with a commercial sex partner and that condom use was never a joint decision between the participant and his commercial partner.

When asked to respond to a hypothetical situation about how he would 'react' to a partner refusing to use a condom during sex, most MSM responded that they would refuse to have sex (48.6%), whereas 33.8% responded that they would 'accept readily'. Sixteen percent responded that they would 'accept after insistence' and only 1.4% said that they would 'accept on additional payment'.

Twenty two percent of MSM reported using a condom during last oral sex with a man. Few MSM reported ever using a female condom.

**Table 5. General condom use among MSM, Mauritius, 2010**

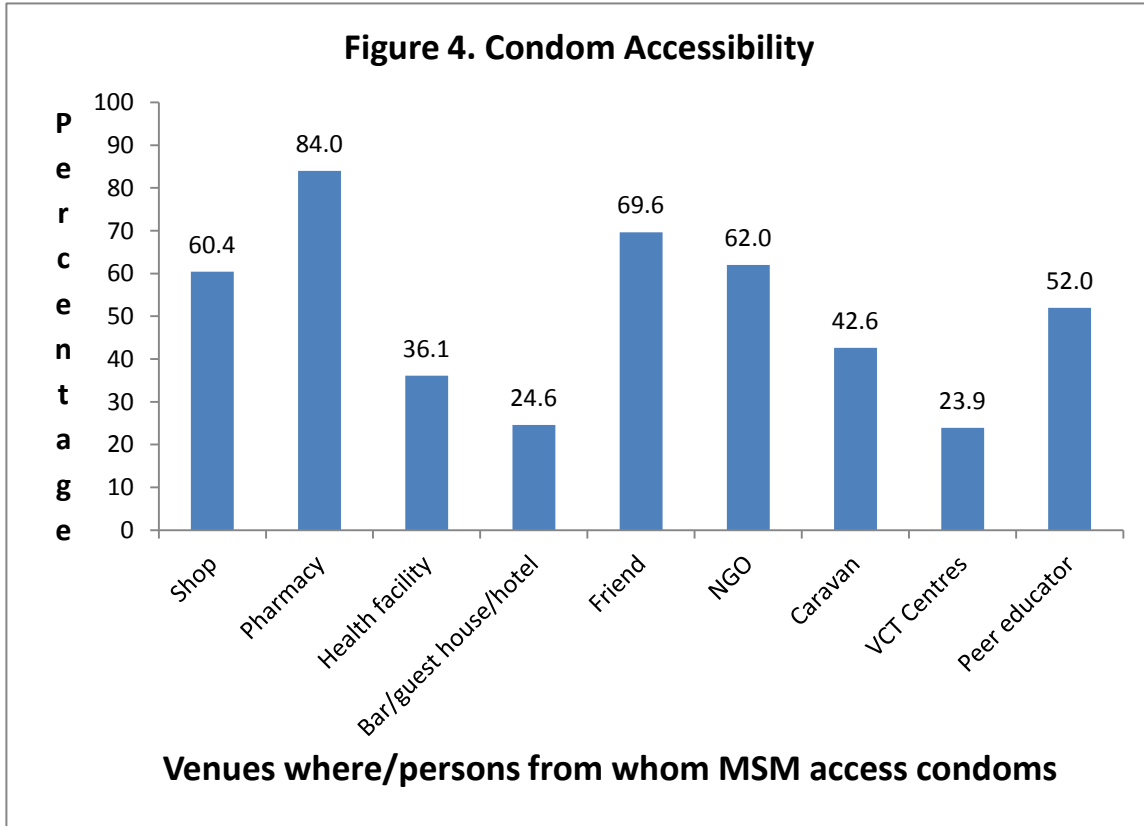
	N*	%	95% CI
Used a condom at last sexual intercourse			
Any male partner	189	46.2	39.1, 53.3
Male commercial	46	55.2	27.0, 76.2
Female	29	36.8	16.7, 72.6

<b>Frequency of negotiating condom use before having sex with any partner</b>			
Always	208	51.8	44.2, 59.1
Sometimes	104	29.4	23.3, 35.8
Never	47	18.8	13.2, 25.3
<b>By whom condom use was suggested at last sexual intercourse with any male partner</b>			
Participant	95	47.9	28.2, 59.1
Participant's partner	37	2.5	12.3, 40.8
Joint decision between participant and partner	57	27.1	19.5, 44.2
<b>By whom condom use was suggested at last sexual intercourse with a male commercial partner among those who reported having a commercial partner</b>			
Participant	40	97.0	80.2, 100.0
Participant's partner	2	3.0	0.0, 18.6
Joint decision between participant and partner	4	0.0	0.0, 7.2
<b>Hypothetical response by respondent if a partner refused to use a condom</b>			
Accept readily	107	33.8	25.9, 41.5
Accept after insistence	55	16.3	11.6, 21.6
Accept on additional payment	9	1.4	0.5, 2.5
Refuse	191	48.6	41.2, 56.2
<b>Condom use at last oral sex with a man</b>			
Yes	83	22.2	15.2, 27.6
No	244	77.8	72.4, 84.8
<b>Ever used a female condom</b>			
Yes	20	3.5	1.3, 6.8
No	340	96.5	93.2, 98.7

When MSM who reported not using a condom at last sex with another man were asked why they did not do so (multiple responses possible), more than 50% responded the reason as they 'trust' their partner (61.1%, CI. 51.5, 70.5), that using a condom was 'not pleasurable' (58.6%, CI. 49.4, 69.2), that they 'did not think it was necessary' to use a condom 55.7%, 45.2, 66.3 and that a condom was 'not available' (25.5%, CI. 16.7, 35.6) (data not shown in table).

MSM were able to access condoms from several different venues (Figure 4, following page). Most MSM accessed condoms from the pharmacy (84%). Other common venues for accessing condoms were from non-governmental organizations (62%), shops or supermarkets (60.4%) and from peer educators (52%). Seventy percent of participants reported accessing condoms from friends. In response to a question about whether a participant received free condoms through outreach services, peer educators

or public health centers in the past three months, 52% (CI. 43.2, 58.8) of MSM replied that they had and 48% (CI. 41.2, 56.8) replied that they had not (data not shown in table).



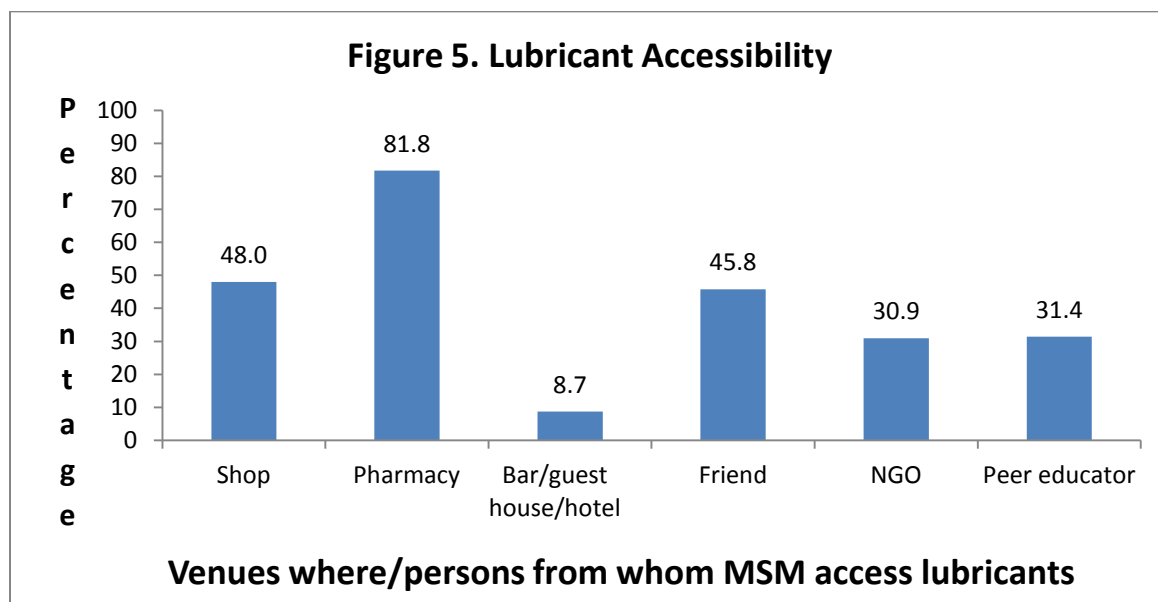
## Lubricant Use

The majority (83.1%) of MSM reported using lubricants for anal sex in the past three months (Table 6). The most common types (multiple responses possible) of lubricant used by MSM were KY jelly (52%), followed by Vaseline (24.3%) and baby oil (17.9%). Small proportions of MSM reported using hand lotion, vaginal gel, butter or cooking oil.

**Table 6. Lubricant use among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Used lubricant for anal sex in the past three months</b>			
Yes	288	83.1	78.8, 89.3
No	58	16.9	10.7, 21.2
<b>Types of lubricants commonly used for anal sex among those who reported using lubricants in the past three months</b>			
Vaseline	84	24.3	18.4, 31.0
KY Jelly	203	52.0	44.1, 59.8
Hand lotion	30	6.4	3.9, 9.3
Vaginal gel	25	8.5	5.0, 12.6
Baby oil	62	17.9	12.4, 23.7
Butter	13	2.5	0.9, 4.6
Cooking oil	33	7.8	4.7, 11.4

The most common venues (multiple responses possible) from which MSM reported accessing lubricants were the pharmacy (81.8%), followed by a shop (48%) (Figure 5). Forty six percent of MSM reported accessing lubricants from friends.



## Group sex

Thirty four percent of MSM reported ever having sex in a group more than one partner and, among those, 41.1% had done so in the past three months (Table 7).

**Table 7. Group sex among MSM, Mauritius, 2010**

	<b>N*</b>	<b>%</b>	<b>95% CI</b>
<b>Ever had sex in a group</b>			
Yes	128	34.2	27.6, 41.1
No	234	65.8	58.9, 72.4
<b>Had sex in a group in the past three months</b>			
Yes	51	41.1	29.5, 69.1
No	77	58.9	30.9, 70.5

## Substance use

Table 8 displays alcohol, non-injection and injection drug use among MSM. The majority (88.6%) of MSM reported that they drink alcohol (no time reference used in this questionnaire). Among the 11.8% of MSM who reported using illegal, non-injecting drugs in the past three months (multiple responses possible), 77.6% reported using marijuana, 18% reported using Codeine and 36.2% reported using Tranquilizers. No participants reported using ecstasy.

Few (7.5%) MSM reported ever injecting drugs and even fewer (3.3%) reported doing so in the past three months. The drug most commonly injected by MSM in the past three months was Subutex®, or buprenorphine, an opiate narcotic which is frequently prescribed as a treatment for heroin addiction but widely abused for recreational use.

**Table 8. Alcohol, drug use and injection practices among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Drinks alcohol no time reference</b>			
Yes	317	88.6	83.9, 93.2
No	44	11.4	6.8, 16.1
<b>Non-injection drug use in the past three months</b>			
Yes	46	11.8	6.9, 17.3
No	316	88.2	82.7, 93.1
<b>Non-injection drug used in the past three months</b>			
Marijuana	42	77.6	55.5, 94.9
Codeine	10	18.0	2.5, 25.5
Tranquilizers	15	36.2	9.6, 70.2
Ecstasy	--	--	--
<b>Injection drug use ever</b>			
Yes	30	7.5	3.4, 12.4
No	332	92.5	87.7, 96.6
<b>Injection drug use in past three months</b>			
Yes	16	3.3	0.9, 6.3
No	346	96.7	93.7, 99.1
<b>Types of drugs injected most often in the past 3 months</b>			
Brown Heroin	7	45.7	3.1, 86.3
Subutex®	9	54.3	13.7, 96.9

## Stigma, discrimination and violence

Table 9 provides findings for stigma, discrimination and violence experienced by MSM. Seventeen percent of MSM reported being refused services because they were perceived to have sex with other men. Among those who were refused services in the past 12 months (multiple responses possible), 10% reported that they were refused employment, 8.4% reported being refused housing and 7.5% reported being refused police assistance.

Forty percent of MSM reported receiving verbal insults and 8% reported being hit or kicked in the past 12 months because they were perceived to have sex with other men. Fourteen percent of MSM reported being forced to have sexual intercourse in the past 12 months.

**Table 9. Stigma, discrimination and violence among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Was ever refused service because of being MSM</b>			
Yes	80	16.9	11.9, 22.4
No	282	83.1	77.6, 88.1
<b>Refused the following services in the last 12 months because of being MSM</b>			
Health care	20	4.1	1.5, 7.4
Education	9	2.5	0.6, 5.3
Employment	42	10.0	5.8, 14.7
Religious service	12	3.1	1.1, 5.8
Restaurant	20	2.9	1.4, 4.7
Housing	30	8.4	4.5, 12.9
Police assistance	38	7.5	3.9, 11.7
<b>Received verbal insults in the last 12 months because of being MSM</b>			
Yes	161	40.2	32.7, 47.7
No	201	59.8	52.3, 67.3
<b>Hit or kicked in the last 12 months because of being MSM</b>			
Yes	29	8.0	4.2, 12.3
No	333	92.0	87.7, 95.8
<b>Forced to have sexual intercourse in the last 12 months</b>			
Yes	45	13.8	8.6, 19.4
No	317	86.2	80.6, 91.4

## HIV and sexually transmitted infections (STIs)

### STI knowledge and signs and symptoms

Almost all (97.7%) MSM had heard of STIs, of diseases that can be transmitted through sexual intercourse, however only 44.1% could accurately describe any signs or symptoms of STIs in men (Table 10). Forty one percent of MSM reported ever seeking routine (undefined in the questionnaire) medical checks for STIs even without having signs or symptoms and 11.4% reported having signs or symptoms of an STI (genital/anal discharge/sore/ulcer) in the past 12 months.

**Table 10. STI knowledge, signs and symptoms among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Has ever heard of diseases that can be transmitted through sexual intercourse</b>			
Yes	352	97.7	95.6, 99.3
No	10	2.3	0.7, 4.4
<b>Can describe any signs and symptoms of STIs in men</b>			
Yes	155	44.1	36.2, 51.5
No	197	55.9	48.5, 63.8
<b>Has ever sought routine medical checks for STIs even without signs and symptoms</b>			
Yes	162	41.0	33.7, 48.0
No	200	59.0	52.0, 66.3
<b>Has had a genital/anal discharge/sore/ulcer in the last 12 months</b>			
Yes	33	11.4	6.4, 16.9
No	319	88.6	83.1, 93.6

### HIV knowledge and testing

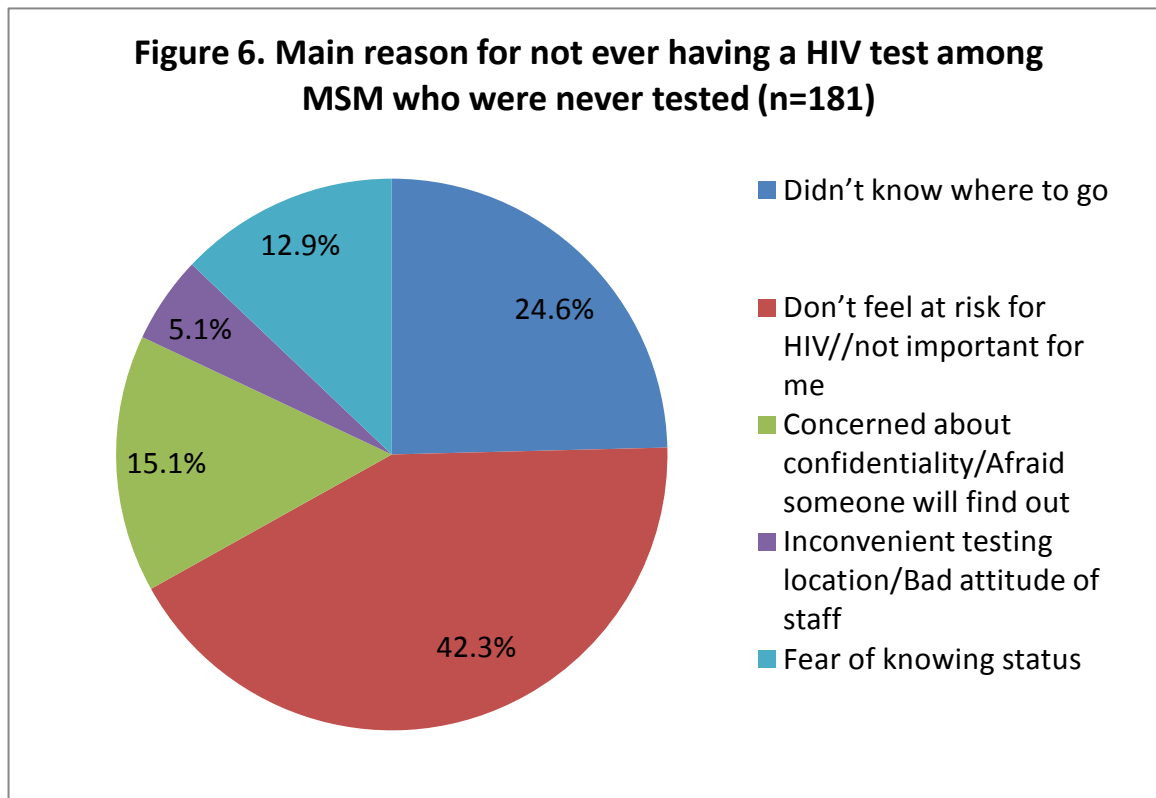
Just under 50% of MSM had accurate knowledge about HIV transmission, 59.5% knew where to go to get an HIV test and 41.8% had ever had an HIV test (Table 11). Among those who had ever had an HIV test, 72.5% received their test results, among whom only 1.1% tested positive.

**Table 11. HIV knowledge and testing among MSM, Mauritius, 2010**

	N*	%	95% CI
<b>Has correct HIV transmission Knowledge</b>			
Yes	174	48.8	41.2, 56.1
No	188	51.2	43.9, 58.8

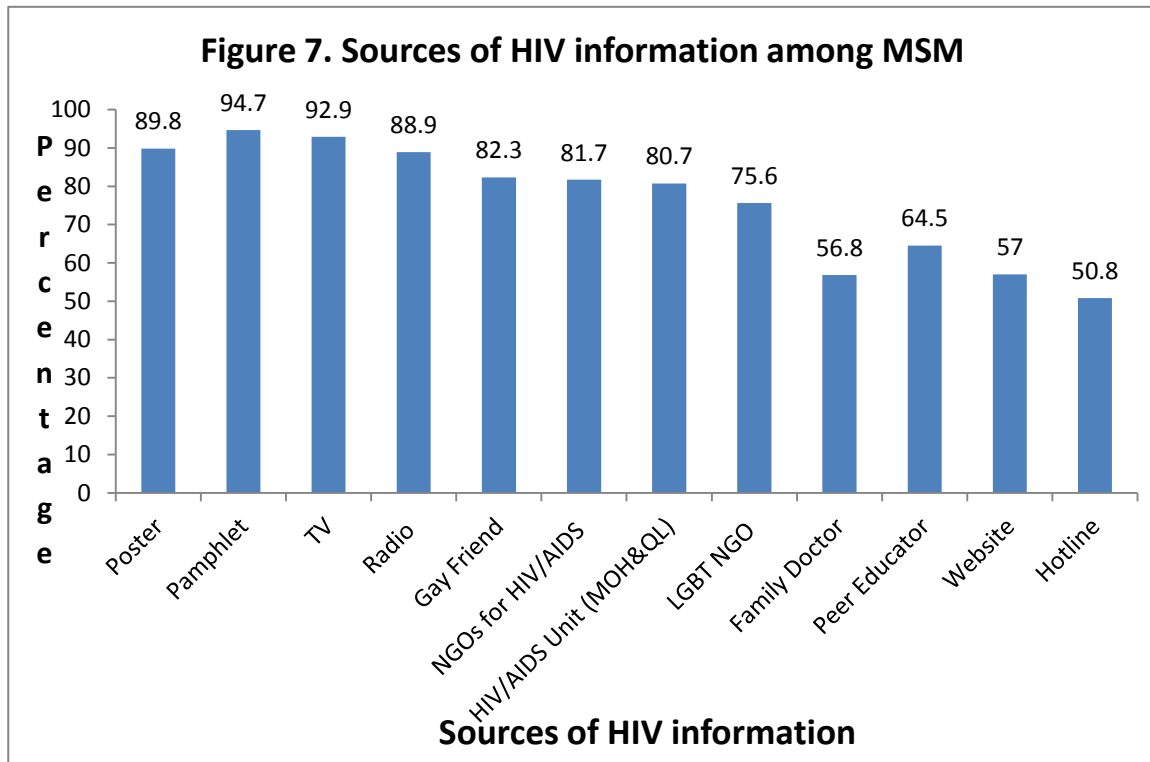
<b>Knows where to go to have an HIV test</b>			
Yes	228	59.5	53.2, 66.5
No	132	40.5	33.5, 46.8
<b>Has ever been tested for HIV</b>			
Yes	170	41.8	33.6, 49.9
No	192	58.2	5.1, 66.4
<b>Participant received HIV test result at last testing</b>			
Yes	139	72.5	61.6, 86.9
No	31	27.5	13.1, 38.4
<b>HIV test result among those who received a result</b>			
Positive	3	1.1	0, 3.1
Negative	136	98.9	96.9, 100

Over 50% of MSM have never been tested for HIV. When asked the main reason why they had never received an HIV test (Figure 6), 42.3% responded that they ‘did not feel at risk for HIV’, 24.6% responded that they ‘did not know where to go’ for an HIV test, and 15.1% were ‘concerned about confidentiality’ or ‘afraid someone will find out’.



## Sources of HIV information

Respondents reported receiving HIV information from a variety of sources (Figure 7). More than 90% of MSM reported receiving HIV information through pamphlets and the television and more than 80% of MSM reported receiving HIV information through posters, the radio, NGOs for HIV/AIDS, HIV/AIDS Unit MOH&QL and from gay friends.



## HIV, Hepatitis B & C, and Syphilis prevalence

HIV prevalence among MSM was 8.1%; prevalence of HCV was 14.2% and syphilis was 5.0% (Table 12). No one tested positive for HBV.

**Table 12. Prevalence of HIV, HBV, HCV, and Syphilis among MSM in Mauritius, 2010**

Disease prevalence	N*	%	95% CI
<b>HIV</b>			
Negative	320	91.9	87.4, 96.2
Positive	38	8.1	3.8, 12.6
<b>HBV</b>			
Negative	362	100	--
Positive	0	--	--
<b>HCV</b>			
Negative	301	85.8	80.1, 91.5
Positive	57	14.2	8.5, 19.9
<b>Syphilis</b>			
Negative	341	95.0	91.7, 98.0
Positive	21	5.0	2.0, 8.3

## HIV prevalence by select risk behaviors

Table 13 (following page) provides findings from a bi-variate analysis of select socio-demographic and behavioral risk variables and HCV and syphilis prevalence among MSM who tested positive for HIV during the survey (n=38). Among those who were HIV sero-positive, HIV prevalence was highest among MSM in Port Louis (50.7%), followed by those in Plaines Wilhems (34.5%) and Moka (8.4%). Men who self identified as 'homosexual' had the highest prevalence of HIV (51.3%) compared to men who self identified as 'bisexual' (18%), "heterosexual" (14.9%), 'Gay' (6.3%) or 'transsexual' (9.5%).

HIV prevalence was higher (78.3%) among MSM who reported having two or more (compared to having just one) male anal sex partners in the last three months. A slightly higher percentage (50.4%) of MSM who reported not using condoms (compared to those who reported using condoms) at last anal sex with a male partner was HIV sero-positive.

A lower percentage of MSM who reported having sexual intercourse with a female (compared to those who did not) in the past six months were HIV sero-positive (31.6%). Among HIV sero-positive MSM who reported having sexual intercourse with a female, 100% reported not using a condom at last penetrative vaginal sex. Compared to those MSM who reported not having group sex, a smaller percentage (29.3%) of HIV sero-positive MSM reported ever having group sex (sex with more than one other person); however, a higher percentage (67%) of MSM reported having group sex in the past three months.

Among MSM who were sero-positive for HIV, a higher percentage reported no presence of genital/anal discharge/sore/ulcer in the last 12 months (90.9%), had incorrect knowledge of HIV transmission (71.5%) and reported ever having had an HIV test (72.1%). Most MSM who tested positive for HIV during the survey, reported injecting drugs in the past three months (71.6%).

Sixty four percent of MSM who were sero-positive for HIV, were also positive for HCV. Few MSM who tested positive for HIV during the survey were also infected with syphilis (6.4%).

**Table 12. Bivariate analysis of select variables among those that tested positive for HIV prevalence MSM in Mauritius, 2010**

Select Variables	HIV Positive		
	N	%	95% CI
<b>District</b>			
Port-Louis	13	50.7	31.7, 84.8
Pamplemousses	0	1.0	--
Riviere du Rempart	1	0.8	0, 2.5
Flacq	0	1.0	--
Grand-Port	1	0.8	0, 2.2
Savanne	1	2.9	0, 7.4
Plaines Wilhems	18	34.5	9.5, 58.6
Moka	3	8.4	0, 23.1
Black-River	-	--	--
<b>Self reported sexual identity</b>			
Homosexual	14	51.3	40.6, 78.6
Bisexual	8	18.0	3.7, 30.4
Heterosexual	2	14.9	0, 29.3
Gay	4	6.3	0.9, 8.3
Trans	10	9.5	2.3, 16.5

<b>Number of male anal sex partners in the last three months among those who reported male anal sex partners</b>			
1	7	21.7	2.7, 50.3
≥2	31	78.3	49.7, 97.3
<b>Condom use at last anal sex with a male partner</b>			
Yes	19	49.6	26.1, 73.2
No	19	50.4	26.8, 73.9
<b>Sexual intercourse with a female in the last six months</b>			
Yes	7	31.6	7.3, 56.6
No	31	68.4	43.4, 92.7
<b>Condom use at last penetrative vaginal sex</b>			
Yes	0	0	--
No	7	100	--
<b>Ever had group sex</b>			
Yes	13	29.2	7.2, 54.0
No	25	70.8	46.0, 92.8
<b>Group sex in the last three months</b>			
Yes	6	67.0	--
No	7	33.0	--
<b>Presence of genital/anal discharge/sore/ulcer in the last 12 months</b>			
Yes	3	9.1	0, 23.0
No	32	90.9	77.0, 100
<b>Has correct knowledge about HIV transmission</b>			
Yes	13	28.5	87.0, 55.0
No	24	71.5	45.0, 91.3
<b>Has ever had an HIV test</b>			
Yes	26	72.1	49.5, 91.0
No	12	27.9	9.0, 50.5
<b>Injected drugs in the past three months</b>			
Yes	27	71.6	48.0, 94.5
No	11	28.4	5.5, 52.0
<b>HCV</b>			
Negative	12	36.0	16.7, 70.1
Positive	23	64.0	29.9, 83.4
<b>Syphilis</b>			
Negative	30	93.6	84.3, 98.4
Positive	7	6.4	1.6, 15.7

## Population Size Estimation

One week prior to the commencement of the survey of MSM using RDS, 590 unique objects key rings were distributed to MSM throughout Mauritius by peer outreach groups. During the survey, 115 MSM reported receiving the unique object. The RDS weighted estimator for those who responded that they had received the unique object was 28.5%. The calculation for the population size estimation using the unique identifier method is  $590/.285$  which provides a size estimation of 2,070 MSM, which is below 1% of males between the ages of 15 and 59 ( $n=416,179$ ) residing in Mauritius in 2009, and therefore, likely to be an underestimation.

Other attempts to estimate the population size of MSM with multiplier methods were not successful due to the lack of reliable service data available. This is a common problem in many countries who are trying to attain reliable population size estimations on their hidden and hard-to-reach populations. Efforts should be made now to develop service registries to establish counts of unique key risk group individuals who access these services. Attempts were made to calculate population size estimates based on attendance at the Gay Pride Parade, the 'celebrate yourself' party and the Gay Pride party all held in March 2010, however accurate counts of MSM were not available.

## DISCUSSION AND RECOMMENDATIONS

**Concentrated epidemic of HIV; relatively high prevalence of HCV:** Prevalence of HIV was 8.1%, much higher than any previous HIV estimates among MSM in Mauritius but on the lower end of the range of HIV prevalence found in other African studies of MSM (8%-36%). HCV prevalence was 14.2% and among those who were HCV positive, 77.2% (CI. 57.8, 92.0) reported injecting drugs in the previous three months. No one tested positive for HBV. Formal guidelines and interventions for hepatitis prevention and management of both HCV and HCV-HIV co-infection are needed. Guidelines and interventions should be comprehensive, including HCV education and prevention, HIV-HCV counseling, screening for HCV and referral for services where appropriate and available, promotion of safe sex, and overall integration of hepatitis prevention into HIV prevention programs. Although, all MSM who were positive for HCV had also been injectors, HCV screening should not only be incorporated into programs targeting IDUs, but should also be integrated into programs targeting MSM, many of whom may not want to be associated with IDUs.

HIV among MSM is concentrated in Port Louis, the capital of Mauritius, and in Plaines Wilhems (lower central part of the island). MSM who reported their self-identity as homosexual had the highest prevalence of HIV compared to the other categories of MSM self-identities. Eighteen percent of self identified bisexual men were HIV sero-positive, indicating possible further HIV infection to their female partners.

**High levels of risky sexual behaviors:** Although MSM who had only practiced oral sex were also eligible for this survey, almost all 359/362 MSM who enrolled reported having anal sex in the previous three months. MSM reported having multiple male anal sex partners 68.4% reported having two or more partners in the past three months and inconsistent condom use during anal sex with commercial and non-commercial partners. In addition, just over one third of MSM reported having ever been in a group sex situation, among which 41% reported having done so in the past three months. In the bivariate analysis of HIV sero-prevalence and sexual risk factors, a higher percentage of men who reported having two or more male anal sex partners (compared to one partner) or being in a group sex situation (compared to not being in a group sex situation) in the past three months were HIV sero-positive.

Forty four percent of MSM reported having both insertive and receptive anal sex, whereas 27.3% reported generally practicing exclusive receptive anal sex. It is widely known that HIV is more easily transmitted through receptive anal sex rather than through insertive anal sex. According to one study, the estimated per-contact risk of acquiring HIV from unprotected receptive anal sex is 0.82% when the partner is known to be HIV positive and 0.27% (similar to the risk of a health care worker getting stuck by a needle with positive blood [0.3%]) when partners of unknown serostatus are included<sup>9</sup>.

Less than one quarter of MSM reported having sexual intercourse with a female partner in the past three months. However, among those who reported doing so, more than three quarters of them reported having multiple female sexual partners. Furthermore, in the bi-variate analysis, all men who did not use a condom at last penetrative vaginal sex were HIV sero-positive.

Low condom use and the high numbers of sexual contacts reported by MSM with male and female sex partners, including in group and receptive anal sex situations highlights many opportunities for wider HIV transmission to other male sex partners as well as to the general population in Mauritius. Behavior change interventions and communications aimed at partner reduction, knowing a partner's HIV status before engaging in sex, and the promotion of condom use among MSM are urgently needed.

**Thirty five percent of MSM report themselves as bisexual:** Many MSM are having sex with females. However, it is not known whether these men are openly bisexual and communicate this with their partners or whether they have an open heterosexual persona and a hidden homosexual persona. All too often, MSM in many societies feel societal pressures to marry and have children or engage in sexual relationships with women. These pressures increase the HIV vulnerability for both men and women. Men who feel the need to hide their sexual orientation may be less forthcoming about their sexual health when seeking health care. In societies where MSM activity is secretive withholding this information from female sexual partners outreach efforts and policy changes, including decriminalizing and reducing stigma related to male-to-male sex,

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<sup>9</sup> Vittinghoff, E, Douglas, J, Judson, F, McKirnan, D, MacQueen, K, Buchbinder, S.P. Per-Contact Risk of Human Immunodeficiency Virus Transmission between Male Sexual Partners. American Journal of Epidemiology August 1, 1999;150:306-11

must be developed to address sexual health needs of these men and their partners. Furthermore, given that MSM practice low condom usage with female and male partners, strategies are needed to reduce HIV transmission among intimate partners including scaling up HIV prevention interventions to emphasize the importance of protecting main female and male partners and conducting further research to improve understanding of the dynamics of HIV transmission among intimate partners UNAIDS, 2009<sup>10</sup>.

**High-risk injection drug use practices:** The majority of MSM reported that they drink alcohol. Few (7.5%) MSM reported ever injecting drugs and even fewer (3.3%) reported doing so in the past three months. However, among those who tested positive for HCV, 100% reported ever injecting drugs giving strong evidence of HCV exposure through the sharing of needles and/or drug equipment. In addition, 71.6% of MSM who tested positive for HIV reported injecting drugs in the past three months.

Interventions for MSM who inject drugs need to be designed to account for the overlap of high-risk sexual and drug using networks and should include condom and lubricant distribution, STI testing and treatment, HIV counseling, testing, care and treatment, and integrate linkages to injecting drug use services, including evidence-based risk reduction programs such as syringe exchange and opiate substitution therapy. In addition, current programs for IDUs should include special services that are 'gay friendly' and are equipped to address the needs of injectors who might be MSM.

**Few MSM report stigma and discrimination.** Overall, few MSM reported being subject to stigma and discrimination in the past year. Nevertheless, any sign of stigma or discrimination towards someone who is perceived to be having male-to-male sexual relations is problematic. Given that 17% of MSM were ever refused service and that 10% were refused employment, 8% refused housing and 8% were hit or kicked in the past year because of their sexual orientation, enhancement of ongoing community educational and awareness programs may be needed.

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<sup>10</sup> UNAIDS. (2009) HIV Transmission in Intimate Partner Relationships in Asia. Accessed on September 9, 2010 at: [http://data.unaids.org/pub/Report/2009/intimate\\_partners\\_report\\_en.pdf](http://data.unaids.org/pub/Report/2009/intimate_partners_report_en.pdf)

**Low knowledge of HIV and STIs:** Although most MSM had heard of diseases that can be transmitted through sexual intercourse, only 44% were able to correctly describe any signs or symptoms of STIs in men. In addition, even though 41% of MSM reported that they had ever sought routine medical checks for STIs even without signs and symptoms, and that only 11.4% reported having actual signs of an STI in the past year, not knowing the correct signs and symptoms of STIs in males may result in MSM not seeking advice and treatment when infected, thus increasing the risk of acquiring or transmitting HIV and other STIs. Systematic screening for STIs should be integrated into programs providing services to MSM; health facility-based services should consider including systematic physical examinations for STIs in people known or suspected to be MSM since signs or symptoms may neither be self-recognized nor reported.

More than 90% of MSM reported receiving HIV information through a variety of information sources. However, less than 50% of MSM had correct knowledge about HIV transmission. Among HIV sero-positive MSM, 71.5% had incorrect knowledge about HIV transmission. It is unclear how MSM interpreted “HIV information” (e.g., whether it was information about HIV transmission, outreach services, the Gay Pride Parade, etc.) when responding to the question about where they get sources of HIV information so it is not possible to link the high percentage of MSM receiving HIV information to their low percentages of having correct HIV transmission knowledge. Nevertheless, there is evidence of the need for increased education about HIV risk and transmission for sexual active males.

**Some MSM do not know where to go for HIV testing:** Forty one percent of MSM do not know where to go to be tested for HIV and only 42% have ever been tested. Among those who were tested, just over one quarter of them did not get their test results. The main reason why IDUs reported not ever having an HIV test was because they “did not feel at risk for HIV” and that “it was not important for them”. This is plausible given that among HIV positive MSM in this survey, a higher percentage had ever been tested for HIV (compared to those who had never been tested for HIV). The reason for having an HIV test in this group could have been based on their own assessment of being at higher risk for HIV. Nevertheless, given that all MSM in this survey reported having some sexual contact and that many of them reported practicing high risk sexual behaviors, respondent’s perception of HIV risk may not be accurate and even those MSM who do

not perceive themselves at high risk for HIV infection should be encouraged to get tested and to obtain their test results.

HIV VCT for MSM could be addressed in several ways: (a) increase awareness about the importance of being tested and the availability of HIV testing locations around the island; (b) promotion of the use of existing services, with additional training for counselors on how to receive and provide quality VCT services for this population, and (c) providing VCT services to MSM in 'gay friendly' settings. In addition, given that 13% of MSM said that they did not ever have an HIV test because they were afraid of knowing their status may indicate that more widespread awareness is needed to inform this population of the consequences of a positive HIV test result and how the disease can be controlled through proper medication and medical care.

**HIV/syphilis co-infection:** Although syphilis prevalence was relatively low at 5%, co-infection of HIV and was slightly higher at 6.4%. Monitoring STIs, especially those that result in genital ulcers, among MSM is essential as STIs are associated with increased sexual HIV transmission<sup>11</sup> and are a marker of unprotected sex.

In this study all participants were encouraged to return to the study location to receive their test results and then were referred elsewhere for treatment and follow-up. In future studies where there is an opportunity to capture and treat study participants who either have or are suspected of having syndromic treatment an easily curable infection such as syphilis, all efforts should be made to provide the necessary treatment. Furthermore, given that syphilis was found in a relatively small number of participants, on-site treatment would not expend many resources.

**MSM population size is still unknown:** Currently there is insufficient service data to calculate an accurate population size estimate of MSM in Mauritius. Attempts were made to create a multiplier from the Gay Pride Parade, the 'celebrate yourself' party and the Gay Pride party all held in March 2010. However, accurate counts of MSM were not

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<sup>11</sup> Wasserheit J. Epidemiologic synergy interrelationships between human immune virus infection and other sexually transmitted diseases. *Sex Transm Dis* 1999; 75(1): 3–17; Dickerson MC, Johnston J, Delea TE, et al. The causal role for genital ulcer disease as a risk factor for transmission of Human Immunodeficiency Virus: An application of the Bradford Hill Criteria. *Sex Transm Dis* 1996; 23(5):429-440.

properly gathered. One way to improve the ability to calculate future population size estimations on all hidden and hard-to-reach populations is to set up systems whereby all service providers record one-time visits of select groups of people such as those who classify themselves as injectors, sex workers or a man having sex with men during the course of each year.

It is commonly accepted that between 3-10% of the adult male population  $\geq 15$  years old comprise men who have had sex with men<sup>12</sup> and our attempts at using a multiplier method were far lower than the minimum 3%.

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<sup>12</sup> Bazemore, P.H., Wilson, W.H., Bigelow, D.A. (2008) Homosexuality. eMedicine. Accessed on June 20, 2010 at: <http://emedicine.medscape.com/article/293530-overview>.

## Conclusion

To conclude, study findings clearly identify and confirm the need for the establishment and expansion of programs targeting MSM in Mauritius. HIV prevalence among MSM can easily be classified concentrated and MSM are thereby a most-at-risk population in Mauritius. Currently there are limited services targeting MSM. These results support the need to develop a minimum package for prevention, care, and treatment of HIV infection, provided in settings that are easily accessed by and comfortable to MSM. As described earlier, this package should build on existing services and integrate important messages on how to reduce sexual and drug use risk, particularly among individuals that engage in multiple risk behaviors. In addition, continued condom distribution, routine STI screening and treatment, and linkages to appropriate HIV care and treatment services should be included. Most of the HIV infection among MSM is concentrated in two geographic areas of Mauritius: Port Louis, and Plaines Wilhems. If resources are limited, targeted risk reduction for MSM should be directed to these areas.

Any scale-up of programs and services will need to be appropriately defined and adapted according to the unique context and risks identified for each population, endorsed by appropriate stakeholders in Mauritius, and once implemented, monitored appropriately.

This was the first use of RDS in Mauritius and by all accounts this sampling methodology worked well in the population of MSM. This first round of an IBBS survey conducted among MSM in Mauritius successfully captured a representative sample of MSM serving as a foundation for the establishment of a HIV surveillance system. This baseline survey has provided important epidemiological data to better understand the current context of the HIV epidemic in Mauritius and should be used by policy makers to prioritize where to target their resources for HIV prevention. IBBS should be incorporated into an on-going surveillance strategy whereby surveys on HIV and other infections prevalence and associated risk behaviors are implemented every two to three years using the same sampling methodology RDS to monitor trends, identify and respond to failures and measure successes.