

# Technical Report

## Lambda survey: M-Track Ontario second generation surveillance

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**mtrack**



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## Executive summary

M-Track is an ongoing second generation surveillance system conducted at sentinel sites across Canada. It is the most recent in a series of studies, including the National Men's Survey (1991), the Winnipeg Men's Survey (1995) and the Ontario Men's Survey (2002), targeting men who have sex with men (MSM). The Ontario component of M-Track (*Lambda*) was conducted in Toronto and Ottawa.

The *Lambda* study was a venue-based cross-sectional survey that consisted of a questionnaire and collection of biologic samples (dried blood spots) to measure HIV, HCV and syphilis prevalence. *Lambda* used tests designed to detect recent infection to assess HIV incidence among MSM. *Lambda* sought to collect information about risk behaviours associated with HIV/STI infection and general issues relevant to sexual health and sexual behaviour among MSM. Community members and service providers were integral throughout the study from development and implementation to interpretation and translation of knowledge into action.

Overall, 2,438 participants took part in the *Lambda* survey and 1,104 (45.3%) of these participants provided a dried blood spot (DBS). The Ottawa site recruited 506 participants, of whom 304 (60.1%) provided a DBS. 1,932 participants were recruited from the Toronto site and 41.4% of these participants provided a DBS.

The average age of participants was approximately 40 years. With greater than 60% of participants having completed at least one post-secondary degree the study, population had a relatively high level of education. Further, the median income of participants was estimated to be \$45,000 per annum.

The majority of participants were Canadian born, with this being more pronounced in Ottawa (83.7%) than Toronto (69.0%). With respect to self-reported ethnicity, the majority of participants reported European/North American ancestry. However, among Toronto participants, 8.3% were Southeast Asian, 5.8% were Aboriginal, 3.3% were South Asian, 3.2% were Caribbean, 3.2% were Latin, 2.5% were African, 2.1% were multi-ethnic and 1.6% were Arab/West Asian. Among Ottawa participants, 4.6% were Aboriginal, 3.3% were Southeast Asian, 2.6% were Arab/West Asian, 2.2% were South Asian, 2.0% were multi-ethnic, 1.5% were Caribbean, 1.1% were Latin, and 0.4% were African. While the majority of participants spoke only English, 148 Toronto participants (8.6%) and 122 participants from Ottawa (26.9%) spoke French only. Although the study materials and questionnaire were available only in English and French, 14.5% and 7.5% of participants from Toronto and Ottawa, respectively, spoke a language other than French or English.

Greater than 85% of the *Lambda* population identified as gay or homosexual, while 10.4% of Toronto participants and 8.2% of Ottawa participants identified as bisexual. Approximately 2% of participants identified as straight or heterosexual and approximately 1% identified as two-spirit.

The venues most commonly used to look for sex partners were gay bars ( $\approx$ 46%), the internet ( $\approx$ 46%) and saunas or bathhouses (42.0% among Toronto participants; 27.2% among Ottawa participants). A higher proportion of Toronto participants than Ottawa participants reported looking for sex at raves or circuit parties, sauna's or bathhouses, sex parties and through personal advertisements. The proportion of respondents who

reported using the internet to find male sex partners was higher in *Lambda* than in the Ontario Men's Survey (2004) which was in turn higher than the National Men's Survey (1991).

In the previous six months, over 80% of participants reported sex with at least one man and more than 70% of participants reported at least one casual partner. 20.2% of Toronto participants and 14.3% of Ottawa participants had at least ten casual sex partners in the previous six months. Regular male sex partners were reported by over 80% of participants and approximately one quarter of participants reported two to five regular sex partners (25.7% of Ottawa and 27.6% of Toronto participants) during the same time period. Six or more regular partners were reported by 8.3% of Toronto participants and 5.3% of Ottawa participants. The high number of partners reported, particularly regular partners, suggests a high rate of concurrency in relationships.

As in the Ontario Men's Survey (2002), *Lambda* found that unprotected anal intercourse, commonly practiced by sub-groups of MSM remains an important factor in the HIV epidemic among MSM in Ontario. 56.5% of Toronto participants and 60.3% of Ottawa participants reported unprotected anal sex (receptive or insertive) with at least one man (casual or regular) in the previous six months. More than 30% of participants who reported casual sex reported unprotected anal intercourse with their casual male partner(s). Casual partners were reported by more than 70% of HIV-seronegative participants and, among these, 29.1% from Toronto and 29.5% from Ottawa reported at least one episode of unprotected sex with their casual partner(s).

47.1% of *Lambda* participants reported at least one episode of delayed condom application during receptive anal sex. The risk of infection associated with delayed condom application and the prevalence of this behaviour raise an important concern for HIV infection[1].

Approximately 10% of participants reported a history of injection drug use (including steroid injection) with 2.5% from Ottawa and 3.9% from Toronto reporting injection drug use in the previous six months. Excluding steroids, 7.1% of Toronto participants and 5.4% of Ottawa participants reported a history of injection drug use.

While the majority of participants reported having been tested for HIV at least once (413 (87.3%) participants from Ottawa; 1,545 (86.9%) participants from Toronto), 208 (11.7%) participants from Toronto and 53 (11.3%) participants from Ottawa reported that they had never been tested for HIV. From bivariate analysis, participants who reported a history of HIV testing were older, more likely to report an income of at least \$30,000 and reported higher numbers of male sex partners. Lower rates of HIV-testing were reported by Asian participants from Toronto and African participants from Ottawa.

1,104 participants provided a DBS for the purposes of HIV, HCV and syphilis testing. A total of 224 (20.5%) *Lambda* participants were HIV-positive. HIV prevalence was 11.8% (36 participants) in Ottawa and 23.8% (188 participants) in Toronto. The HIV incidence rates were 5.1 (95%CI: 2.3—7.9) and 2.6 (95%CI: 1.8—5.3) per 100 person years among Toronto and Ottawa participants, respectively. Seven (2.3%) participants from Ottawa and 38 (4.9%) participants from Toronto tested positive for HCV, indicating a past or present HCV infection. The prevalence of syphilis was 10.5% in Toronto and

6.4% in Ottawa, indicating a past or present syphilis infection. The overall prevalence of syphilis among *Lambda* participants was 9.4%.

This report is intended to provide an overview of sexual behaviours, HIV and other STIs among MSM in two Ontario epi-centres and in so doing inform prevention and treatment initiatives. The observed changes in behaviour over time and the apparent increase in HIV prevalence indicate the need for ongoing surveillance and highlights areas of concern that warrant further investigation, analytic research and targeted prevention strategies.

# 1 Background

## 1.1 Rationale

HIV education, prevention and treatment strategies have evolved in response to an increasing body of knowledge and understanding of the virus and behaviours that promote its spread. With this, there also has been an evolution in the methods used to collect more comprehensive data. A 'second generation' of surveillance systems have been developed to meet these needs by targeting both biomedical and behavioural surveillance of populations that have been hard hit by the epidemic. Second generation surveillance is the regular, systematic collection, analysis and interpretation of information to track and describe trends in the HIV/AIDS epidemic[2-3]. Information on the number of people infected with HIV and sexually transmitted infections (STI) can assist in identifying trends in infection[4]. Second generation surveillance systems fall into a category of enhanced surveillance systems that use individual rather than aggregate ([Glossary](#)) data to collect focused data suited to planning prevention and care. The benefits of behavioural surveillance are twofold: it assists in detecting and explaining trends in infection and is also necessary to inform and monitor prevention and education campaigns[2-4]. Guidelines for the implementation of second generation surveillance systems were developed by the World Health Organization (WHO) in 2000 and have been implemented among populations of men who have sex with men (MSM) in many countries including Australia, the United Kingdom, and the United States[5-8]. There has been recent debate in the public health arena over the distinction between research and surveillance[9-10]. The M-Track system relies on surveys to collect information from participants and plans to regularly collect data using the same instrument and similar sampling strategies. This, in combination with the descriptive nature of M-Track, makes it more similar to what is traditionally recognized as surveillance than to inferential research[9-10]. Inferential research is typically designed to test answer a specific set of questions or a specific hypotheses [9-10].

## 1.2 Brief history of M-Track

The Public Health Agency of Canada's (PHAC) M-Track surveillance system is the most recent in a series of studies, including the National Men's Survey (1991), the Winnipeg Men's Survey (1995) and the Ontario Men's Survey (2002). These studies were designed to support the development and continued improvement of prevention programs through enhanced understanding of the HIV/AIDS epidemic. The M-Track surveillance system project was developed to assist in tracking trends in HIV, viral hepatitis (HCV), sexually transmitted infections (STI) and related risk behaviours among gay, bisexual, two-spirit and other men who have sex with men (MSM) in Canada. M-Track is an ongoing second generation surveillance system which consists of cross-sectional surveys ([Glossary](#)) repeated at regular intervals (i.e. every 2-3 years) at sentinel sites ([Glossary](#)) across Canada. The M-Track sites include urban and semi-urban areas that have notable HIV epidemics among men who have sex with men (MSM). A coordinated approach to secondary surveillance within Canada promotes better use of surveillance data for

prevention and care through an increased understanding of the behaviours which underlie trends in infection.

### ***1.3 Brief history of surveillance and research of MSM in Ontario***

Men's Survey '90 was based in Toronto and was the first major community-based study which provided insight into the knowledge, attitudes and behaviour of gay and bisexual men in Canada. Evidence continues to suggest that MSM in Ontario should remain an HIV research priority[11-14]. There have been several cross-sectional and cohort studies conducted among MSM in Ontario[13-16]. The most recent of these, the Ontario Men's Survey (OMS), was conducted in 2002 and was based on a pilot study conducted in Winnipeg. The OMS consisted of a behavioural survey and a biologic (saliva) sample to determine HIV and hepatitis C prevalence[11]. The representativeness of the OMS sample was greater than had previously been achieved. This was, in part, due to the recruitment methods employed[11]. Development and advancement of the gay community and culture, changes within individuals' sex lives, changes in the demographics of Ontario and changing attitudes of society also contributed to the diversity of participants recruited[11].

### ***1.4 The epidemiology of HIV among MSM in Ontario***

It is not surprising that the epidemiology of HIV among MSM in Ontario is similar to that at the national level because the population of Ontario is large and tends to drive national trends. It is important to recognize that this does not necessarily translate into a uniform national picture. There are several epi-centres located in Ontario, including Toronto and Ottawa and nationally in Montreal and Vancouver. Behaviours among MSM in these epi-centres may not be representative of behaviours of MSM living in other parts of the country.

MSM remain the most affected group in Ontario[12]In 1985, when HIV testing was introduced in Ontario, MSM accounted for 90% of the HIV diagnoses[12]. The proportion HIV diagnoses accounted for by MSM steadily declined until 1998 and then remained constant at approximately 45-50% of HIV diagnoses until 2001[12]. Since 2001, there has been a 26% increase in HIV diagnoses among MSM in Ontario[12]. .

In 2006, there were an estimated 26,355 HIV-infected persons living in Ontario, of whom 15,656 (59%) were MSM [12]. Modelled estimates, based in part on information from repeat testers, indicate that there were 1,800 incident HIV infections in Ontario in 2006, 50% (900 new infections) of which were among MSM[12]. In Ontario, 8,421 AIDS cases have been reported since the beginning of the epidemic and MSM account for 70% of these[12]. At the end of 2006, 6,239 HIV-infected MSM had died, 5,767 (92.4%) of these deaths were due to HIV-related causes[12].

More than 25% of Canadians who are infected with HIV are unaware of their positive status[6]. In the Ontario Men's Survey, an Ontario-based study of the MSM population, 16% of participants with a laboratory confirmed HIV-positive status reported they were HIV-negative[11]. A further 11% of those who tested positive did not know their status, did not report their result or said that they had never been tested for HIV[11].

## **1.5 *Lambda objectives***

The main goal of M-Track Ontario (*Lambda*) was to initiate a secondary surveillance system among MSM in Ontario by conducting the first phase of a series of cross-sectional behavioural and biologic studies.

### **1.5.1 Primary objectives**

- ◆ To develop, implement and manage a nationally-based sentinel behavioural surveillance system that will track HIV, hepatitis C (HCV) and STIs and associated risk behaviours in populations of men who have sex with men by means of repeated cross-sectional surveys at selected sites across Canada.
- ◆ To implement a series of Memoranda of Agreements (MOAs) with provincial and/or local health authorities to enhance the quality, completeness and timeliness of epidemiologic data collection at the local level and to develop systems for data transfer to the national level.
- ◆ To produce repeated national surveillance reports that describe the changing patterns in risk behaviours and well as HIV, HCV, and other STI testing behaviours, prevalence, and if feasible, incidence of HIV, HCV and syphilis infection, among MSM at the national and regional level.
- ◆ To permit provincial and regional data to be analyzed.

### **1.5.2 Secondary objectives**

- ◆ To identify potential risk factors associated with high-risk sexual behaviour, including socio-demographic variables, recreational drug use and relationship status.
- ◆ To identify potential risk factors associated with current or past HIV infection and STI including sexual behaviour, socio-demographic variables, recreational drug use and relationship status.
- ◆ To identify general issues relevant to sexual health and sexual behaviour of men who have sex with men.
- ◆ To assess incidence of HIV with tests to detect recent infection.

## 2 Methods

The *Lambda* study was an anonymous venue-based cross-sectional survey that consisted of a self-administered behavioural questionnaire and collection of biologic samples to measure HIV, HCV and syphilis antibodies. A feasibility study was conducted November – December 2006. Community engagement activities were initiated in Toronto at the same time the feasibility study and were subsequently initiated in Ottawa in January 2007. Community engagement continued at both sites throughout the duration of the *Lambda* survey, with increased activity January- March 2007. Participants were recruited and data were collected from March-July in Toronto and April-June 2007 in Ottawa.

### 2.1 Study population and eligibility criteria

Self-identification as gay or bisexual was not a requirement for participation. However, as recruitment was venue-based and took place at gay bars, bathhouses and community groups, it was assumed that participants were likely to have had some connection with the gay community.

To be eligible to participate, respondents were required to:

- ♦ Be a biologic or self-identified man who has sex with biologic or self-identified men
- ♦ Be at least 16 years of age
- ♦ Have not previously completed a questionnaire in this study

Participants were excluded from the study if they:

- ♦ Were less than 16 years of age

### 2.2 Feasibility study

From November—December 2006, prior to launching the *Lambda* survey, we conducted a feasibility study. The purpose of this preliminary study was to verify the feasibility of the design, recruitment strategies and the proposed outcome measures over a small number of venues and including a small sample of MSM. Venues were purposively selected from among those that responded positively to both the study's objectives and agreed to allow recruitment at the venue. A subset of the behavioural surveys completed during the feasibility study was used to determine face validity and readability of the questionnaire. Participants in the feasibility study completed the *Lambda* questionnaire to determine its acceptability. Participants were given a demonstration of the technique and materials that would be used for biologic sampling to assess the willingness of participants to provide a sample.

### 2.3 Venue selection

“Venues” were defined as social interaction or health care settings used by gay and bisexual men within the selected *Lambda* surveillance sites (i.e. Toronto and Ottawa). Specific venues may have catered to or attracted MSM with certain characteristics and

thus, venue-based recruitment may have introduced selection bias; however, a multi-stage sampling approach was designed and used to improve the diversity of the data collected. A recruitment calendar was constructed through the selection of special events, venues and their sampling events, as described below.

Eligible venues were those frequented by MSM and included dance clubs, bars, restaurants in the gay community, bathhouses, parks, cruising areas, high-traffic locations, business establishments, social organizations, health care clinics and special events, such as pride events. Venues, and times at which they were frequented, were ascertained, prior to study implementation, through a variety of strategies, including review of local newspapers, magazines, online media and other publications targeting the gay community; interviews and discussions with HIV prevention workers, gay community leaders and representatives of community-based organizations; informal interviews with MSM at various public venues, and; consultation with *Lambda* participants. An email and phone schedule was implemented to contact each venue type to arrange in person meetings with research staff.

Consenting venues were then assessed using a standard form to determine the feasibility of effectively and efficiently sampling MSM. Factors included in the venue assessment included interviewer safety, owner permission, suitability of layout, and number of participants who could potentially be recruited during a reasonable time period. The sampling frame was generated from the list of consenting venues and special events. Venues and social groups/organizations targeted towards ethno/culturally diverse groups were over-sampled to increase the representativeness of the survey.

Venues, particularly social groups, which yielded small numbers of participants on initial recruitment visits were subject to repeat visits. The research team went to all selected venues. Visits to a particular venue were stopped when saturation was reached (i.e. when no new information and/or participants were being gained from that venue). Thus, the number of visits made to a venue was venue specific.

## ***2.4 Promotion to potential participants***

The content of publicity campaigns and promotional strategies leading up to the survey period was determined in collaboration with local agencies participating in the administration of the survey including the AIDS Committee of Toronto (ACT), Asian Community AIDS Services (ACAS) and The Alliance for South Asian AIDS Prevention (ASAAP). General promotion was targeted at bars and restaurants within the gay community, bathhouses, community and social groups, sports clubs as well as universities and two alternative high schools. Promotional materials were originally targeted to the general MSM population and subsequently adapted to target specific ethnic or cultural groups, including Black/African, East/South East Asian, South Asian, Portuguese, Brazilian, Latino, and Aboriginal/First/Nations/Metis/Inuit. To ensure the sample was representative of the MSM communities in Ottawa and Toronto, efforts were made to communicate with and provide information to community groups which reflected the diversity of the MSM community.

As data collection began, full-page advertisements were purchased in the Ontario editions of *Xtra!* and *Fab*. An online advertisement was purchased on Gay Guide Toronto (<http://www.gayguidetoronto.com/>). In addition to this, several groups and organizations

offered free advertising or distributed *Lambda* promotional postcards and/or displayed a promotional poster.

## **2.5 Venue-based recruitment of participants**

Eligible MSM were invited to complete an anonymous questionnaire and to provide an anonymous blood sample. To be tested for the presence of HIV, HCV, and *Treponema pallidum* (syphilis) antibodies. Participants could choose to complete the questionnaire or provide a specimen or both. Informed consent was obtained from participants before completion of the questionnaire and/or collection of the biologic specimen. Eligible participants could participate only once. To further support the ascertainment of a representative sample of MSM, ethno-specific groups were purposively selected and approached for recruitment. Men were offered free movie passes in gratitude for their participation in the study.

## **2.6 Collection of behavioural data**

The core M-Track questionnaire, comprised of a brief self-administered questionnaire, was used in all M-Track sites to facilitate national and regional comparisons and evaluations. This core questionnaire was developed in consultation with experts and attempted to use standardized questions, where possible, to further facilitate comparisons with other studies within Canada and internationally. The questionnaire was designed to collect socio-demographic information on participants and information on key indicators of risky sexual behaviour, drug use and HIV testing. Each site, including *Lambda*, had the opportunity to customise the research instrument by adding questions relevant to their own surveillance and programme needs. In addition to the M-Track core questions, *Lambda* also gathered information relating to:

- ♦ Country of birth
- ♦ Health care and social service utilization
- ♦ Venue preferences for receiving STI counselling and testing
- ♦ Cigarette smoking
- ♦ Crystal methamphetamine use
- ♦ Frequency of condom use with women
- ♦ Frequency of protected and unprotected oral sex
- ♦ Delayed condom use and premature removal
- ♦ Syphilis opinions and knowledge
- ♦ Syphilis testing opinions and behaviours
- ♦ Identification with ethno-cultural groups
- ♦ Participants who had not been tested for HIV in the previous two years were provided three additional options for the questions asking for reasons why they had not tested (e.g. “I do not have health care coverage in Canada”, “I do not believe that HIV causes AIDS”, “I do not know anyone who has HIV or AIDS so I am not worried”).

The *Lambda* questionnaire was available in English and French. The decision to limit the survey to two languages was based on the experience of the OMS survey. In this prototype survey, while the information and questionnaire were available in seven languages, only 1% of the survey population chose to complete the questionnaire in a language other than English or French.

## **2.7 Collection of biologic specimens**

Dried blood spot (DBS) were obtained by using a lancing device to prick the participant's finger and obtain a few drops of whole blood. The lancing device ensured a precise incision to minimize pain. Although fingerprick samples are somewhat invasive, they also provide additional screening possibilities considered to be advantageous in epidemiologic surveys such as *Lambda*.

The blood was deposited on a specialized filter paper and the sample labelled with a unique identifier. This unique identifier corresponded with the participant's questionnaire. Coded samples were dried and stored in a secure location and shipped weekly to the National HIV and Retrovirology Laboratory (NHRL) in Ottawa for HIV and HCV testing and forwarded to the National Microbiology Laboratory (NML) in Winnipeg for syphilis testing. Both of these facilities are part of the Public Health Agency of Canada. Validity and reliability of methods of testing algorithms used has been established.

As the *Lambda* survey was anonymous, participants were not given their results. Rather, they were encouraged to seek appropriate counselling and testing with local health care providers and clinics. Contact information for appropriate counselling and testing sites was made available to survey participants who requested this information.

## **2.8 Data management and analysis**

Completed surveys were sent to the Public Health Agency of Canada (PHAC) in Ottawa to be entered into the M-Track standardized database. PHAC also carried out data cleaning. Participants who indicated that they resided outside of Canada were excluded from this analysis due to small numbers. Participants who indicated that their sex at birth was female, or whose year of birth indicated that they were less than 16 years of age at the time of survey completion, were included in a separate analysis.

Self-reported ethnicity information was collected from participants as a text response, which resulted in a large variety of responses. To facilitate analysis, ethnicity variables were recoded. The Public Health Agency of Canada (PHAC) M-Track team compared written responses to the Statistics Canada 2006 Census ethnic origins classification index to create ethnic origin variables. A variable for ethnicity was based on the primary ethnicity and taken as the first recorded in situations where participants recorded more than one ethnicity. Exceptions to this were that participants who indicated any aboriginal ethnicity were coded as aboriginal and both "French Canadian" and "English Canadian" were coded as "North American". Details of the ethnic origins classification index can be found at

<http://www12.statcan.gc.ca/english/census06/reference/dictionary/app003.cfm>

To examine ethnicity among *Lambda* participants more closely a supplemental analysis was conducted and a special report was prepared (*Ethnicity analysis in the Lambda Survey of men who have sex with men, Ontario 2007*). *Francophone and language group comparison in the Lambda survey, Ontario 2007*, another special report, presents a supplemental analysis of the first language spoken and places a focus on francophone participants.

A case-control study was carried out using a subset of the data to examine the determinants of recent HIV-infection. A participant was classified as a case if he self-reported having had a previous HIV-negative test and had a DBS HIV-seropositive result or had a Serological Testing Algorithm for Recent HIV Seroconversion (STAHRS) discordant result in this survey. A participant was classified as a control if he reported no previous HIV-positive test and had a DBS HIV-seronegative result in the survey. There were a total of 72 cases and 866 controls in this analysis. Logistic regression analysis was conducted to explore independent factors associated with recent HIV infection (seroconversion). The independent variables examined included age, study site, sexual orientation, history of injection drug use, unprotected anal sex with casual partners, unprotected anal sex with HIV-positive regular partners or regular partners of unknown HIV status, delayed condom application during anal sex with HIV-positive partners or partners of unknown HIV status and unprotected receptive oral sex with HIV-positive partners or partners of unknown HIV status.

We also carried out logistic regression analyses to examine independent factors associated with unprotected anal sex (with casual partners, regular partners of unknown HIV status and HIV-positive regular partners) among participants with DBS HIV-seronegative result. The independent variables examined included age, study site, sexual orientation, alcohol, and illegal drugs within 2 hours before sex or during sex.

## **2.9 Laboratory analysis**

HIV prevalence was determined using sequential HIV enzyme immunoassays (EIA). A non-reactive EIA was considered to be negative. A sample was considered positive if sequential EIAs were positive or through combination of EIA and a confirmatory Western Blot. HIV incidence was determined using a Serological Testing Algorithm for Recent HIV Seroconversion (STARHS) or detuned assay. The HIV incidence rate was calculated using the number of recent infections over the product of the number of people tested and the mean window period. Participants who reported use of antiretroviral drugs were not included in the calculation of HIV incidence.

HCV testing was performed using the Ortho® HCV version 3.0 EIA. A positive result indicated a past or present HCV infection, and did not discriminate acute from chronic or resolved infections. Validation of commercially available laboratory tests on DBS specimens for HCV is ongoing. Syphilis testing was performed using the Seroida® TP-PA assay. Confirmatory testing was not performed for samples that tested positive. A positive result indicated past or present syphilis infection. Validation of commercially available laboratory tests on DBS specimens for syphilis is ongoing.

### ***2.10 Purpose of this report***

This report is designed to be a reference document the primary purpose of which is to describe sexual risk and drug use behaviours as well as HIV, HCV, and syphilis prevalence among gay, bisexual men, two-spirit men, and other men who have sex with men in Toronto and Ottawa. Many relationships were hypothesized and explored during the course of analysis and cannot all be discussed at depth in a single document. Univariate analysis, which looked at each variable separately was used to describe recruitment patterns, study participant characteristics, sexual and drug use behaviours, testing and sex in exchange for material or monetary gain among participants. Bivariate analyses, which assess the association between two variables without controlling for other factors, were conducted to examine differences in the characteristics of participants choosing to provide a DBS and those choosing not to provide a DBS, participants who reported having tested for HIV and those reporting no history of HIV testing, and HIV-seropositive and HIV-seronegative participants. A descriptive analysis of the data informed more complex analyses. Multivariable analyses of the determinants of HIV, HCV and syphilis acquisition also were conducted to further examine the complex relationships between behaviours and infection.

### ***2.11 Ethical considerations***

As part of a process of informed consent, participants were informed of their right to opt out of either questionnaire administration or biologic specimen collection as well as their right to decline to answer any specific questions. All staff (i.e. site-coordinators and research assistants), volunteers and relevant investigators were required to sign an Oath of Confidentiality.

Ethics approval was obtained from the Public Health Agency of Canada, Ottawa Public Health and University of Toronto Research Ethics Review Boards.

### ***2.12 Knowledge transfer and exchange***

In addition to this report, which outlines findings from the Ontario sites, a national report will be prepared by PHAC. More in-depth analysis, including those focused on specific sub-groups will be conducted to assist in preparation of community reports. All reports will be disseminated to key stakeholders. Updated surveillance reports will be produced subsequent to each phase of M-Track by each study site, including *Lambda*.

### 3 Results

Unless otherwise stated, the proportion of respondents reported is given as the proportion of respondents among those who provided a response for each given question. The term missing may refer to non-response or to missing values. Prevalence (HIV, syphilis, HCV) is used to describe results obtained through the dried blood spot. Serostatus (i.e. HIV-seropositive and HIV-seronegative) refers to a participants HIV status as determined by the results from analysis of the dried blood spot.

Two (one each from Toronto and Ottawa) participants were excluded from the analysis because they did not meet the age criteria. An additional 71 (65 from Toronto, six from Ottawa) participants were excluded due to residence outside Ontario and Quebec. Finally, 27 (23 from Toronto and four from Ottawa) participants reported that they were females at birth and were therefore excluded from the primary analysis.

#### 3.1 Feasibility study

The feasibility study consisted of 57 questionnaires conducted at nine venues. The median time required to recruit participants and subsequently for participants to complete the questionnaire was 23 minutes. Overall, 56.4% of participants in the feasibility study indicated that they would be willing to provide an anonymous biologic sample. In the context of this question, it was explained to participants of the feasibility study that the biologic sample would be taken for research purposes and that they would not receive the results of their tests, but that men interested in receiving voluntary counselling and testing would be referred to appropriate testing centres. Of the men willing to provide an anonymous sample, 53.7% said that they would probably or definitely be willing to provide a blood sample by needle, 58.2% responded that they would be willing to provide a blood sample by fingerpick, 72.2% indicated a willingness to provide a saliva sample and 69.5% a urine sample.

#### 3.2 Response

##### 3.2.1 Participant recruitment and refusals

2,438 participants took part in the *Lambda* survey and 1,104 (45.3%) of these participants provided a DBS. The Ottawa site recruited 506 participants, of whom 304 (60.1%) provided a DBS. 1,932 participants were recruited from the Toronto site and 41.4% of the Toronto participants provided a DBS.

To allow appropriate interpretation of the DBS, the characteristics of participants who provided a DBS were examined and compared to those who did not. DBS without completion of the questionnaire was provided by 33 participants (1.7%) from Toronto and 12 participants (2.4%) from Ottawa. 1,334 participants completed the questionnaire only, 45 participants provided only a DBS and 1,059 provided both the questionnaire and DBS. The proportion of men who provided a DBS was higher in Ottawa (60.1%) than in Toronto (41.4%),  $p < 0.0001$ . Provision of DBS by age group is shown in Table 1.

The participants from Toronto who provided a DBS were older than those who did not provide a DBS ( $p < 0.0001$ ) but no such age difference was observed among Ottawa participants. The average age of participants from Toronto who provided a DBS was 41.6 years (95% CI: 40.8—42.4) with a range from 16—79 years. 25% of Toronto participants who provided a DBS were 34 years or younger and 75% were 48 years or younger. The average age of participants from Toronto who did not provide a DBS was 39 years (95% CI: 38.2—39.8) with a range from 18—86 years.

**Table 1: Participants providing a dried blood spot by age group**

Age category	Toronto*		Ottawa		Both sites*	
	n	% providing a DBS	n	% providing a DBS	n	% providing a DBS
<19	18	44.4	10	50.0	28	46.4
20-24	140	31.4	56	60.7	196	39.8
25-29	190	32.1	50	66.0	240	39.2
30-34	218	31.2	47	46.8	265	34.0
35-39	237	39.7	52	44.2	289	40.5
40-44	300	47.3	74	58.1	374	49.5
45-49	245	52.2	65	64.6	310	54.8
50-54	122	46.7	32	65.6	154	50.6
55-59	83	54.2	18	72.2	101	57.4
60-64	58	41.4	24	66.7	82	48.8
65+	53	41.5	16	68.8	69	47.8
<b>Total excluding missing</b>	1,664	86.1	444	87.7	2,108	86.5
<b>Missing age</b>	268	13.9	62	12.3	330	13.5
<b>Total</b>	1,932	100.0	506	100.0	2,438	100.0

\* $p < 0.0001$ , Note: n refers to the total number of participants in each age category

With respect to the proportion of participants providing a DBS, three groupings can be seen in both Toronto and Ottawa; however, the pattern differed between sites. Among Toronto participants, the greatest uptake of DBS was among those who were 40—59 years of age (approximately 50%). Among those who were less than 40 years approximately 35% provided a DBS, while just over 40% of participants 60 years or greater provided a DBS. In Ottawa, the proportion of participants providing a DBS was higher among those who were 40 years or greater, followed by those who were less than 30 years. The lowest uptake of DBS was observed among those who were 30—34 years.

Table 2 shows the proportion of participants who provided a DBS by ethnic origin and study site. The observed differences were significant among participants from Toronto ( $p < 0.001$ ) but not for Ottawa ( $p = 0.68$ ). From Toronto, 29.0% of Asian participants, 36.6% of Caribbean/Latin, 38.6% of African, 43.7% of Caucasian and 50.5% of Aboriginal participants provided a DBS. Among Ottawa participants, 50.0% of Caribbean/Latin participants, 50.0% of African participants, 54.1% of Asian, 60.4% Caucasian, 66.7% of Aboriginal provided a DBS.

**Table 2: Proportion of participants providing a of dried blood spot by self-reported ethnic origin**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Oceania</b>	—	N/A	—	N/A	—	N/A
<b>Arab/West Asian</b>	28	50.0	12	66.7	40	55.0
<b>Aboriginal</b>	101	50.5	21	66.7	122	53.3
<b>North American</b>	334	46.7	150	58.7	484	50.4
<b>European</b>	890	42.6	228	61.4	1,118	46.4
<b>Latin American</b>	56	41.1	5	40.0	61	41.0
<b>African</b>	44	38.6	2	50.0	46	39.1
<b>South Asian</b>	57	33.3	10	70.0	67	38.8
<b>Caribbean</b>	56	32.1	7	57.1	63	34.9
<b>Multi-ethnic</b>	37	29.7	9	55.6	46	34.8
<b>Southeast Asian</b>	146	23.3	15	33.3	161	24.2
<b>Total excluding missing</b>	1,753	90.7	460	90.9	2,213	90.8
<b>Ethnicity unknown</b>	179	9.3	46	9.1	225	9.2
<b>Total</b>	1,932	100.0	506	100.0	2,438	100.0

Figure 1 indicates the proportion of participants providing a DBS according to income. The highest uptake of DBS in both sites was among participants who reported having an income less than \$20,000 per year.

**Figure 1: Proportion of participants providing a dried blood spot by total personal income**

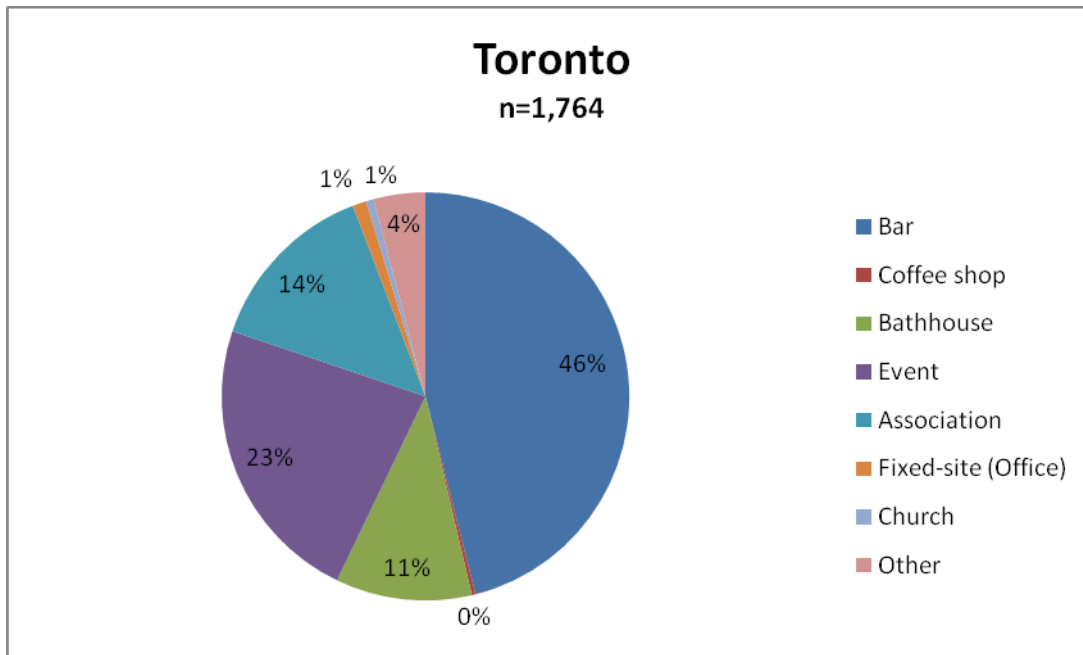


### 3.2.2 Recruitment venues

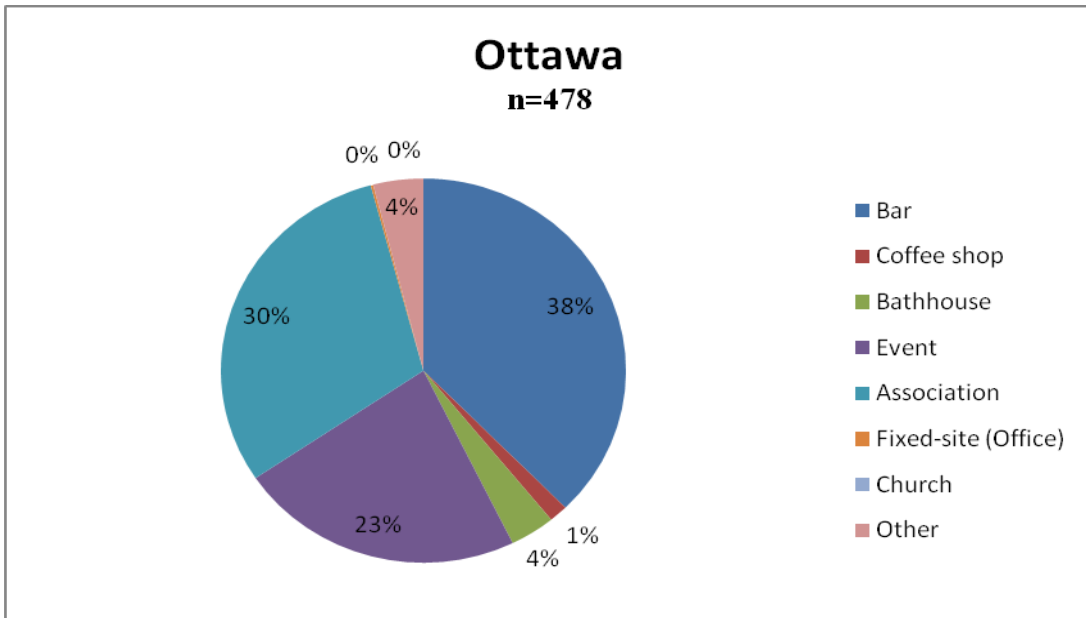
Figure 2 a, b and c show the proportion of participants recruited from each venue type. A greater proportion of participants from Toronto were recruited from bars (46.0%) and bathhouses (10.8%) than were recruited from these venue types in Ottawa. The proportion of participants recruited from associations was greater in Ottawa (30.3%) than in Toronto (14.0%). The most common recruitment venues across sites were bars (44.3%), events (23.0%) and associations (17.4%).

**Figure 2: Proportion of participants recruited by venue type**

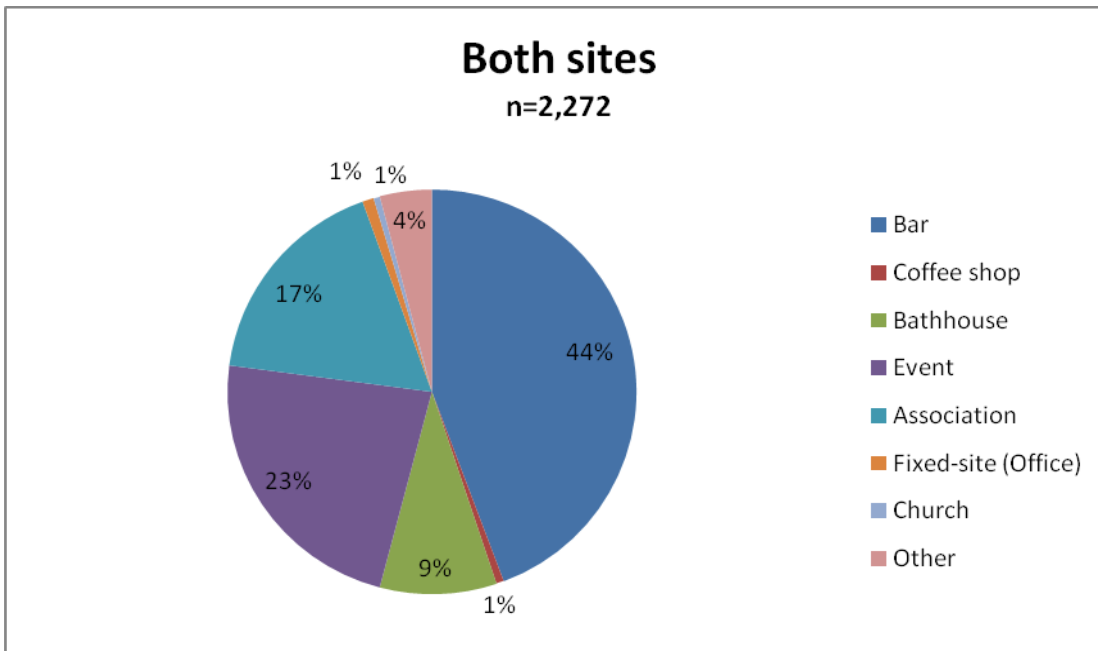
a.



b.



c.



### 3.3 Respondent characteristics

#### 3.3.1 Demographic characteristics

There was no significant difference in age between participants from Toronto and Ottawa. The average age of participants from Toronto and Ottawa was 39.8 years (95%CI: 38.5-39.8) and 40.1 years (95%CI: 39.5-40.7), respectively. The median age of participants from Toronto was 40 years with a range of 16 to 86 years. 25% of Toronto participants were 31 years of age or younger and 75% were 47 years or younger. Among Ottawa participants, 40 years of age was also the median (range: 17 years – 83 years). 25% of Ottawa participants were 29 years of age or younger and 75% were 47 years or younger. Table 3 shows the distribution of participants by age category. There were no significant differences in the proportion of participants in age categories between study sites.

**Table 3: Age distribution of participants**

Age in years	Toronto n= 1,664 %	Ottawa n= 444 %	Both sites n= 2,108 %
Less than 19	1.1	2.3	1.3
20-24	8.4	12.6	9.3
25-29	11.4	11.3	11.4
30-34	13.1	10.6	12.6
35-39	14.2	11.7	13.7
40-44	18.0	16.7	17.7
45-49	14.7	14.6	14.7
50-54	7.3	7.2	7.3
55-59	5.0	4.1	4.8
60-64	3.5	5.4	3.9
65 or older	3.2	3.6	3.3
<b>Total</b>	100.0	100.0	100.0

The majority (94.0%) of participants recruited at the Toronto site were residents of Toronto. Similarly, the majority (87.9%) of Ottawa participants resided in Ottawa at the time of the survey (data not shown). A higher proportion of Quebec residents were recruited in Ottawa (9.5%) than were recruited in Toronto (1.3%). The proportion of participants reporting residence in Ontario but outside of Toronto and Ottawa was higher in Toronto (3.8%) than in Ottawa (0.7%).

The level of education completed and the income distribution are shown in Table 4 and Table 5, respectively. There were no significant differences between the study sites for these variables. Approximately 6% of participants had not completed secondary school. More than 60% of the participants reported obtaining at least one post-secondary degree. The estimated median income of participants was approximately \$45,000.

**Table 4: Level of education completed by participants**

	<b>Toronto n= 1,793 %</b>	<b>Ottawa n=473 %</b>	<b>Both sites n= 2,266 %</b>
<b>Elementary/primary school</b>	0.6	0.2	0.5
<b>Some secondary/high school</b>	5.7	5.1	5.6
<b>Completed secondary/high school</b>	9.4	8.2	9.2
<b>Some college or university</b>	22.4	21.4	22.2
<b>Completed college or university</b>	40.8	42.1	41.0
<b>Some graduate education</b>	6.4	6.6	6.4
<b>Completed graduate education</b>	14.7	16.5	15.1
<b>Total</b>	100.0	100.0	100.0

**Table 5: Income distribution of participants**

	<b>Toronto n=1,761 %</b>	<b>Ottawa n= 463 %</b>	<b>Both sites n=2,224 %</b>
<b>No personal income</b>	2.8	1.5	2.5
<b>\$1 - \$9,999</b>	6.2	8.0	6.6
<b>\$10,000 - \$19,999</b>	11.1	11.7	11.2
<b>\$20,000 - \$29,999</b>	10.9	11.0	10.9
<b>\$30,000 - \$39,999</b>	14.3	10.6	13.5
<b>\$40,000 - \$49,999</b>	13.3	9.9	12.6
<b>\$50,000 - \$59,999</b>	10.0	11.9	10.4
<b>\$60,000 - \$69,999</b>	8.9	9.1	8.9
<b>\$70,000 - \$79,999</b>	6.1	9.1	6.7
<b>\$80,000 - \$89,999</b>	5.6	5.6	5.6
<b>\$90,000 - \$99,999</b>	1.9	2.8	2.1
<b>\$100,000 or more</b>	8.9	8.9	8.9
<b>Total</b>	100.0	100.0	100.0
<b>Estimated median income</b>	\$42,000	\$48,000	\$45,000

### 3.3.2 Ethnicity and language

Table 6 highlights the region of birth reported by participants. The proportion of participants reporting that they were born in Canada (83.7%) was higher than in Toronto (69.0%;  $p < 0.0001$ ). Toronto had significantly more participants from Latin America than did Ottawa. 7.7% of Toronto participants reported that they were born in Asia. This was double that reported in Ottawa (3.5%).

**Table 6: Region of birth reported by participants**

	<b>Toronto n=1,710 %</b>	<b>Ottawa n= 449 %</b>	<b>Both sites n= 2,159 %</b>
<b>Canada</b>	69.0	83.7	72.1
<b>United States</b>	3.6	2.2	3.3
<b>Mexico</b>	2.4	0.4	2.0
<b>Caribbean</b>	3.3	1.1	2.9
<b>Central America</b>	0.6	0.2	0.5
<b>South America</b>	2.5	0.9	2.1
<b>Eastern Europe</b>	1.0	0.4	0.9
<b>Western Europe</b>	3.9	3.8	3.8
<b>Northern Europe</b>	0.1	0.0	0.1
<b>Southern Europe</b>	1.2	0.4	1.0
<b>Sub-Saharan Africa</b>	1.9	0.9	1.7
<b>North Africa</b>	0.4	0.0	0.3
<b>Middle East</b>	0.8	1.1	0.8
<b>Central Asia</b>	0.4	0.2	0.3
<b>South Asia</b>	1.4	0.2	1.2
<b>Southeast Asia</b>	5.9	3.1	5.3
<b>Oceania</b>	0.3	0.0	0.2
<b>Region of origin not stated</b>	1.4	1.1	1.3
<b>Total</b>	100.0	100.0	100.0

As seen in Figure 3, approximately 50% of participants in both Ottawa and Toronto self-identified as being of European descent. A higher proportion of Ottawa participants (32.6%) indicated that they were of North American descent, while more Toronto participants (30.2%) reported ancestry outside North America and Europe. 2.6% and 1.6% of participants from Ottawa and Toronto respectively reported having Arab or West Asian heritage, while 8.3% of Toronto participants and 3.3% of Ottawa participants reported South Asian descent.

**Figure 3: Proportion of participants by self-reported ethnicity**

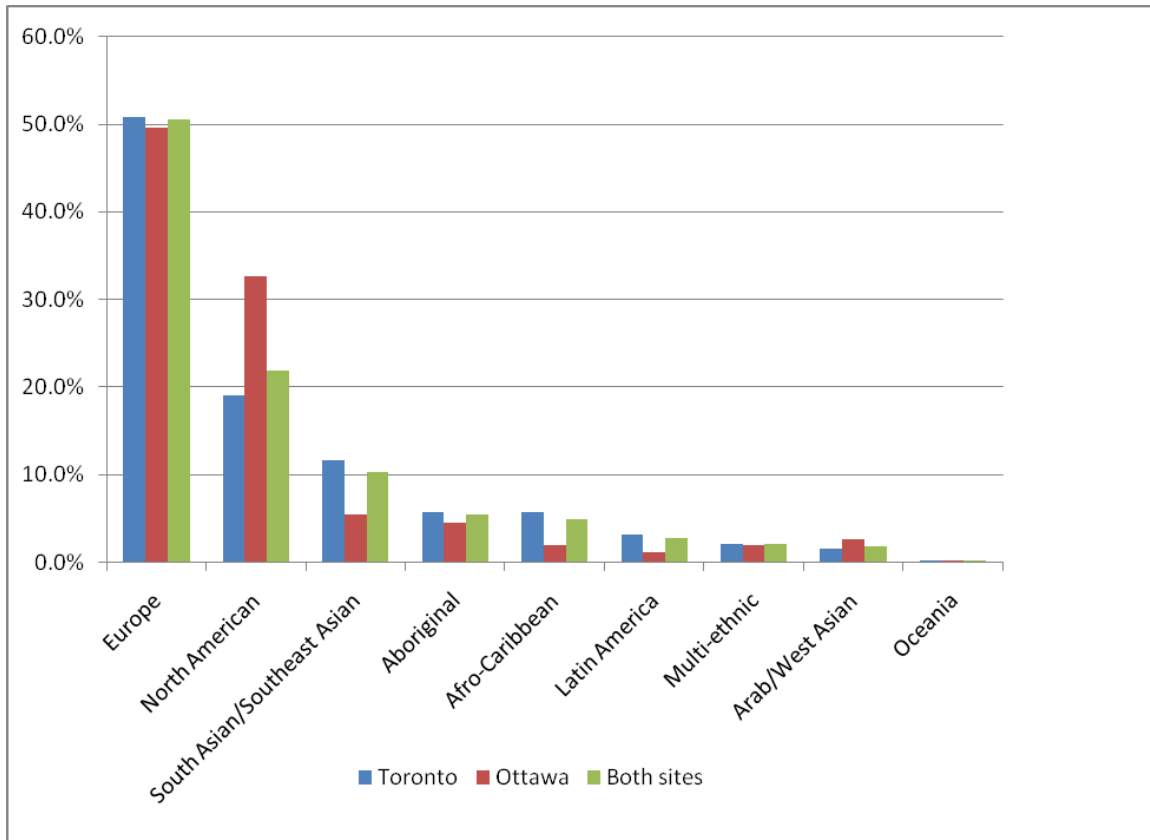


Table 7 indicates the first language spoken by *Lambda* participants. The majority of participants reported English as their first spoken language. The proportion of Toronto participants reporting English or a language other than English or French as their first language was higher than the proportion among Ottawa participants. The proportion of Ottawa participants who reported that their first spoken language was French was higher than that among Toronto participants; however, the absolute number of French speaking participants was higher in Toronto (148) than Ottawa (122).

**Table 7: First language spoken by participants**

	<b>Toronto n=1,714 %</b>	<b>Ottawa n=453 %</b>	<b>Both sites n= 2,167 %</b>
<b>English</b>	72.9	63.1	70.8
<b>French</b>	8.6	26.9	12.5
<b>A language other than English or French</b>	14.5	7.5	13.0
<b>English and French</b>	1.2	1.3	1.2
<b>English and a second language other than French</b>	2.3	0.7	1.9
<b>French and a second language other than English</b>	0.2	0.0	0.1
<b>English and French and a third language</b>	0.4	0.4	0.4
<b>Total</b>	100.0	100.0	100.0

### 3.3.3 Sexual identity

The gender identity of participants is reported in Table 8. The majority of participants were men with the next most commonly reported identity being two-spirit. Small sample sizes among less commonly reported gender identities make interpretation difficult.

**Table 8: Gender identity of participants**

<b>Gender Identity</b>	<b>Toronto n= 1,828 %</b>	<b>Ottawa n = 471 %</b>	<b>Both sites n =2,299 %</b>
<b>Man</b>	98.3	98.7	98.4
<b>Two-spirit</b>	0.8	1.1	0.9
<b>Transgender</b>	0.6	0.0	0.5
<b>Woman</b>	0.1	0.2	0.1
<b>Intersex</b>	0.2	0.0	0.2
<b>Total</b>	100.0	100.0	100.0

The sexual orientation of participants is shown in Table 9. The majority of participants were gay or homosexual (86.7%); however, bisexuality also was reported by approximately 10% of participants. A small number of participants identified their orientation as being straight/heterosexual or two-spirit.

**Table 9: Sexual orientation of participants**

<b>Sexual orientation</b>	<b>Toronto n= 1,838 %</b>	<b>Ottawa n= 473 %</b>	<b>Both sites n= 2,311 %</b>
<b>Gay or homosexual</b>	86.2	88.6	86.7
<b>Bisexual</b>	10.4	8.2	10.0
<b>Straight or heterosexual</b>	1.9	1.9	1.9
<b>Two-spirit</b>	1.4	1.3	1.4
<b>Total</b>	100.0	100.0	100.0

### ***3.4 Socializing and sexual behaviour***

#### **3.4.1 Sexual behaviour with female partners**

Table 10 indicates the proportion of participants reporting sex (oral, anal or vaginal) with a woman during the previous six months. The proportion of participants with female sex partners in the previous six months ( $\approx 8\%$ ) was similar across sites. In Toronto, 87 (4.8%) participants reported having one female partner and an additional 51 (2.8%) reported having two to five female partners. In Ottawa, 20 (4.3%) reported one female partner and 14 (3.0%) reported having two to five female partners.

**Table 10: Number of female sexual partners reported by participants in the previous six months**

<b>Number of female sexual partners</b>	<b>Toronto n=2,041 %</b>	<b>Ottawa n= 545 %</b>	<b>Both sites n= 2,586 %</b>
<b>None</b>	91.2	92.7	91.5
<b>Only one</b>	4.8	4.3	4.7
<b>Two to five</b>	2.8	3.0	2.8
<b>Six or more</b>	1.2	0.0	0.9
<b>Yes, but number of partners unknown</b>	0.4	0.2	0.4
<b>Total</b>	100.0	100.0	100.0

Table 11 indicates the frequency of condom use with female partners. The proportion of participants who never used a condom during sexual encounters with a woman in the previous six months was higher in Ottawa (58.8%) than in Toronto (22.2%;  $p=0.0001$ ). Conversely, the proportion who always used condoms with their female partner(s) was significantly higher in Toronto (50.9%) than in Ottawa (17.6%) ( $p=0.0001$ ).

**Table 11: Frequency of condom use with female sexual partners among participants reporting heterosexual sexual contact in the previous six months**

	<b>Toronto n=153 %</b>	<b>Ottawa n= 34 %</b>	<b>Both sites n=187 %</b>
<b>Never</b>	22.2	58.8	28.9
<b>Occasionally, usually, sometimes</b>	26.8	23.5	26.2
<b>Always</b>	51.0	17.6	44.9
<b>Total</b>	100.0	100.0	100.0

### 3.4.2 Sexual behaviour with male partners

Of participants in Ottawa, 87.3% (426) reported having oral or anal sex with a male partner during the previous six months. Among participants in Toronto, 84.0% (1,549) reported having sex with a male partner in the previous six months. Table 12 indicates the number of sexual partners reported by participants in the previous six months. 60.6% of Toronto participants and 54.7% of Ottawa participants reported having at least two male sexual partners in the previous six months.

**Table 12: Number of male sexual partners reported by participants in the previous six months**

	<b>Toronto n= 1,845 %</b>	<b>Ottawa n=488 %</b>	<b>Both sites n=2,333 %</b>
<b>No male partners</b>	16.0	12.7	16.7
<b>Only one</b>	23.4	32.4	27.4
<b>Two to five</b>	28.7	29.7	31.3
<b>Six to nine</b>	9.9	9.0	2.0
<b>10 to 29</b>	12.8	11.5	13.6
<b>≥ 30</b>	7.4	2.9	7.0
<b>Yes, but number of partners unknown</b>	1.8	1.8	2.0
<b>Total</b>	100.0	100.0	100.0

### **3.4.2.1 Sexual behaviour with male partners while travelling**

There was no significant difference between the proportion of participants from Toronto (290, 19.3%) and the proportion of participants from Ottawa (90, 21.6%) who had sex (oral or anal) with a new male partner met while traveling in Canada outside of Ontario (data not shown). A higher proportion of Toronto participants (20.6%) than Ottawa participants (14.7%) reported having sex with a new male partner that they met while travelling outside of Canada ( $p < 0.01$ ). The proportion of participants who reported sex while in Ontario with a male partner who was not a resident of Ontario was similar in Toronto (23.4%) and Ottawa (19.8%). Data on sexual behaviour with male partners while travelling is not shown elsewhere.

### **3.4.2.2 Finding male sexual partners**

Table 13 indicates the locations where participants reported looking for sex. Participants often reported use of more than one venue to find sex partners. The most commonly reported venues were gay bars, the internet and bathhouses. The proportion of participants using other venues to find sex partners was lower. A higher proportion of participants from Toronto compared to those from Ottawa looked for sex at raves or circuit parties ( $p = 0.03$ ), bathhouses ( $p < 0.0001$ ), sex parties ( $p < 0.01$ ) and through personal advertisements ( $p = 0.02$ ).

**Table 13: Venues where participants reported looking for sex in the previous six months**

	<b>Toronto n= 1,830 %</b>	<b>Ottawa n=482 %</b>	<b>Both sites n= 2,312 %</b>
<b>Gay bars</b>	46.6	45.0	46.2
<b>Internet</b>	42.3	41.7	42.2
<b>Saunas/bathhouses</b>	42.0	27.2	38.9
<b>Gym/health clubs</b>	14.3	11.4	13.7
<b>Parks</b>	13.9	11.9	13.4
<b>Straight bars</b>	12.0	13.9	12.4
<b>Public restrooms</b>	11.1	11.8	11.2
<b>After-hours clubs/parties</b>	11.5	9.5	11.1
<b>Community events for gays and lesbians</b>	10.5	12.2	10.9
<b>Gay associations</b>	11.0	9.3	10.6
<b>Coffee shops</b>	10.1	10.2	10.1
<b>Personal advertisements</b>	10.3	6.8	9.6
<b>Sex parties</b>	10.1	6.2	9.3
<b>Raves/circuit parties</b>	9.0	6.0	8.4
<b>Telephone chat lines</b>	8.4	6.4	8.0
<b>Recreational groups</b>	7.9	8.1	7.9
<b>Community organizations</b>	7.2	6.0	6.9
<b>Bicycle paths</b>	6.0	5.6	5.9

Among participants reporting use of each venue type, Table 14 indicates the frequency of use in the previous six months. Gay bars were the most commonly cited location to look for sex. Of men who looked for sex at gay bars, 42.6% and 39.6% did so less than once a month in Toronto and Ottawa, respectively. Approximately 23% of men in Toronto and Ottawa looked for sex at a gay bar once a month and an additional 23% looked for sex at a gay bar 2-3 times per month. 9.6 % (Ottawa) and 13.4 % (Toronto) of participants looked for sex at a gay bar at least once per week.

The internet was also commonly used to look for sex in both Ottawa and Toronto. Of the Ottawa participants who reported using the internet to look for sex, 26.7% used this method less than once a month, 15.9% used it once a month, 28.4% used it 2-3 times per month and 29.0% use it at least once a week. Of the Toronto participants who reported using the internet to look for sex, 25.5% used the internet less than once per month, 15.1% used it once a month, 23.4% used it 2—3 times per month and 36.0% used the internet at least once a week. Note, the frequency of use by users was greater among Toronto participants than Ottawa participants. There was no significant difference in the proportion of men who used the internet to look for sex between *Lambda* sites.

The proportion of men who reported that they had found male sexual partners in bathhouses in the previous six months was higher in Toronto (42.0%) than in Ottawa (27.2%). Further, among those participants who reported using bathhouses, the proportion of participants reporting frequent use was higher in Toronto than in Ottawa. 48.7% of Toronto participants who reported that they had frequented a bathhouse to look for sex did so less than once per month, while 18.6% did so once a month, 21.4% did so 2-3 times per month and 11.3% did so at least once per week. Among Ottawa participants reporting use of bathhouses, 56.0% did so less than once per month, 15.5% did so once per month, 21.6% did so 2-3 times per month and 6.9% did so once or more per week.

**Table 14: Frequency of venue use among participants who reported looking for sex at the venue in the previous six months, by each venue**

	Toronto n=1,830 %		Ottawa n=482 %		Both sites n=2,312 %	
	Frequent *	Less frequent**	Frequent*	Less frequent**	Frequent*	Less frequent**
<b>Gay bars</b>	37.4	62.6	33.5	66.5	36.5	63.5
<b>Internet †</b>	59.4	40.6	57.4	42.6	59.0	41.0
<b>Saunas/ bathhouses</b>	32.7	67.3	28.4	71.6	32.0	68
<b>Gym/health clubs</b>	42.5	57.5	54.8	45.2	44.6	55.4
<b>Parks</b>	31.2	68.8	30.2	69.8	31.0	69
<b>Straight bars</b>	29.7	70.3	22.6	77.4	27.9	72.1
<b>After-hours clubs/parties</b>	21.1	78.9	24.3	75.7	21.7	78.3
<b>Public restrooms</b>	40.4	59.6	38.3	61.7	39.9	60.1
<b>Gay associations</b>	24.8	75.2	22.9	77.1	24.4	75.6
<b>Community events for gays and lesbians</b>	19.9	80.1	9.4	90.6	16.9	83.1
<b>Personal advertisements</b>	43.0	57.0	33.3	66.7	41.3	58.7
<b>Sex parties</b>	23.0	77.0	9.1	90.9	21.1	78.9
<b>Coffee shops</b>	45.8	54.2	22.5	77.5	39.9	60.1
<b>Rave/circuit parties</b>	16.3	83.7	16.0	84.0	16.2	83.8
<b>Telephone chat lines</b>	39.1	60.9	39.3	60.7	39.1	60.9
<b>Recreational groups</b>	27.5	72.5	30.3	69.7	28.2	71.8
<b>Community organizations</b>	29.8	70.2	45.0	55.0	32.7	67.3
<b>Bicycle paths</b>	24.6	75.4	30.0	70.0	25.8	74.2

\*Frequent ( $\geq 2$  times per month) and \*\*less frequent ( $\leq 1$  times per month) use among participants who reported use

† including chat rooms and personal ads

### 3.4.2.3 Oral sex with male partners

96.7% (404) of Ottawa participants and 94.9% (1,446) of Toronto participants performed oral sex on a male partner in the previous six months. Toronto participants reported giving (receptive) oral sex to a higher number of partners than did Ottawa participants ( $p < 0.0001$ ). Data on the number of oral sex partners is not shown.

Toronto participants reported performing oral sex on an average of 12.6 (95%CI: 10.3-14.8) partners. The range of the number of sex partners that Toronto participants performed oral sex on was one partner to 700 partners with a median of 4 partners. 25% of Toronto participants performed oral sex on two partners or fewer and 75% of participants reported 10 or fewer.

Ottawa participants had an average of 7.2 (95%CI: 6.0-8.3) partners. The median number of male sex partners that Ottawa participants performed oral sex on was three with a range of one to 100 partners. 25% of Ottawa participants performed sex on one partner, while 75% reported seven partners or fewer. Table 15 indicates the frequency of condom use by the participant's partner while the participant performed oral sex.

**Table 15: Frequency of condom use reported by participants while giving oral sex (sucking) in the previous six months**

	<b>Toronto n=1,396 %</b>	<b>Ottawa n=396 %</b>	<b>Both sites n=1,792 %</b>
<b>Never</b>	88.1	83.7	84.7
<b>Rarely</b>	4.8	6.5	6.1
<b>Sometimes</b>	1.5	3.5	3.1
<b>Most of the time</b>	1.5	1.3	1.3
<b>Almost every time</b>	1.0	1.5	1.4
<b>All the time</b>	3.0	3.5	3.4
<b>Total</b>	100.0	100.0	100.0

As presented in Table 16, a greater proportion of Toronto participants (51.7%) than Ottawa participants (43.8%) indicated that they never had a partner ejaculate in their mouth without a condom on ( $p < 0.01$ ).

**Table 16: Frequency of partner ejaculating in mouth (without a condom on) reported by participants in the previous six months**

	<b>Toronto n=1,400 %</b>	<b>Ottawa n=390 %</b>	<b>Both sites n=1,790 %</b>
<b>Never</b>	51.7	43.8	50.0
<b>Rarely</b>	22.4	22.6	22.5
<b>Sometimes</b>	13.4	13.1	13.4
<b>Most of the time</b>	4.6	9.0	5.6
<b>Almost every time</b>	3.5	5.9	4.0
<b>All the time</b>	4.3	5.6	4.6
<b>Total</b>	100.0	100.0	100.0

#### **3.4.2.4 Anal sex with male partners**

In the previous six months, 304 (74.1%) Ottawa participants and 1,168 (78.7%) Toronto participants had anal sex with a man (data not shown). On average, participants from Ottawa had anal sex with 4.1 (95%CI: 3.2-5.0) partners in the previous six months. This was less than the average number of anal sex partners (6.8; 95%CI: 6.0-7.6) reported by Toronto participants ( $p < 0.0001$ ).

The median number of anal sex partners reported by both Ottawa and Toronto participants was two. The observed range among Toronto participants was one to 180 partners. 25% of Toronto participants reported one partner, while 75% reported five or fewer partners. Among Ottawa participants, the observed range was one to 80 partners. 25% of Ottawa participants reported one partner, while 75% of participants reported one to four partners.

The difference between sites in the proportion of participants who had unprotected sex with at least one man was not significant (60.3% of 300 in Ottawa and Toronto 56.5% of 1,142 in Toronto). During their last anal sex episode, 169 (57.5%) Ottawa participants used a condom. This proportion was less than that observed in Toronto (722 participants, 63.7%;  $p < 0.05$ ) (data not shown).

There were no significant differences in the proportion of men reporting partially unprotected insertive anal sex in Ottawa compared to Toronto (Tables 19 and 20). The proportion of men reporting delayed condom application is shown in Table 17. 47.1% of *Lambda* participants reported at least one episode of delayed condom application during receptive anal sex. Ottawa participants were less likely to report having a partner prematurely remove a condom during receptive anal sex than Toronto participants,  $p < 0.05$  (see Table 18).

**Table 17: Proportion of participants reporting delayed condom application in the previous six months**

		<b>Toronto n= 1,134 %</b>	<b>Ottawa n=296 %</b>	<b>Both sites n= 1,427 %</b>
<b>Delayed condom application during insertive anal sex</b>	<b>No</b>	48.3	50.0	48.7
	<b>Yes, once</b>	19.9	15.2	19.0
	<b>Yes, more than once</b>	31.7	34.8	32.4
	<b>Total</b>	100.0	100.0	100.0
<hr/>				
<b>Delayed condom application during receptive anal sex</b>		n=1,141	n=297	n=1,438
	<b>No</b>	53.1	49.2	52.3
	<b>Yes, once</b>	14.5	17.5	15.1
	<b>Yes, more than once</b>	31.7	33.0	32.0
	<b>Don't know</b>	0.7	0.3	0.6
	<b>Total</b>	100.0	100.0	100.0

**Table 18: Proportion of participants reporting premature condom removal in the previous six months**

		<b>Toronto n= 1,122 %</b>	<b>Ottawa n=287 %</b>	<b>Both sites n= 1,409 %</b>
<b>Premature condom removal during insertive anal sex</b>	<b>No</b>	84.4	89.5	85.5
	<b>Yes, once</b>	7.0	4.2	6.4
	<b>Yes, more than once</b>	8.6	6.3	8.2
	<b>Total</b>	100.0	100.0	100.0
<hr/>				
<b>Premature condom removal during receptive anal sex</b>		n=1,111	n=291	n=1,402
	<b>No</b>	83.0	88.3	84.1
	<b>Yes, once</b>	6.4	3.4	5.8
	<b>Yes, more than once</b>	8.8	7.9	8.6
	<b>Don't know</b>	1.8	0.3	1.5
	<b>Total</b>	100.0	100.0	100.0

Table 19 indicates the proportion of participants reporting unprotected anal sex (insertive or receptive) by partner’s HIV status. A greater proportion of Toronto participants reported unprotected anal sex with an HIV-positive partner ( $p = 0.01$ ).

**Table 19: Proportion of participants reporting unprotected anal sex (receptive or insertive) in the previous six months by partner’s HIV status**

	<b>Toronto n=1,142 %</b>	<b>Ottawa n=300 %</b>	<b>Both sites n=1,442 %</b>
<b>Unprotected anal sex with any partner</b>	56.5	60.3	57.3
<b>HIV- negative partner</b>	34.4	39.0	35.4
<b>Partner’s HIV status unknown</b>	22.6	19.7	22.0
<b>HIV- positive partner</b>	14.3	10.0	13.4

Note: Categories are not mutually exclusive.

### 3.4.2.5 Casual partners

1,186 (78.5%) Toronto participants and 293 (71.1%) Ottawa participants reported at least one casual anal sex partner ([Glossary](#)) (oral and/or anal) in the previous six months. The distribution of the number of casual partners reported by *Lambda* participants reporting sex in the previous six months, including those who reported no casual partner, is shown in Table 20. 119 (28.9%) participants from Ottawa and 325 (21.5%) participants from Toronto reported no casual partners in the previous six months. 24.7% of Toronto participants and 17.0% of Ottawa participants reported that they had at least 10 casual sex partners in the previous six months.

**Table 20: Number of casual male sexual partners (oral and/or anal) reported by participants who had sex in the previous six months**

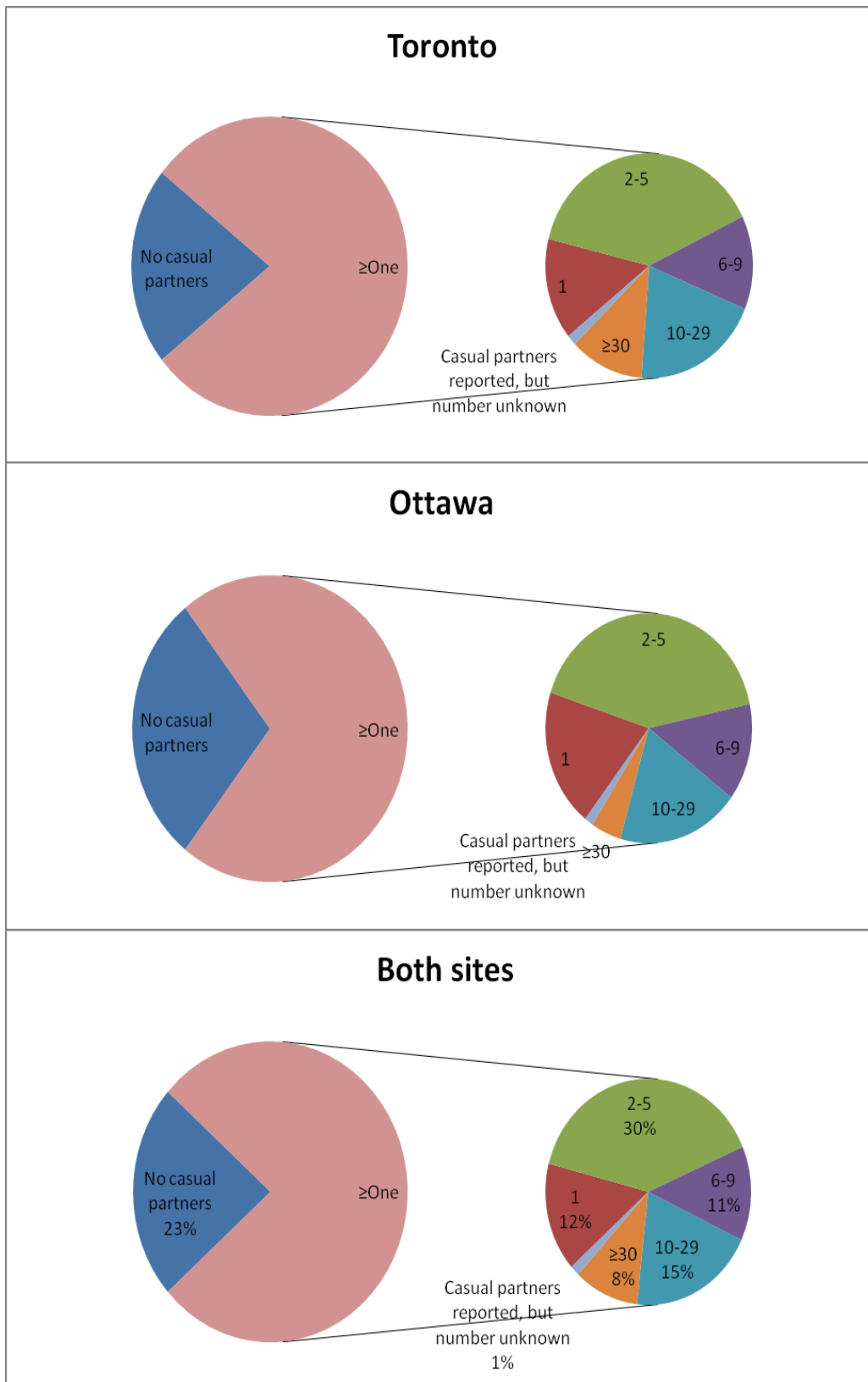
	<b>Toronto n= 1,511 %</b>	<b>Ottawa n= 412 %</b>	<b>Both sites n= 1,923 %</b>
<b>No casual partners</b>	21.5	28.9	23.1
<b>Only one</b>	11.4	13.8	12.0
<b>Two to five</b>	30.6	29.6	30.4
<b>Six to nine</b>	10.6	9.7	10.4
<b>10 to 29</b>	15.6	13.6	15.2
<b>≥30</b>	9.1	3.4	7.9
<b>Casual partners reported, but number unknown</b>	1.2	1.0	1.1
<b>Total</b>	100.0	100.0	100.0

The distribution of the number of casual partners among participants reporting at least one casual partner is shown in Table 21 and Figure 4. No significant difference was observed between sites with respect to the number of casual partners reported.

**Table 21: Number of casual male sexual partners (oral and/or anal) reported by participants, among participants who reported at least one casual partner in the previous six months**

<b>Number of partners</b>	<b>Toronto n=1,186 %</b>	<b>Ottawa n= 293 %</b>	<b>Both sites n= 1,479 %</b>
<b>Only one</b>	14.6	19.5	15.6
<b>Two to five</b>	39.0	41.6	39.5
<b>Six to nine</b>	13.5	13.7	13.5
<b>10 to 29</b>	19.9	19.1	19.7
<b>≥30</b>	11.6	4.8	10.2
<b>Casual partners reported, but number</b>	1.5	1.4	1.5
<b>Total</b>	100.0	100.0	100.0

**Figure 4: Number of casual male sexual partners (oral and/or anal) reported by participants in the previous six months**



Insertive anal sex with casual male partners was reported by 159 (56.8%) Ottawa participants and 693 (61.2%) Toronto participants. There was no significant difference between sites. Protected anal sex with at least one casual male partner was reported by 177 (63.2%) and 716 (63.5%) Ottawa and Toronto participants, respectively. However, unprotected anal sex with at least one casual partner also was reported by 89 (31.3%) Ottawa participants and 405 (35.5%) Toronto participants.

The frequency of condom use, respectively during insertive and receptive anal sex is shown in Table 22 and Table 23, respectively. Almost 50% of participants reported that they always used a condom during insertive and receptive anal sex with casual partners; approximately 10% indicated that they never use of condoms with casual partners.

**Table 22: Frequency of condom use during insertive anal sex with casual male sexual partners in the previous six months**

	<b>Toronto n= 669 %</b>	<b>Ottawa n= 157 %</b>	<b>Both sites n=826 %</b>
<b>Never</b>	9.6	13.4	10.3
<b>Rarely</b>	8.8	8.9	8.8
<b>Sometimes</b>	10.0	7.6	9.6
<b>Most of the time</b>	9.0	9.6	9.1
<b>Almost every time</b>	16.9	10.8	15.7
<b>All the time</b>	45.7	49.7	46.5
<b>Total</b>	100.0	100.0	100.0

**Table 23: Frequency of condom use during receptive anal sex with casual male sexual partners in the previous six months**

	<b>Toronto n= 550 %</b>	<b>Ottawa n=148 %</b>	<b>Both sites n= 698 %</b>
<b>Never</b>	10.5	10.8	10.6
<b>Rarely</b>	9.1	6.8	8.6
<b>Sometimes</b>	11.8	8.8	11.2
<b>Most of the time</b>	6.5	8.8	7.0
<b>Almost every time</b>	14.9	8.8	13.6
<b>All the time</b>	47.1	56.1	49.0
<b>Total</b>	100.0	100.0	100.0

Table 24 indicates the proportion of participants reporting protected anal sex (receptive or insertive) in the previous six months by HIV status of partner. There was no significant difference between sites with respect to the proportion of men reporting protected sex with a partner whose HIV status they did not know. The proportion of Ottawa participants reporting protected anal sex with both HIV-negative ( $p = 0.02$ ) and HIV-positive partners ( $p = 0.001$ ) was less than that reported among Toronto participants.

**Table 24: Proportion of participants reporting protected anal sex (receptive and/or insertive) with casual male sexual partners in the previous six months by partner's HIV status**

	<b>Toronto n=1,126 %</b>	<b>Ottawa n=280 %</b>	<b>Both sites n=1,406 %</b>
<b>Protected anal sex</b>	63.6	63.2	63.5
<b>HIV-negative partner</b>	32.8	26.1	31.4
<b>Partner's HIV status unknown</b>	39.6	40.7	39.8
<b>HIV-positive partner</b>	16.1	8.6	14.6

Table 25 shows the proportion of participants reporting unprotected anal sex with partners by HIV status of partner in the previous six months. There was no significant difference between sites. At both sites, a greater proportion of participants reported unprotected casual sex with a partner whose status they did not know (Toronto = 21.0%; Ottawa = 19.4%) then with HIV-negative or HIV-positive partners.

**Table 25: Proportion of participants reporting unprotected anal (receptive and/or insertive) sex with casual male sexual partners in the previous six months by partner's HIV status**

	<b>Toronto n=1,140 %</b>	<b>Ottawa n=284 %</b>	<b>Both sites n=1,424 %</b>
<b>Unprotected anal sex</b>	35.5	30.1	34.7
<b>HIV-negative partner</b>	16.2	13.4	15.7
<b>Partner's HIV status unknown</b>	21.0	19.4	20.6
<b>HIV-positive partner</b>	12.1	8.8	11.4

### 3.4.2.6 Regular partnerships

Table 26 indicates the number of regular male sexual partners (oral and/or anal) (refer to [Glossary](#)) reported by participants. Approximately half of the participants reported only one regular partner in the previous six months (51.7% of Ottawa and 45.0% of Toronto participants). The next most commonly reported category was two to five regular partners (25.7% of Ottawa participants and 27.6% of Toronto participants).

**Table 26: Number of regular male sexual partners (oral and/or anal) reported by participants reporting sex with regular male partners in the previous six months**

	<b>Toronto n=1,505 %</b>	<b>Ottawa n= 412 %</b>	<b>Both sites n=1,917 %</b>
<b>None</b>	16.7	15.3	16.4
<b>Only one</b>	45.0	51.7	46.5
<b>Two to five</b>	27.6	25.7	27.2
<b>Six or more</b>	8.3	5.3	7.7
<b>Regular partners reported, but number unknown</b>	2.3	1.9	2.2
<b>Total</b>	100.0	100.0	100.0

In the previous six months, 55 Ottawa participants (16.7%) and 208 Toronto participants (17.5%) had sex (oral and/or anal) with a regular male partner they knew to be HIV-positive (no significant difference between sites). Of these, 41 from Ottawa (80.4%) and 150 from Toronto (76.9%) reported insertive anal sex and 32 (62.8%) from Ottawa and 137 (70.3%) from Toronto reported receptive anal sex (no significant difference between sites). Table 27 and Table 28, respectively, indicate the frequency of condom use during insertive and receptive anal sex with regular partners known to be HIV-positive. No significant difference was observed between sites with respect to condom use during insertive anal sex with HIV-positive regular partners. 68.5% of participants used condoms less than all the time during insertive anal sex with regular partners known to be HIV-positive. The distribution of the frequency of condom use during receptive anal sex with regular HIV-positive partners was different in Ottawa than in Toronto ( $p=0.03$ ). 27.6% of Toronto participants and 41.9% of Ottawa participants used a condom during receptive anal sex with regular partners known to be HIV-positive. Although the most common frequencies of condom use were never or always among both Toronto and Ottawa participants, the proportion of Ottawa participants reporting these categories was higher than the proportion of Toronto participants. The proportion of Toronto participants who reported infrequent use (rarely, sometimes) was greater than that among Ottawa participants.

**Table 27: Frequency of condom use during insertive anal sex with regular male sexual partners known to be HIV-positive in the previous six months**

	<b>Toronto n= 144 %</b>	<b>Ottawa n=40 %</b>	<b>Both sites n= 184 %</b>
<b>Never</b>	35.4	40.0	36.4
<b>Rarely</b>	14.6	10.0	13.6
<b>Sometimes</b>	10.4	2.5	8.7
<b>Most of the time</b>	4.2	10.0	5.4
<b>Almost every time</b>	4.9	2.5	4.3
<b>All the time</b>	30.6	35.0	31.5
<b>Total</b>	100.0	100.0	100.0

**Table 28: Frequency of condom use during receptive anal sex with regular male sexual partners known to be HIV-positive in the previous six months**

	<b>Toronto n= 127 %</b>	<b>Ottawa n= 31 %</b>	<b>Both sites n=158 %</b>
<b>Never</b>	34.6	41.9	36.1
<b>Rarely</b>	12.6	3.2	10.8
<b>Sometimes</b>	14.2	0.0	11.4
<b>Most of the time</b>	5.5	12.9	7.0
<b>Almost every time</b>	5.5	0.0	4.4
<b>All the time</b>	27.6	41.9	30.4
<b>Total</b>	100.0	100.0	100.0

The proportion of participants reporting anal sex with a regular partner of unknown HIV status in the previous six months was similar in Ottawa (34.0%) and Toronto (38.7%). Of the Ottawa participants who reported anal sex with a regular partner of unknown HIV status, 72 (64.9%) reported insertive anal sex and 65 (59.6%) reported receptive anal sex with these partners (participants could report both insertive and receptive anal sex). Among Toronto participants, 295 (66.0%) reported insertive anal sex and 252 (57.1%) reported receptive anal sex.

As shown in Table 29 and Table 30, the reported frequency of condom use with regular partners of unknown HIV status was not significantly different between sites. About half of participants reported condom use all of the time during both insertive and receptive anal sex but approximately 30% of participants reported condom use less than most of the time with their regular partners.

**Table 29: Frequency of condom use during insertive anal sex with regular male sexual partners of unknown HIV status in the previous six months**

	<b>Toronto n= 282 %</b>	<b>Ottawa n=71 %</b>	<b>Both sites n= 353 %</b>
<b>Never</b>	12.1	12.7	12.2
<b>Rarely</b>	8.9	7.0	8.5
<b>Sometimes</b>	12.4	4.2	10.8
<b>Most of the time</b>	8.5	11.3	9.1
<b>Almost every time</b>	13.1	8.5	12.2
<b>All the time</b>	45.0	56.3	47.3
<b>Total</b>	100.0	100.0	100.0

**Table 30: Frequency of condom use during receptive anal sex with regular male sexual partners of unknown HIV status in the previous six months**

	<b>Toronto n= 242 %</b>	<b>Ottawa n= 64 %</b>	<b>Both sites n= 306 %</b>
<b>Never</b>	11.6	15.6	12.4
<b>Rarely</b>	12.0	6.3	10.8
<b>Sometimes</b>	11.6	6.3	10.5
<b>Most of the time</b>	7.4	9.4	7.8
<b>Almost every time</b>	10.3	9.4	10.1
<b>All the time</b>	47.1	53.1	48.4
<b>Total</b>	100.0	100.0	100.0

Anal sex with a regular male partner who was known to be HIV-negative was reported by 238 (71.4%) and 806 (68.1%) Ottawa and Toronto participants, respectively. Among these men, the proportion reporting insertive anal sex with their regular HIV-negative partner(s) was lower in Ottawa (59.6%) than in Toronto ( $p < 0.01$ ). Receptive anal sex with regular HIV-negative partners was reported by 154 (66.1%) and 505 (64.3%) Ottawa and Toronto participants, respectively.

As shown in Table 31 and Table 32, there was no significant difference between sites with respect to frequency of condom use during anal intercourse with a regular partner who was known to be HIV negative. A higher proportion of participants reported condom use either all of the time ( $\approx 30\%$ ) or none of the time ( $\approx 40\%$ ) during both insertive and receptive anal sex than the proportion reporting infrequent (rarely, sometimes, most of the time, almost all of the time) condom use.

**Table 31: Frequency of condom use during insertive and receptive anal sex with regular male sexual partners known to be HIV-negative in the previous six months**

	<b>Toronto n= 507 %</b>	<b>Ottawa n= 133 %</b>	<b>Both sites n= 640 %</b>
<b>Never</b>	28.4	32.3	29.2
<b>Rarely</b>	8.5	7.5	8.3
<b>Sometimes</b>	7.7	4.5	7.0
<b>Most of the time</b>	4.7	7.5	5.3
<b>Almost every time</b>	11.8	8.3	11.1
<b>All the time</b>	38.9	39.8	39.1
<b>Total</b>	100.0	100.0	29.2

**Table 32: Frequency of condom use during receptive anal sex with regular male sexual partners known to be HIV-negative in the previous six months**

	<b>Toronto n= 471 %</b>	<b>Ottawa n=146 %</b>	<b>Both sites n=617 %</b>
<b>Never</b>	32.2	31.0	31.3
<b>Rarely</b>	6.2	10.2	9.2
<b>Sometimes</b>	8.2	6.2	6.6
<b>Most of the time</b>	6.8	5.3	5.7
<b>Almost every time</b>	6.2	8.3	7.8
<b>All the time</b>	40.4	39.1	39.4
<b>Total</b>	100.0	100.0	100.0

### 3.4.2.7 Sex in exchange for goods and services

No significant differences were observed between *Lambda* sites with respect to sex in exchange for material and/or monetary gain (data not shown). Approximately 7.3% of participants in both Ottawa and Toronto reported that they had given money in exchange for sex in the previous six months. Sixteen Ottawa participants (4.1%) and 59 Toronto participants (4.0%) indicated that they had given drugs in exchange for sex in the previous six months. Exchange of other goods or services (i.e. meal or food) for sex was reported by 13 (3.3%) Ottawa and 53 (3.9%) Toronto respondents. Receipt of money, drugs and other goods or services during the previous six months was reported by 19 (4.9%), 20 (5.0%), and 12 (3.1%) Ottawa participants, respectively. Receipt of money, drugs and other goods or services was reported respectively by 84 (5.9%), 57 (3.9%) and 49 (3.5%) Toronto participants, respectively.

### 3.4.3 Sexual behaviour among men susceptible to HIV infection

481(84.8%) HIV-seronegative participants (as determined by DBS) from Toronto and 226 (87.6%) HIV-seronegative participants (as determined by DBS) reported having male sex partners in the previous six months. 56.6% of Toronto participants and 57.8% of Ottawa participants reported unprotected anal sex with at least one of their male partners in the previous six months (see Table 33).

**Table 33: Unprotected anal intercourse among HIV-seronegative participants in the previous six months by reported HIV status of the partner**

	<b>Toronto n=355 %</b>	<b>Ottawa n=166 %</b>	<b>Both sites n=521 %</b>
<b>Unprotected anal sex (with any partner)</b>	56.6	57.8	57.0
<b>HIV-negative partner</b>	39.7	34.3	38.0
<b>Partner's HIV status unknown</b>	20.3	20.5	20.3
<b>HIV-positive partner</b>	7.3	4.2	6.3

In a multivariate analysis the odds of UAI with regular partners (HIV-positive or partners of unknown HIV status) were higher among men who used poppers in the two hours before sex controlling for site, age and sexual orientation as well as use of alcohol, marijuana, party drugs, crystal methamphetamine/cocaine and Viagra in the two hours before sex (refer to Table 34).

**Table 34: Association of selected variables with unprotected anal intercourse with regular partners (HIV-positive partners or partners of unknown HIV status) among HIV-negative participants**

	Odds ratio	95% Confidence Limits	
		Lower limit	Upper limit
<b>Site</b>			
Ottawa (referent)	1.0	—	—
Toronto	0.99	0.53	1.7
<b>Age</b>			
< 30 years of age (referent)	1.0	—	—
30—49 years of age	0.82	0.43	1.6
50 years of age and older	0.49	0.19	1.2
<b>Sexual orientation</b>			
Bisexual (referent)	1.0	—	—
Homosexual	0.60	0.30	1.3
<b>Alcohol in the two hours before sex</b>			
No (referent)	1.0	—	—
Yes	0.89	0.45	1.6
<b>Marijuana in the two hours before sex</b>			
No (referent)	1.0	—	—
Yes	1.2	0.64	2.3
<b>Poppers in the two hours before sex</b>			
No (referent)	1.0	—	—
Yes	3.3 <sup>†</sup>	1.8	6.0
<b>Party drugs in the two hours before sex*</b>			
No (referent)	1.0	—	—
Yes	2.1	0.94	4.8
<b>Crystal methamphetamine or cocaine in the two hours before sex</b>			
No (referent)	1.0	—	—
Yes	1.0	0.4	2.2
<b>Viagra in the two hours before sex</b>			
No (referent)	1.0	—	—
Yes	1.3	0.66	2.7

\*Party drugs include ecstasy, special K and GHB

<sup>†</sup> p < 0.0001

Of the seronegative participants reporting male sex partners, 364 participants (77.1%) from Toronto and 154 participants (70.3%) from Toronto reported at least one casual male sex partner. Table 35 shows the proportion of participants reporting unprotected anal intercourse with casual male sex partners in the previous six months. At both sites, the proportion of men reporting unprotected anal intercourse with HIV-positive partners was less among HIV-seronegative participants than among HIV-seropositive participants (p<0.001).

**Table 35: Unprotected anal intercourse among HIV-seronegative participants with casual partners in the previous six months by reported HIV status of the partner**

	<b>Toronto n=344 %</b>	<b>Ottawa n=149 %</b>	<b>Both sites n=493 %</b>
<b>Unprotected anal sex (with any partner)</b>	29.1	29.5	29.2
<b>HIV-negative partner</b>	13.1	9.4	12.0
<b>Partner's HIV status unknown</b>	18.6	20.1	19.1
<b>HIV-positive partner</b>	7.3	4.0	6.3

In a multivariate analysis (Table 36), the odds of UAI with casual partners was higher among HIV-seronegative participants who used poppers (2.2, 95%CI: 1.4-3.4) or party drugs in the two hours before sex controlling for site, age and sexual orientation as well as use of alcohol, marijuana, crystal methamphetamine/cocaine or Viagra in the two hours before sex.

**Table 36: Association of selected variables with unprotected anal intercourse with casual partners among HIV-negative participants**

	Odds ratio	95% Wald	
		Lower Limit	Upper Limit
<b>Site</b>			
Ottawa (Referent)	1.0	—	—
Toronto	0.77	0.50	1.2
<b>Age</b>			
< 30 years of age (Referent)	1.0	—	—
30—49 years of age	0.98	0.58	1.6
50 years of age and older	1.2	0.63	2.2
<b>Sexual orientation</b>			
Bisexual (Referent)	1.0	—	—
Homosexual	0.90	0.48	1.7
<b>Alcohol in the two hours before sex</b>			
No (Referent)	1.0	—	—
Yes	1.0	0.63	1.6
<b>Marijuana in the two hours before sex</b>			
No (Referent)	1.0	—	—
Yes	1.5	0.93	2.4
<b>Poppers in the two hours before sex</b>			
No (Referent)	1.0	—	—
Yes	2.2 <sup>††</sup>	1.4	3.4
<b>Party drugs in the two hours before sex*</b>			
No (Referent)	1.0	—	—
Yes	2.1 <sup>†</sup>	1.1	4.1
<b>Crystal methamphetamine or cocaine in the two hours before sex</b>			
No (Referent)	1.0	—	—
Yes	1.4	0.7	2.7
<b>Viagra in the two hours before sex</b>			
No (Referent)	1.0	—	—
Yes	1.3	0.77	2.2

\*Party drugs include ecstasy, special K and GHB

† P<0.05, †† P<0.001

Among HIV-seronegative participants who reported at least one casual partner in the previous six months, 155 Toronto participants (45.6%) and 81 Ottawa participants (54.0%) reported receptive anal sex. Condom frequency during receptive anal is shown in Table 37. Approximately 40% of HIV-seronegative participants in both sites reported condom use during anal intercourse less than all the time with their casual partners.

**Table 37: Frequency of condom use reported by HIV-negative participants during anal intercourse with regular partners known to be HIV-positive in the previous six months**

	<b>Toronto n=340 %</b>	<b>Ottawa n=150 %</b>	<b>Both sites n=490 %</b>
<b>Receptive</b>	45.6	54.0	48.2
	<b>n=150</b>	<b>n=78</b>	<b>n=228</b>
<b>Never</b>	7.3	10.3	8.3
<b>Rarely</b>	4.7	7.7	5.7
<b>Sometimes</b>	7.3	3.8	6.1
<b>Most of the time</b>	6.0	3.8	5.3
<b>Almost every time</b>	16.0	12.8	14.9
<b>All of the time</b>	58.7	61.5	59.6
<b>Total</b>	100.0	100.0	100.0

#### **3.4.4 Sexual behaviour among men who self-report HIV-positivity**

Among men who had sexual partners in the previous six months, the proportion of self-reported HIV-positive participants who reported UAI is shown in Table 38. Among men who had casual partners in the previous six months, the proportion reporting UAI with their casual partners is shown in Table 39. While the proportion of Ottawa participants who reported UAI (74.1%) was higher than the proportion who reported UAI with casual partners (62.1%), the proportions were similar among Toronto participants (66.8% versus 68.4% with casual partners). The proportion of HIV-positive Ottawa participants who had UAI with partners of unknown status was 32.3%. 42.9% of HIV-positive Toronto participants had UAI with partners of unknown HIV status.

**Table 38: UAI among self-reported HIV-positive participants in the previous six months by reported HIV status of the partner**

	<b>Toronto n= 217 %</b>	<b>Ottawa n= 31 %</b>	<b>Both sites n=255 %</b>
<b>Unprotected anal sex (with any partner)</b>	66.8	74.1	65.9
<b>HIV-negative partner</b>	20.7	29.0	21.2
<b>Partner's HIV status unknown</b>	42.9	32.3	40.4
<b>HIV-positive partner</b>	47.0	61.3	47.5

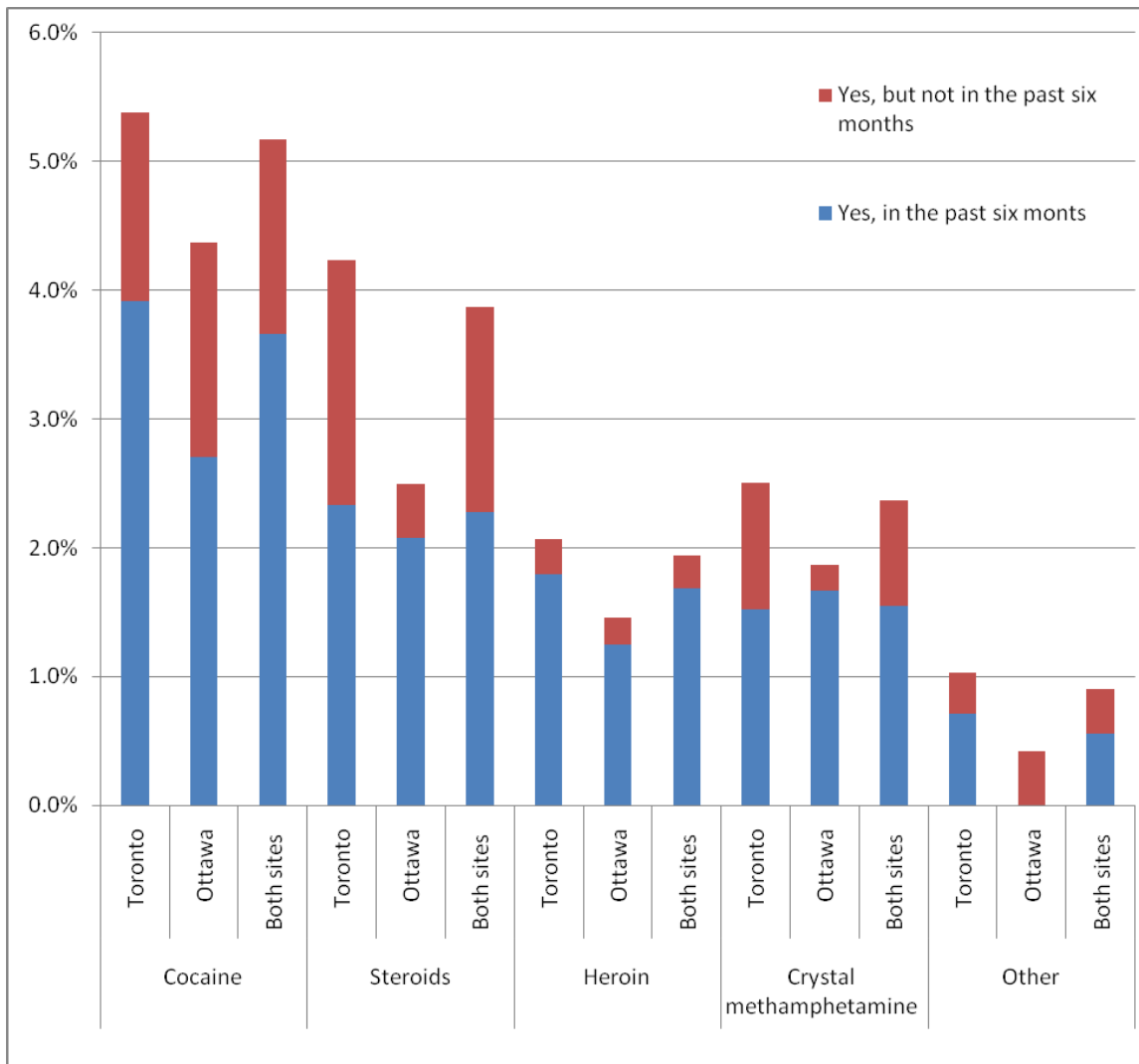
**Table 39: UAI among self-reported HIV-positive participants with casual partners in the previous six months by reported HIV status of the partner**

	<b>Toronto n=187 %</b>	<b>Ottawa n= 29 %</b>	<b>Both sites n=216 %</b>
<b>Unprotected anal sex (with any partner)</b>	68.4	62.1	67.6
<b>HIV-negative partner</b>	25.1	27.6	25.5
<b>Partner's HIV status unknown</b>	48.1	31.0	45.8
<b>HIV-positive partner</b>	48.7	51.7	49.1

### **3.4.5 Injection drug use**

10.5% of Toronto participants (192 participants) and 10.6% of Ottawa participants (34 participants) reported a lifetime history of injection drug use. Figure 5 indicates injection drug use by type of drug. There was no significant differences between participants from Ottawa and those from Toronto with respect to history of injection drug use. 2.5% and 3.9% of participants in Ottawa (12 participants) and Toronto (71 participants), respectively, reported injection drug use in the last 6 months. Excluding steroids, 7.1% of Toronto participants (131 participants) and 5.4% of Ottawa participants (26 participants) reported a history of injection drug use. In both Toronto and Ottawa, injection of cocaine was reported by a higher proportion of men than were other drugs.

**Figure 5: Type of injection drug use reported by participants in the previous six months**



Note: Categories are not mutually exclusive. Participants could report injection of more than one drug.

### 3.4.6 Smoking, alcohol and other non-injection drug use

Table 40 shows the frequency of smoking reported by participants. No significant differences were observed between Toronto and Ottawa. Among participants who reported smoking every day, there was no significant difference in the mean number of cigarettes smoked per day between Ottawa participants (16.9; 95%CI: 14.6—19.1) and Toronto participants (16.2; 95%CI: 15.2—17.2). The median number of cigarettes smoked per day by Ottawa participants who reported smoking every day was 18.5 (inter-quartile range: 10—25). Among Toronto participants who reported daily smoking, the median number of cigarettes smoked per day was 15.5 (inter-quartile range: 10—20).

**Table 40: Frequency of cigarette smoking reported by participants in the previous six months**

	<b>Toronto n=1,821 %</b>	<b>Ottawa n=481 %</b>	<b>Both Sites n=2,302 %</b>
<b>Not at all</b>	64.0	64.2	64.0
<b>Occasionally</b>	10.5	9.1	10.3
<b>Every day</b>	25.5	26.6	25.7
<b>Total</b>	100.0	99.9	100.0

Table 41 indicates the patterns of alcohol and recreational drug use in the two hours before sex with a male partner among participants who reported having sex in the previous six months. The drug most commonly used prior to sex in both Toronto and Ottawa was alcohol. The next most commonly used drugs were marijuana, poppers and erectile dysfunction drugs (Viagra, Levitra and Cialis). Greater than 30% of *Lambda* participants used alcohol before more than half their sexual episodes.

Among men who reported having sex during the previous six months, more than half used drugs other than alcohol in the two hours prior to sex with a male partner. 22.5% of Ottawa participants reported using drugs other than alcohol more than half the time and an additional 30.7% reported using them less than half the time. The proportion of participants reporting drug use prior to sex was higher in Toronto. 29.7% of participants reported using drugs other than alcohol more than half the time, while 31.5% of participants reported use less than half the time.

The proportion of participants reporting use of poppers (Toronto = 34.8, Ottawa = 14.8;  $p = 0.02$ ), cocaine (Toronto = 15.6, Ottawa = 10.3;  $p = 0.01$ ), and crystal methamphetamine (Toronto = 7.1, Ottawa = 3.3;  $p = 0.01$ ) was higher among Toronto participants than the proportion among Ottawa participants.

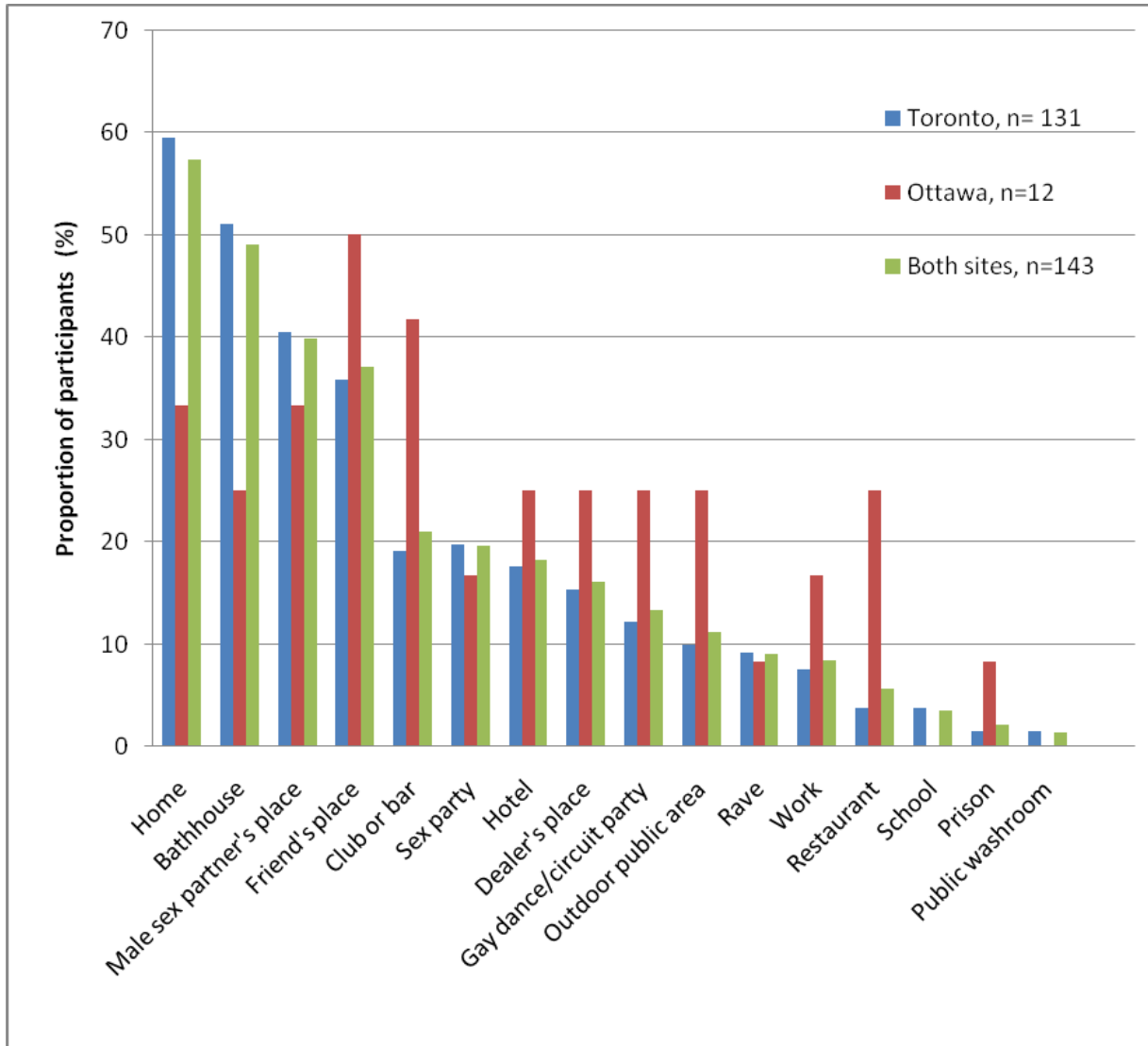
**Table 41: Drug and alcohol use in the two hours before sex in the previous six months**

	Toronto % n= 1,524		Ottawa % n=427		Both sites % n= 1,951	
	< half the time	> half the time	< half the time	> half the time	< half the time	> half the time
<b>Alcohol</b>	40.2	31.7	40.9	31.2	40.3	31.6
<b>Marijuana/hash/pot/grass</b>	22.0	14.0	12.6	21.1	21.8	13.7
<b>Poppers</b>	20.3	14.5	18.5	9.8	19.9	13.5
<b>Viagra, Levitra, Cialis, or other erectile drugs</b>	11.9	7.3	12.9	4.9	12.1	6.8
<b>Cocaine/crack/free base</b>	12.7	2.9	7.5	2.8	11.5	2.9
<b>Ecstasy/MDMA</b>	11.2	2.9	2.6	9.8	10.9	2.8
<b>Special K/ketamine</b>	5.8	2.2	4.7	1.4	5.6	2.0
<b>Crystal Methamphetamine</b>	5.1	2.0	2.8	0.5	4.6	1.7
<b>Gamma-hydroxybutyric acid</b>	4.3	1.6	3.0	0.7	4.0	1.4
<b>Other amphetamines or stimulants</b>	3.9	0.8	4.7	0.9	4.1	0.8
<b>Tranquilizers or benzodiazepines</b>	1.4	0.9	1.9	0.5	1.5	0.8
<b>Psychedelics (LSD, acid, mescaline, mushrooms)</b>	2.8	0.5	2.1	0.0	2.6	0.4
<b>Other opioids (percocet, dilaudid, oxycontin)</b>	1.6	0.4	1.6	0.0	1.6	0.3
<b>Heroin (smack)</b>	0.7	0.1	0.5	0.2	0.6	0.2

Note: Categories are not mutually exclusive, participants could report use of more than one type of drug.

329 men (296 from Toronto, 33 from Ottawa) reported ever using crystal methamphetamine and 143 men (131 from Toronto, 12 from Ottawa) reported using crystal methamphetamine in the previous six months. Although the proportion of men reporting a lifetime history of crystal methamphetamine use was higher in Toronto (16.2%) than in Ottawa (7.0%;  $p < 0.0001$ ), among participants with a history of crystal methamphetamine use there was no significant difference between sites (Ottawa: 38.2%; Toronto: 45.8%) in the proportion of participants reporting use in the previous six months ( $p=0.6$ ). The average number of days during which crystal methamphetamine was used was 24.3 (95%CI: 2.0—47.0) in Ottawa and 14.5 (95%CI: 9.0—19.8) in Toronto (data not shown). The median number of days was four (interquartile range=2—30) in Ottawa and three (inter-quartile range = 2—11) in Toronto (data not shown). There was no significant difference in the number of days that crystal methamphetamine was used by participants from the *Lambda* sites (data not shown). Among participants reporting crystal methamphetamine use in the previous six months, Figure 6 shows the locations used during this period. The greatest proportion of men reported crystal methamphetamine use at home, bathhouses, or a male sex partner's house. With respect to commercial venues, the highest proportion of Toronto crystal methamphetamine users reported use at bathhouse, while the largest proportion of Ottawa users reported use at clubs or bars. Table 42 presents the distribution of the methods of crystal methamphetamine use.

**Figure 6: Locations where participants reported using crystal methamphetamine in the previous six months**



Note: Locations of use are not mutually exclusive.

**Table 42: Routes of crystal methamphetamine use reported by participants reporting crystal methamphetamine use in the previous six months**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Oral</b>	17	13.0	—	N/A	22	15.4
<b>Smoke</b>	76	58.0	—	N/A	81	56.6
<b>Snort/inhale</b>	78	59.5	—	N/A	83	58.0
<b>Inject</b>	14	10.7	—	N/A	15	10.5
<b>Anal/rectal</b>	22	16.8	—	N/A	22	15.4

— Insufficient numbers

Note: Routes of use are not mutually exclusive. Participants could report more than one route of use.

### ***3.5 STI knowledge and opinions***

#### **3.5.1 HIV knowledge and opinions**

Table 43 shows the participants' responses to questions concerning knowledge of HIV and other STIs. 40.4% of Ottawa participants and 34.2% of Toronto participants did not know whether or not treatment was available for HCV. Almost all participants responded that condoms could be used to protect against HIV and that a healthy-looking person could be infected with HIV.

**Table 43: The proportion of participants correctly answering sexually transmitted infection knowledge questions**

		n	Toronto %	n	Ottawa %	n	Both sites %
<b>Condoms can protect you against HIV</b>	<b>Yes</b>	1,785	93.6	470	93.2	2,255	93.5
	<b>Don't know</b>		1.5		1.7		1.5
<b>Sex with only one faithful, uninfected partner can reduce the risk of HIV</b>	<b>Yes</b>	1,775	82.8	466	87.1	2,241	83.7
	<b>Don't know</b>		1.8		0.9		1.6
<b>A healthy-looking person can have HIV</b>	<b>Yes</b>	1,783	94.3	468	95.3	2,251	94.5
	<b>Don't know</b>		1.0		1.1		1.0
<b>Syphilis can be transmitted through unprotected oral sex</b>	<b>Yes</b>	1,769	83.7	466	80.5	2,235	83.0
	<b>Don't know</b>		12.9		17.2		13.8
<b>I would always have symptoms if I contacted a STD</b>	<b>No</b>	1,772	77.5	467	85.2	2,239	79.1
	<b>Don't know</b>		8.1		6.4		7.7
<b>I would always have symptoms if I was infected with hepatitis C</b>	<b>No</b>	1,765	64.0	468	69.2	2,233	65.1
	<b>Don't know</b>		18.9		19.2		18.9
<b>There is treatment available for hepatitis C</b>	<b>Yes</b>	1,765	34.8	468	27.1	2,233	33.2
	<b>Don't know</b>		34.2		40.4		35.5

Note: n represents the total number of participants responding to this question. Those that responded 'no' for a given question are not shown in this table.

Table 44 shows that the majority of participants believe that it is important to use a condom with an HIV-infected partner even if that partner's viral load is undetectable and that the availability of treatment has not decreased their concern about contracting HIV. Participants who reported that they strongly agreed or agreed with the statement "I am not concerned about getting HIV because of the available treatment" were classified as having treatment optimism. In Toronto, 6.3% of participants had treatment optimism while in Ottawa 3.1% reported treatment optimism.

**Table 44: Other knowledge about HIV**

		<b>Toronto n=1,729 %</b>	<b>Ottawa n=453 %</b>	<b>Both sites n=2,182 %</b>
<b>It is less important that a condom be used when one partner is HIV infected and has an undetectable viral load</b>	<b>Strongly agree/agree</b>	16.0	11.7	15.1
	<b>Neutral</b>	3.6	2.2	3.3
	<b>Strongly disagree/disagree</b>	74.0	79.9	75.2
	<b>Don't know</b>	6.5	6.2	6.4
	<b>Total</b>	100.0	100.0	100.0
		n=1,712	n=448	n=2,160
<b>I am not very concerned about getting HIV because of the available treatment</b>	<b>Strongly agree/agree</b>	6.3	3.1	5.6
	<b>Neutral</b>	4.8	2.5	4.3
	<b>Strongly disagree/disagree</b>	85.8	91.7	87.1
	<b>Don't know</b>	3.2	2.7	3.1
	<b>Total</b>	100.0	100.0	100.0

### **3.5.2 Syphilis knowledge and opinions**

The responses to questions concerning knowledge of syphilis transmission are shown in Table 45. Approximately 75% of participants knew that a person can contract syphilis through giving oral sex and approximately 80% of participants knew that syphilis can be contracted through unprotected anal (receptive or insertive) sex.

**Table 45: Participants’ knowledge about methods of syphilis transmission**

		Toronto		Ottawa		Both sites	
		n	%	n	%	n	%
<b>Giving oral sex (sucking)</b>	<b>No</b>	1,732	8.5	456	6.4	2,188	8.1
	<b>Yes</b>		73.0		75.0		73.4
	<b>Unsure</b>		18.4		18.6		18.5
<b>Receiving oral sex (being sucked)</b>	<b>No</b>	1,722	14.4	451	15.1	2,173	14.5
	<b>Yes</b>		62.7		62.7		62.7
	<b>Unsure</b>		22.9		22.2		22.8
<b>Oral-anal sex (rimming)</b>	<b>No</b>	1,720	8.2	451	6.4	2,171	7.8
	<b>Yes</b>		72.6		72.3		72.5
	<b>Unsure</b>		19.2		21.3		19.7
<b>Insertive anal sex without a condom</b>	<b>No</b>	1,704	6.4	450	4.7	2,154	6.0
	<b>Yes</b>		82.0		80.7		81.7
	<b>Unsure</b>		11.6		14.7		12.3
<b>Receptive anal sex without a condom</b>	<b>No</b>	1,717	6.1	452	5.1	2,169	5.9
	<b>Yes</b>		82.9		81.2		82.5
	<b>Unsure</b>		11.0		13.7		11.6
<b>Vaginal sex without a condom</b>	<b>No</b>	1,713	6.4	450	5.6	2,163	6.2
	<b>Yes</b>		80.9		79.6		80.6
	<b>Unsure</b>		12.7		14.9		13.1

### 3.5.3 “Be Real” campaign

From Table 46, it can be seen that fewer than half of the *Lambda* participants were aware of the “Be Real” Campaign. Among the participants who were aware of the campaign, 16.7% from Ottawa and 25.9% from Toronto felt strongly that the “Be Real” campaign was effective in raising awareness about safer sex. 34.0% from Ottawa and 26.9% from Toronto were neutral with respect to the effectiveness of the campaign.

**Table 46: Participants’ knowledge and opinion of the “Be Real” campaign**

		Toronto		Ottawa		Both sites	
		n	%	n	%	n	%
<b>Knew “Be Real” campaign</b>	<b>Yes</b>	1,735	42.0	452	34.5	2,187	40.5
<b>The “Be Real” campaign was effective in raising awareness about safer sex.</b>	<b>Strongly Agree/ Agree</b>	683	62.8	150	52.7	833	60.9
	<b>Neutral</b>		26.9		34.0		28.2
	<b>Strongly Disagree/ Disagree</b>		10.3		13.4		10.8
	<b>Total</b>		100.0		100.0		100.0

### ***3.6 Health services and care practices, utilization and access***

#### **3.6.1 Health service utilization**

Table 47 indicates the proportion of participants who sought care from health and/or social service professionals in the previous six months. A greater proportion of participants from Toronto sought care from a family doctor (p=0.04) or chiropractor (p=0.03) than participants in Ottawa. However, the proportion of Ottawa participants who utilised walk-in clinics (p <0.0001) and nurse-practitioners (p = 0.01) was greater than the proportion of Toronto participants. HIV-positive participants from Toronto were more likely to seek medical care from the emergency room, a family doctor, an HIV specialist or a naturopath/homeopath than HIV-negative participants (data not shown). In Ottawa, the only significant difference between HIV-positive and HIV-negative participants was in utilization of care from an HIV specialist (data not shown).

**Table 47: Utilization of health and social service professionals by participants in the previous six months**

	<b>Toronto n= 1,863 %</b>	<b>Ottawa n= 488 %</b>	<b>Both sites n=2,351 %</b>
<b>Family doctor</b>	66.0	61.1	65
<b>Dentist/other dental specialist</b>	62.5	61.9	62.4
<b>Walk-in clinic</b>	35.2	44.9	37.2
<b>Medical specialist</b>	25.9	22.5	25.2
<b>Eye specialist/ ophthalmologist</b>	24.7	23.0	24.4
<b>Emergency room</b>	16.7	16.0	16.5
<b>HIV specialist</b>	17.2	14.1	16.5
<b>Nurse/nurse practitioner</b>	13.7	18.4	14.7
<b>Chiropractor</b>	13.3	9.6	12.5
<b>Psychiatrist</b>	11.2	12.1	11.4
<b>Social worker/counsellor</b>	11.8	9.8	11.4
<b>Physical therapist</b>	8.5	9.0	8.6
<b>Dietician/nutritionist</b>	7.5	5.9	7.2
<b>Psychologist</b>	6.9	8.0	7.1
<b>Massage</b>	2.2	2.7	2.3
<b>Naturopath/homeopath</b>	1.0	0.2	0.8
<b>Acupuncture</b>	0.5	0.8	0.6
<b>Others</b>	0.8	0.0	0.6
<b>Other therapies</b>	0.3	0.8	0.4

Note: Categories are not mutually exclusive. Participants could report using more than one health/social service professional.

Table 48 shows the level of comfort associated with receiving STI counselling and testing from different sources. A greater proportion of HIV-positive participants from Toronto reported that they would be comfortable receiving counselling and testing services from a family doctor than did HIV-negative participants ( $p < 0.001$ ).

**Table 48: Level of comfort associated with receiving counselling and testing for sexually transmitted infections at different locations reported by participants**

		<b>Toronto n=1,859 %</b>	<b>Ottawa n=489 %</b>	<b>Both sites n=2,348 %</b>
<b>Gay bars</b>	<b>Very comfortable</b>	24.8	25.4	24.9
	<b>Comfortable</b>	15.3	18.8	16.1
	<b>Neutral</b>	19.6	22.9	20.3
	<b>Uncomfortable</b>	20.4	17.6	19.8
	<b>Very uncomfortable</b>	19.8	15.3	18.9
<b>Family doctor</b>	<b>Very comfortable</b>	64.4	57.7	63.0
	<b>Comfortable</b>	22.6	28.4	23.8
	<b>Neutral</b>	7.5	6.3	7.3
	<b>Uncomfortable</b>	3.2	5.9	3.7
	<b>Very uncomfortable</b>	2.3	1.6	2.2
<b>Sexual health clinic</b>	<b>Very comfortable</b>	63.9	62.4	63.6
	<b>Comfortable</b>	24.0	26.0	24.4
	<b>Neutral</b>	7.9	8.0	7.9
	<b>Uncomfortable</b>	1.8	2.5	2.0
	<b>Very uncomfortable</b>	2.4	1.2	2.2
<b>Clinic for gay men</b>	<b>Very comfortable</b>	68.0	66.3	67.6
	<b>Comfortable</b>	18.8	21.3	19.3
	<b>Neutral</b>	8.2	9.2	8.4
	<b>Uncomfortable</b>	2.3	1.6	2.1
	<b>Very uncomfortable</b>	2.8	1.6	2.6
<b>Bathhouses</b>	<b>Very comfortable</b>	25.1	22.1	24.5
	<b>Comfortable</b>	14.7	16.0	15.0
	<b>Neutral</b>	24.0	21.3	23.5
	<b>Uncomfortable</b>	14.9	19.2	15.8
	<b>Very uncomfortable</b>	21.2	21.5	21.3
<b>Anonymous testing clinic</b>	<b>Very comfortable</b>	53.4	54.2	53.6
	<b>Comfortable</b>	21.8	26.0	22.7
	<b>Neutral</b>	15.5	13.1	15.0
	<b>Uncomfortable</b>	3.6	3.1	3.4
	<b>Very uncomfortable</b>	5.8	3.7	5.3

### 3.6.2 Circumcision

1,110 Toronto participants (61.4%) and 306 Ottawa participants (63.8%) indicated that they were circumcised. Table 49 shows the age at circumcision and reason for circumcision among circumcised *Lambda* participants. Differences were not observed between Ottawa and Toronto participants either in the proportion of men who reported circumcision or the reason for circumcision. Further, there was no significant difference in the proportion of participants reporting circumcision according to HIV status.

**Table 49: Age at circumcision and reasons for circumcision reported by circumcised participants**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Age</b>						
Less than 1 year of age	1,096	79.7	298	86.2	1,394	81.1
1 to 12 years of age		7.9		6.7		7.7
13 to 20 years of age		5.1		1.0		4.2
21 years of age or older		4.5		3.4		4.2
Respondent didn't know at what age they were circumcised		2.7		2.7		2.7
Total		100.0		100.0		100.0
<b>Reason for circumcision</b>						
Medical reason	1,063	12.7	296	14.5	1,359	13.1
To prevent HIV or other infection		1.3		0.3		1.1
Religious reason		17.0		13.9		16.3
Cultural but non-religious reason		20.3		20.9		20.5
Don't know		48.6		50.3		49.0
Total		100.0		100.0		100.0

### 3.6.3 Vaccination for viral hepatitis

Table 50 shows the proportion of men who reported having been vaccinated against hepatitis A and B. High levels of vaccination were reported by both Ottawa and Toronto participants. A higher proportion of men reported completion of the full cycle of vaccination doses (three shots) for hepatitis B than did for hepatitis A.

**Table 50: Proportion of participants reporting a history of hepatitis A and/or hepatitis B vaccination and the number of doses completed**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Hepatitis A vaccination</b>						
Yes	1,726	54.9	466	57.7	2,221	55.5
Don't know		18.8		18.0		18.7
Number of shots						
1 dose	907	15.2	260	15.4	1,167	15.3
2 doses		28.1		25.8		27.6
3 doses		32.6		36.2		33.4
Number of doses unknown		24.0		22.7		23.7
<b>Hepatitis B vaccination</b>						
Yes	1,751	68.9	470	71.7	2,221	69.5
Don't know		9.9		8.5		9.6
Number of doses						
1 dose	1,163	8.4	320	7.5	1,483	8.2
2 doses		27.3		22.8		26.4
3 doses		46.9		53.8		48.4
Number of doses unknown		17.3		100.0		17.0

Note: Hepatitis A and hepatitis B vaccination are not mutually exclusive.

### 3.6.4 STI testing and history

Table 51 shows the proportion of participants who reported having ever been tested for gonorrhea, syphilis and hepatitis C (HCV), respectively. No significant differences were observed for STI testing history between *Lambda* sites.

**Table 51: Self-reported gonorrhoea, syphilis and HCV testing among participants**

		<b>Toronto %</b>	<b>Ottawa %</b>	<b>Both sites %</b>
<b>Gonorrhoea</b>		<b>n=1,814</b>	<b>n=478</b>	<b>n=2,292</b>
	<b>No</b>	26.0	29.1	26.7
	<b>Yes</b>	64.9	62.1	64.3
	<b>Unknown gonorrhoea testing history</b>	9.1	8.8	9.0
<b>Syphilis</b>		<b>n=1,805</b>	<b>n=474</b>	<b>n=2,279</b>
	<b>No</b>	33.5	36.7	34.2
	<b>Yes</b>	66.5	63.3	65.8
<b>HCV</b>		<b>n=1,798</b>	<b>n=475</b>	<b>n=2,273</b>
	<b>No</b>	28.9	28.4	28.8
	<b>Yes</b>	58.9	58.3	58.8
	<b>Unknown HCV testing history</b>	12.2	13.3	12.4

Note: Categories are not mutually exclusive. Participant could report history of testing for more than one sexual transmitted infection.

A history of having ever tested for gonorrhoea ( $p<0.01$ ), syphilis ( $p<0.0001$ ) and HCV ( $p<0.001$ ) was reported by a greater proportion of HIV-positive Toronto participants than HIV-negative participants (Table 52). No significant difference between HIV-positive and HIV-negative participants was observed.

**Table 52: HIV prevalence among participants by self-reported gonorrhoea, syphilis and HCV testing history**

		Toronto			Ottawa		
		n	HIV-positive %	p	n	HIV-positive %	p
Ever tested for gonorrhoea	No	156	12.8	<0.01	81	11.1	0.99
	Yes	505	26.7		174	11.5	
	Unknown gonorrhoea testing history	77	20.8		28	10.7	
	Total excluding missing	738	93.3		283	93.1	
	Missing gonorrhoea testing history	53	6.7		21	6.9	
	Total	791	100.0		304	100.0	
Ever tested for syphilis	No	218	11.9	<0.0001	102	9.8	0.76
	Yes	515	28.2		179	11.7	
	Total excluding missing	733	92.7		281	92.4	
	Missing syphilis testing history	58	7.3		23	7.6	
	Total	791	100.0		304	100.0	
Ever tested for HCV	No	164	17.1	<0.0001	72	9.7	0.64
	Yes	472	28.6		168	10.7	
	Unknown HCV testing history	98	10.2		39	15.4	
	Total excluding missing	734	92.8		279	91.8	
	Missing HCV testing history	57	7.2		25	8.2	
	Total	791	100.0		304	100.0	

Note: There was not an “I don’t know” option for syphilis testing history on the questionnaire. Categories are not mutually exclusive. Participant could report history of testing for more than one sexually transmitted infection.

For participants indicating that they had a history of STI testing, Table 53 indicates the number of tests received. 277 (67.2%) Ottawa participants and 1,059 (67.1%) Toronto participants reported that they had ever been tested for HCV. 17.7% of Toronto participants reported that they had never had an HCV test, while 39.9% and 20.8% of participants had one and two HCV tests, respectively. Among Ottawa participants, 21.7% reported that they had never been tested for HCV, 35.3% reported one HCV test and 21.7% reported two HCV tests. The majority of participants from both Toronto and Ottawa reported having had two or fewer HCV tests. The reasons reported by participants for having had a syphilis test or not having had a syphilis test are shown in Table 54 and Table 55, respectively.

**Table 53: Self-reported number of gonorrhoea, syphilis and HCV tests**

	<b>Number of Tests</b>	<b>Toronto n= 1,057 %</b>	<b>Ottawa n= 280 %</b>	<b>Both Sites n=1,337 %</b>
<b>Gonorrhea</b>	0	23.6	24.6	23.8
	1	29.1	30.0	29.3
	2 to 5	38.4	38.9	38.5
	> 5	2.4	2.9	2.5
	At least once, but number unknown	6.5	3.6	5.9
	Total	100.0	100.0	100.0
		<b>n=269</b>	<b>n=1,044</b>	<b>n=1,313</b>
<b>Syphilis</b>	0	17.1	19.7	17.7
	1	34.2	30.5	33.4
	2 to 5	40.7	45.0	41.6
	> 5	2.9	2.6	2.8
	At least once, but number unknown	5.1	2.2	4.5
	Total	100.0	100.0	100.0
		<b>n=249</b>	<b>n= 908</b>	<b>n=1,157</b>
<b>HCV</b>	0	17.7	21.7	18.6
	1	39.9	35.3	38.9
	2 to 5	32.7	34.9	33.2
	> 5	3.4	3.6	3.5
	At least once, but number unknown	6.3	4.4	5.9
	Total	100.0	100.0	100.0

**Table 54: Reasons reported by participants for syphilis testing**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Had syphilis symptoms</b>	993	23.1	253	15.4	1,246	21.5
<b>Doctor/ nurse suggested</b>	1,014	45.3	257	35.4	1,271	43.3
<b>Part of regular testing pattern</b>	999	53.7	254	64.2	1,253	55.8
<b>A sex partner had syphilis</b>	994	9.1	253	8.7	1,246	9.0
<b>In conjunction with HIV test</b>	993	41.4	253	59.3	1,246	45.0
<b>Put myself at risk</b>	993	23.8	253	24.9	1,246	24.0
<b>Because of an advertisement, poster, article</b>	993	13.7	253	16.6	1,246	14.3
<b>Public health notified</b>	993	6.2	253	5.1	1,246	6.0

Note: Responses are not mutually exclusive. Participants could report more than one reason.

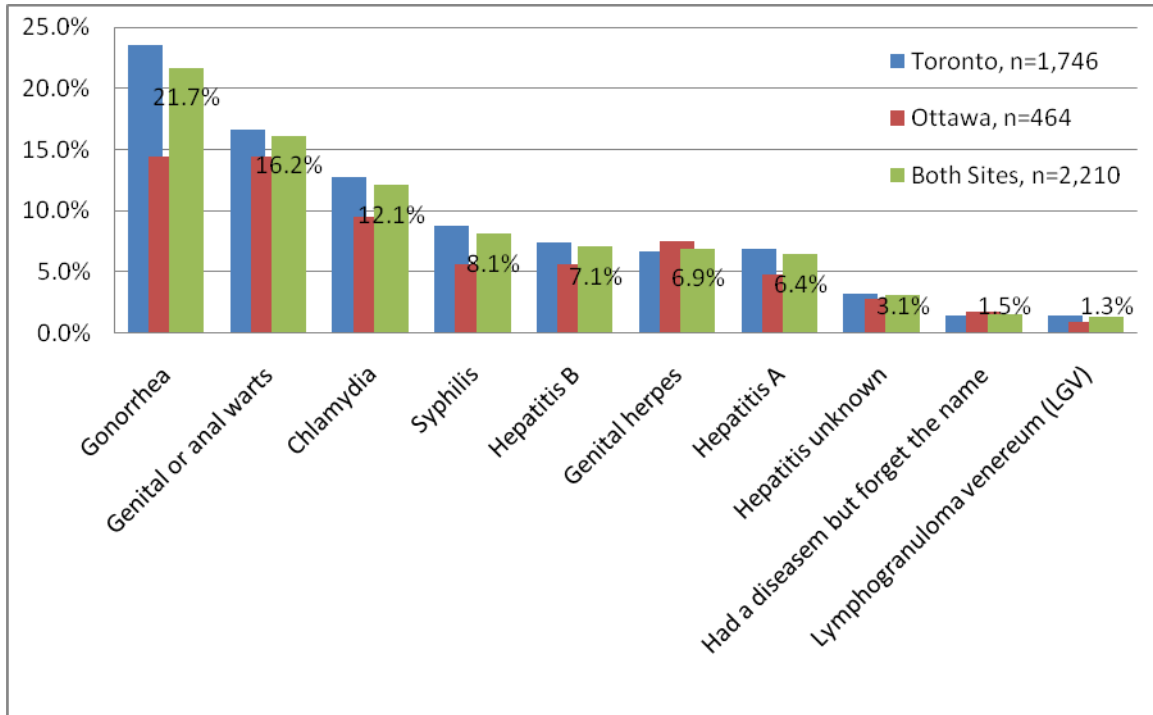
**Table 55: Reasons reported by participants reporting no history of syphilis testing for not having had a syphilis test**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Did not have syphilis symptoms</b>	493	65.7	150	60.7	643	64.5
<b>Not at risk for syphilis</b>	497	35.0	150	34.7	647	34.9
<b>Never thought about having a syphilis test</b>	497	40.8	151	46.4	648	42.1
<b>Do not want to know</b>	494	9.3	150	4.7	644	8.2
<b>If positive nothing can be done</b>	493	4.3	150	1.3	643	3.6
<b>Worried about impact on sex life</b>	493	5.5	150	3.3	643	5.0
<b>No sexual history with an infected person</b>	493	19.1	150	18.7	643	19.0
<b>If positive, do not want treatment for syphilis</b>	493	5.5	150	1.3	643	4.5
<b>Don't want sexual partners contacted</b>	493	9.5	150	2.0	643	7.8
<b>Don't know where to get the test</b>	493	9.3	150	8.0	643	9.0

Note: Responses are not mutually exclusive. Participants could report more than one reason.

Figure 7 presents the proportion of participants who reported a history of a physician diagnosed STI and Table 56 indicates the time period during which participants had the STIs.

**Figure 7: Proportion of participants self-reporting history of sexually transmitted infections among participants**

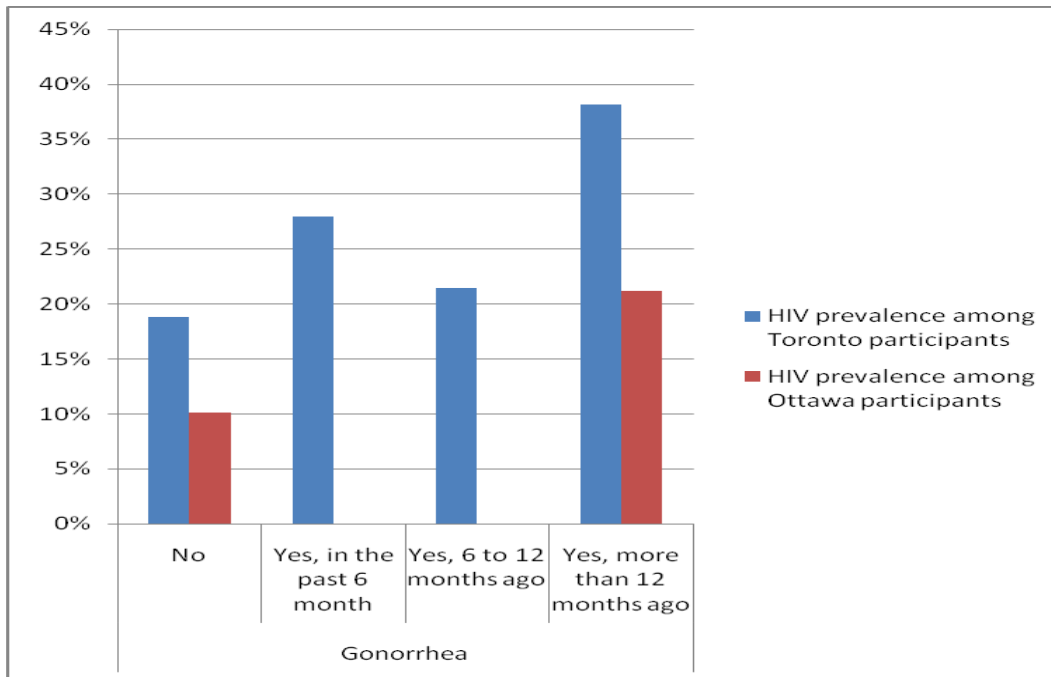


**Table 56: Self-reported history of sexually transmitted infections among participants**

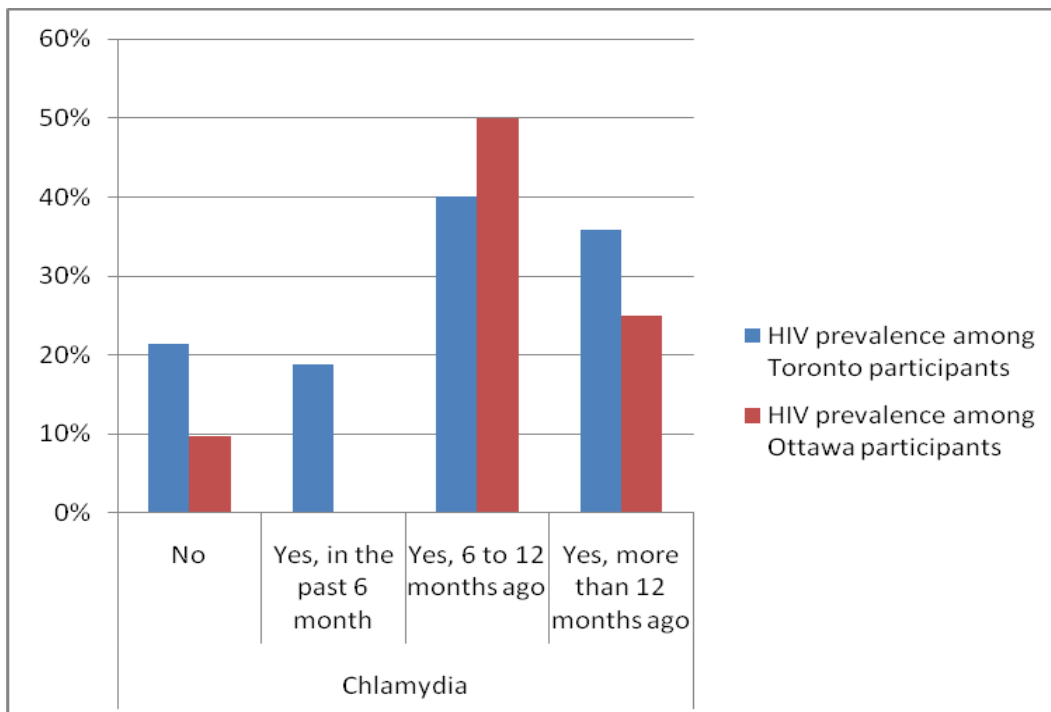
		<b>Toronto n=1,746 %</b>	<b>Ottawa n=464 %</b>	<b>Both sites n=2,210 %</b>
<b>Gonorrhoea</b>	<b>No</b>	76.4	85.6	78.3
	<b>Yes, in the past six months</b>	2.7	1.1	2.4
	<b>Yes, six to 12 months ago</b>	2.5	0.6	2.1
	<b>Yes, more than 12 months ago</b>	18.3	12.7	17.1
<b>Chlamydia</b>	<b>No</b>	87.2	90.5	87.9
	<b>Yes, in the past six months</b>	1.9	1.1	1.7
	<b>Yes, six to 12 months ago</b>	1.7	1.3	1.6
	<b>Yes, more than 12 months ago</b>	9.2	7.1	8.8
<b>Genital or anal warts</b>	<b>No</b>	83.4	85.6	83.8
	<b>Yes, in the past six months</b>	2.6	1.9	2.5
	<b>Yes, six to 12 months ago</b>	1.9	2.2	1.9
	<b>Yes, more than 12 months ago</b>	12.1	10.3	11.7
<b>Syphilis</b>	<b>No</b>	91.2	94.4	91.9
	<b>Yes, in the past six months</b>	1.4	1.1	1.3
	<b>Yes, six to 12 months ago</b>	1.0	0.6	0.9
	<b>Yes, more than 12 months ago</b>	6.4	3.9	5.9
<b>Genital herpes</b>	<b>No</b>	93.3	92.5	93.1
	<b>Yes, in the past six months</b>	1.3	0.6	1.2
	<b>Yes, six to 12 months ago</b>	0.7	0.9	0.8
	<b>Yes, more than 12 months ago</b>	4.6	6.0	4.9
<b>Hepatitis A</b>	<b>No</b>	93.1	95.3	93.6
	<b>Yes, in the past six months</b>	0.7	0.4	0.6
	<b>Yes, six to 12 months ago</b>	0.4	0.0	0.3
	<b>Yes, more than 12 months ago</b>	5.8	4.3	5.5
<b>Hepatitis B</b>	<b>No</b>	92.6	94.4	92.9
	<b>Yes, in the past six months</b>	0.9	0.2	0.7
	<b>Yes, six to 12 months ago</b>	0.5	0.0	0.4
	<b>Yes, more than 12 months ago</b>	6.1	5.4	5.9
<b>Hepatitis unknown</b>	<b>No</b>	96.8	97.2	96.9
	<b>Yes, in the past six months</b>	0.6	0.4	0.5
	<b>Yes, six to 12 months ago</b>	0.1	0.0	0.0
	<b>Yes, more than 12 months ago</b>	2.6	2.4	2.5
<b>Lymphogranuloma venereum (LGV)</b>	<b>No</b>	98.6	99.1	98.7
	<b>Yes, in the past six months</b>	0.6	0.2	0.5
	<b>Yes, six to 12 months ago</b>	0.3	0.2	0.3
	<b>Yes, more than 12 months ago</b>	0.5	0.4	0.5

Figure 8, 9, 10, 11, 12, 13, 14, and 15 show the HIV prevalence among participants by self-reported history of STI.

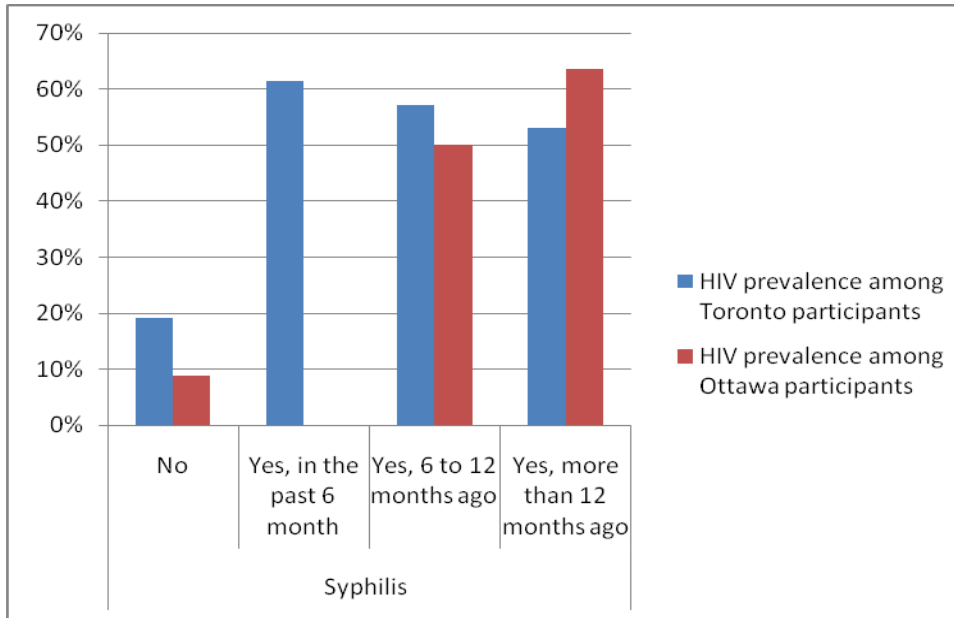
**Figure 8: HIV prevalence by self-reported history of gonorrhoea**



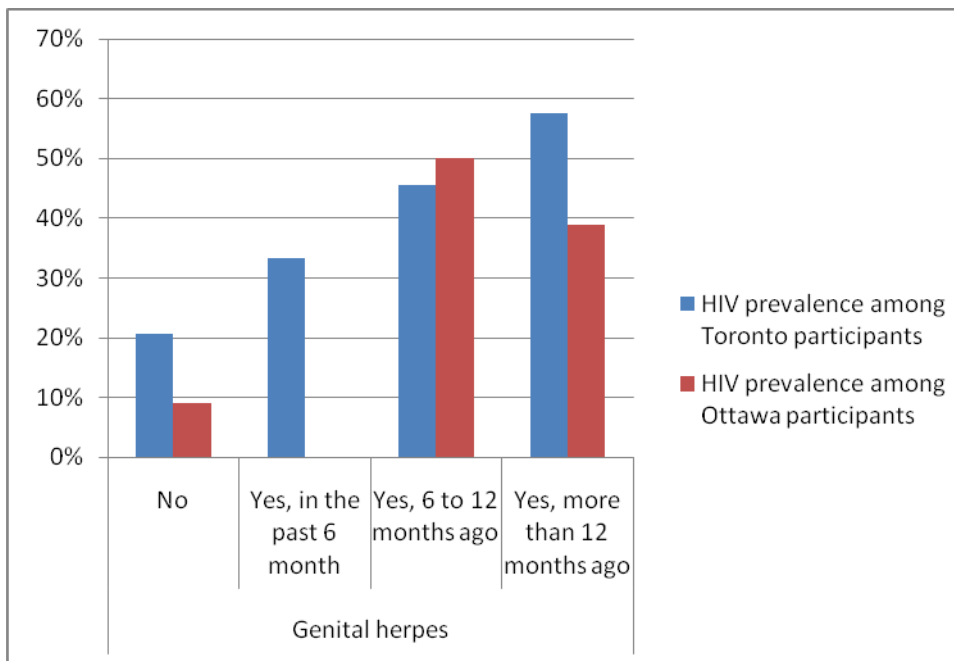
**Figure 9: HIV prevalence by self-reported history of Chlamydia**



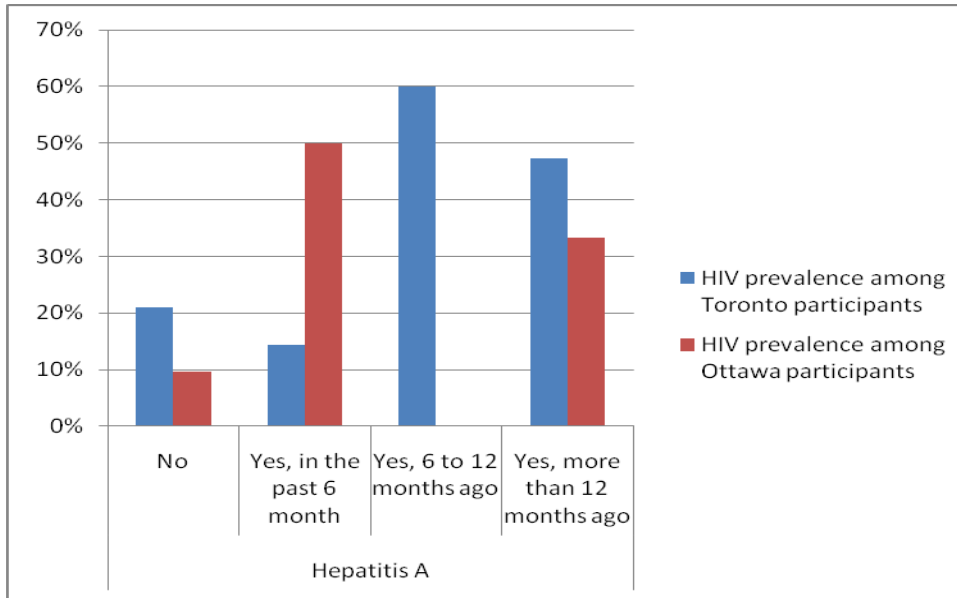
**Figure 10: HIV prevalence by self-reported history of syphilis**



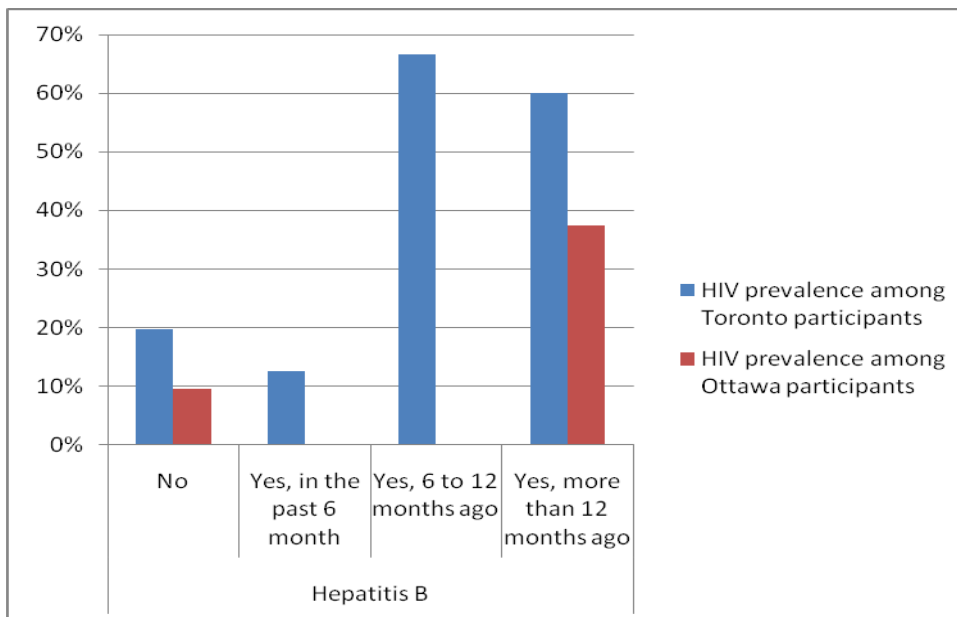
**Figure 11: HIV prevalence by self-reported history of genital herpes**



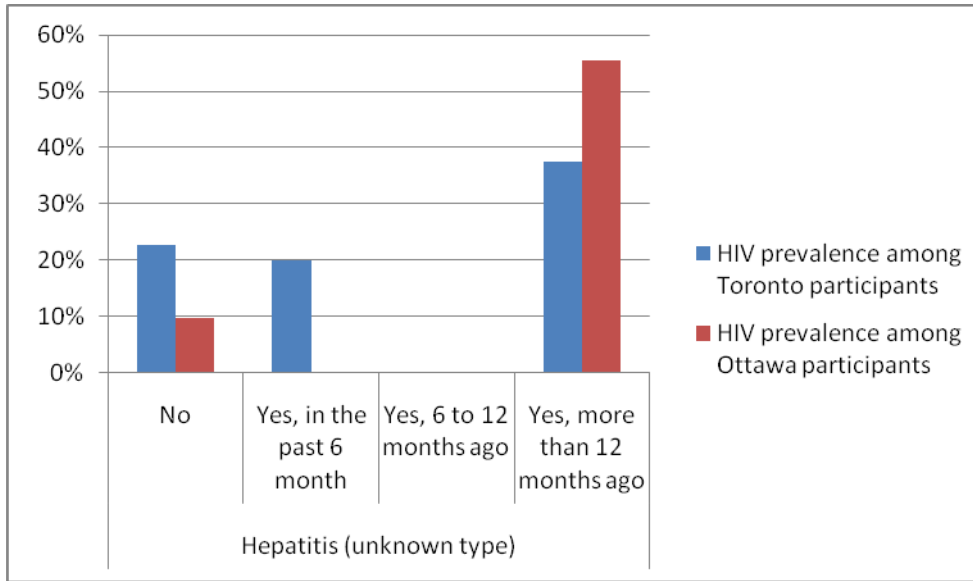
**Figure 12: HIV prevalence by self-reported history of hepatitis A**



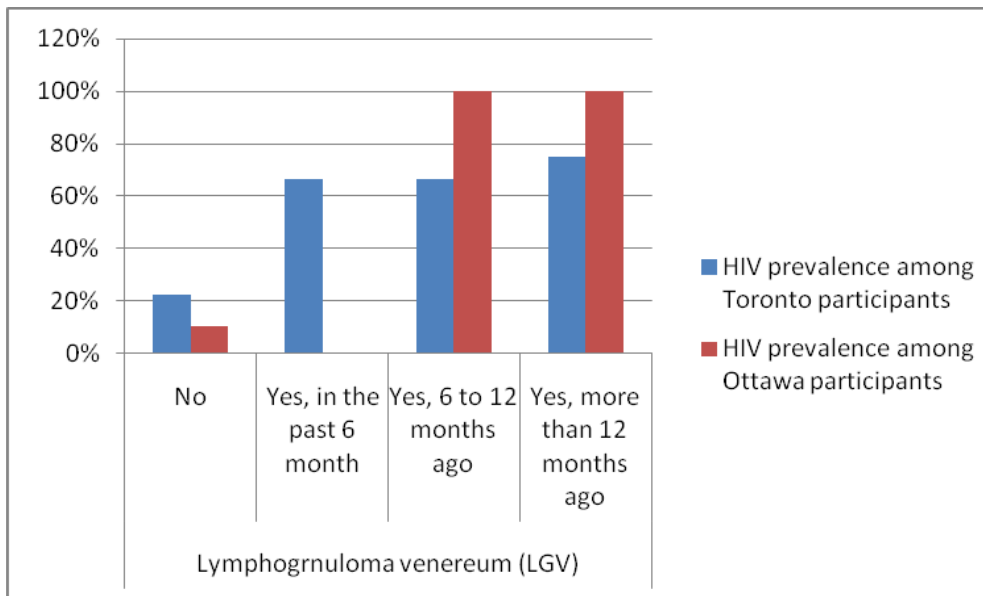
**Figure 13: HIV prevalence by self-reported history of hepatitis B**



**Figure 14: HIV prevalence by self-reported history of hepatitis (unknown)**



**Figure 15: HIV prevalence by self-reported history of Lymphogranuloma Venereum**



### 3.6.5 HIV testing

208 (11.7%) participants from Toronto and 53 participants (11.3%) from Ottawa reported that they had never been tested for HIV (data not shown). 413 (87.7%) and 1,545 (86.9%) participants from Ottawa and Toronto, respectively, reported that they had been tested for HIV at least once. The remaining 5 (1.1%) participants from Ottawa and 25 participants (1.4%) from Toronto who provided an answer to this question indicated that they did not know whether or not they had ever received an HIV test. Table 57 shows the number of HIV tests received and the year of the year of most recent HIV test.

**Table 57: Number of HIV tests received and year of last HIV test reported by participants**

	<b>Toronto</b>	<b>Ottawa</b>	<b>Both sites</b>
	<b>%</b>	<b>%</b>	<b>%</b>
<b>Number of HIV tests in the past 2 years</b>	<b>n= 1,380</b>	<b>n= 379</b>	<b>n= 1,759</b>
0	20.8	22.4	21.1
1	24.8	27.7	25.4
2	24.9	23.7	24.6
3	8.7	8.4	8.6
4	8.0	6.1	7.6
5	0.9	3.2	1.4
> 5	6.0	4.7	5.7
At least once, number unknown	5.9	3.7	5.5
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Year of last HIV test</b>	<b>n=1,268</b>	<b>n=355</b>	<b>n=1,623</b>
1984-89	2.1	2.5	2.2
1990-99	10.0	8.5	9.7
2000-04	14.3	17.2	14.9
2005	10.7	9.9	10.5
2006	32.8	32.1	32.7
2007	30.1	29.9	30.1
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Participants who reported a history of HIV testing were significantly older (40.6 years) than those who reported that they had never been tested (37.0 years;  $p < 0.001$ ) (data not shown). The median age among those who had never received an HIV test was 35.0 years (Inter-quartile range: 25.0-46.0). As indicated in Table 58, the proportion of men reporting a history of HIV testing was lower among those who are less than 25 years in Toronto and less than 20 years in Ottawa than among other participants.

**Table 58: Proportion of participants reporting a history of HIV testing by age**

Age	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<19	16	62.5	10	40.0	26	53.8
20-24	116	69.8	54	83.3	170	74.1
25-29	174	85.6	46	82.6	220	85.0
30-34	207	90.8	44	93.2	251	91.2
35-39	225	92.0	50	90.0	275	91.6
40-44	280	92.5	72	93.1	352	92.6
45-49	233	90.6	57	98.2	290	92.1
50-54	117	89.7	30	86.7	147	89.1
55-59	79	94.9	18	94.4	97	94.8
60-64	57	80.7	24	91.7	81	84.0
65+	48	87.5	14	85.7	62	87.1
<b>Total excluding missing</b>	<b>1,552</b>	<b>88.5</b>	<b>419</b>	<b>89.9</b>	<b>1,971</b>	<b>88.8</b>
<b>Missing age</b>	<b>201</b>	<b>11.5</b>	<b>47</b>	<b>10.1</b>	<b>248</b>	<b>11.2</b>
<b>Total</b>	<b>1,753</b>	<b>100.0</b>	<b>466</b>	<b>100.0</b>	<b>2,219</b>	<b>100.0</b>

With respect to income, participants with a reported income \$10,000 per year had the lowest proportion reporting a history of HIV testing. A lower proportion of participants making \$10,000—29,000 reported a history of HIV testing than those making at least \$30,000 (Table 59).

**Table 59: Proportion of participants reporting a history of HIV testing by income**

Income	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>No personal income</b>	41	61.0	7	71.4	48	62.5
<b>\$1 - \$9,999</b>	97	79.4	35	74.3	132	78.0
<b>\$10,000 - \$19,999</b>	182	85.7	50	90.0	232	86.6
<b>\$20,000 - \$29,999</b>	180	85.6	50	84.0	230	85.2
<b>\$30,000 - \$39,999</b>	236	90.7	46	93.5	282	91.1
<b>\$40,000 - \$49,999</b>	216	87.5	43	90.7	259	88.0
<b>\$50,000 - \$59,999</b>	162	91.4	53	92.5	215	91.6
<b>\$60,000 - \$69,999</b>	149	91.9	41	85.4	190	90.5
<b>\$70,000 - \$79,999</b>	105	92.4	37	86.5	142	90.8
<b>\$80,000 - \$89,999</b>	88	95.5	25	96.0	113	95.6
<b>\$90,000 - \$99,999</b>	31	96.8	13	100	44	97.7
<b>\$100,000 or more</b>	152	93.4	41	92.7	193	93.3
<b>Total excluding missing</b>	1,639	93.5	441	94.6	2,080	93.7
<b>Missing income</b>	114	6.5	25	5.4	139	6.3
<b>Total</b>	1,753	100.0	466	100.0	2,219	100.0

Table 60 shows HIV testing history by ethnicity. The proportion of participants with a history of HIV testing varied by ethnicity ( $p=0.0003$ ) with lower rates of HIV-testing were reported by South Asian/Southeast Asian and Afro-Caribbean participants.

**Table 60: Proportion participants reporting a history of HIV testing by self-reported ethnicity**

Ethnicity	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>Oceania</b>	4	100.0	1	100.0	5	100.0
<b>Arab/West Asian</b>	26	100.0	11	82.0	37	94.6
<b>North American</b>	312	91.7	143	93.0	455	92.1
<b>Aboriginal</b>	98	92.9	19	84.2	117	91.5
<b>Europe</b>	833	89.3	216	89.4	1,049	89.3
<b>Latin</b>	53	88.7	4	75.0	57	87.7
<b>Afro-Caribbean</b>	91	82.4	9	88.9	100	83.0
<b>Multi-ethnic</b>	34	82.4	9	77.8	43	81.4
<b>South Asian/ Southeast Asian</b>	186	78.5	23	73.9	209	78.0
<b>Total excluding missing</b>	1,637	93.4	435	93.3	2,072	93.4
<b>Missing</b>	116	6.6	31	6.7	147	6.6
<b>Total</b>	1,753	100.0	466	100.00	2,219	100.0

The proportion of participants reporting a history of HIV testing was higher among men reporting greater numbers of male sex partners in the previous six months (Table 61). The proportion of men reporting a history of HIV testing was higher among those who were circumcised (63.2%) than those who were not circumcised (36.1%) (data not shown). The proportion of HIV-positive participants (95.9%) who reported ever having an HIV test was higher than the proportion of HIV-negative participants from Toronto (89.9%) reporting that they had ever had an HIV test ( $p<0.05$ ) (data not shown). The odds of reporting a history of HIV-testing among HIV-positive participants was 2.5 (95%CI: 1.2—5.8) compared to that observed among HIV-negative participants (data not shown).

**Table 61: Proportion of participants reporting a history of HIV testing by number of male sex partners in the previous six months**

Number of male sex partners	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>None</b>	272	77.2	59	72.9	331	76.4
<b>Only one</b>	403	86.1	150	88.7	553	86.8
<b>2 to 5</b>	496	90.5	137	88.3	633	90.0
<b>6 to 9</b>	173	90.2	43	100	216	92.1
<b>10 to 29</b>	228	93.9	56	96	284	94.4
<b>≥30</b>	133	97.0	14	100	147	97.3
<b>Male partners reported, but number unknown</b>	22	90.9	—	N/A	27	88.9
<b>Total excluding missing</b>	1,727	98.5	464	99.6	2,191	98.7
<b>Missing</b>	26	1.5	2	0.43	28	1.3
<b>Total</b>	1,753	100.0	466	100.0	2,219	100.00

— Insufficient numbers

Table 62 shows the proportion of participants who indicated reasons for not having had an HIV test. Respondents were invited to indicate all reasons which applied to them. 73.8% of participants from Ottawa and 67.4% of participants from Toronto indicated that they had not taken an HIV test because they felt that they were at low risk for HIV. Among participants with no history of HIV testing, 1.6% of Ottawa and 3.1% of Toronto participants reported that the reason that they had not taken an HIV test was because they felt that they were HIV-positive. 41.0% of Ottawa and 33.1% of Toronto participants indicated that they had not gone for an HIV test because they felt that they were HIV-negative.

**Table 62: Reasons for not having an HIV test provided by participants reporting no history of HIV testing**

	<b>Toronto n=317 %</b>	<b>Ottawa n=101 %</b>	<b>Both sites n=418 %</b>
<b>At low risk</b>	67.4	73.8	71.3
<b>Think I am HIV negative</b>	33.1	41.0	35.6
<b>Always practice safer sex</b>	27.6	25.4	26.6
<b>Just haven't done it yet</b>	21.8	23.8	23.7
<b>Don't have sex with an infected person</b>	17.0	25.4	21.5
<b>Don't want to know</b>	13.2	6.6	12.4
<b>I am healthy</b>	14.4	12.3	12.2
<b>Could not deal with knowing I was infected</b>	11.8	9.8	11.2
<b>Could affect my relationships</b>	10.1	9.8	10.3
<b>Worried about being discriminated against</b>	10.8	6.6	9.3
<b>Never thought about it</b>	7.7	13.1	8.4
<b>Afraid of needle</b>	8.9	5.7	7.7
<b>Don't have a doctor</b>	6.2	9.0	7.2
<b>Afraid of name reported</b>	8.4	3.3	6.0
<b>Don't know where to get test</b>	5.3	9.0	5.7
<b>Could affect my career or insurance</b>	6.5	4.9	5.5
<b>Worried about the impact on sex life</b>	4.3	6.6	5.3
<b>If positive, nothing can be done</b>	3.8	3.3	4.1
<b>Don't know anyone who has HIV</b>	3.8	8.2	4.1
<b>Don't think I can get HIV</b>	5.8	4.9	3.6
<b>No health coverage</b>	3.1	2.5	3.1
<b>Think I am HIV-positive</b>	3.1	1.6	2.2
<b>Don't think test is always right</b>	2.2	1.6	1.4
<b>Don't believe that HIV causes AIDS</b>	1.0	0.0	0.5
<b>Doesn't matter if infected at my age</b>	1.4	0.0	0.0

Note: Among participants who checked at least one reason. Responses are not mutually exclusive. Participants could select more than one reason for not having taking an HIV test.

### 3.7 Prevalence of HIV, HCV and syphilis

1,104 participants provided a DBS for the purpose of HIV, HCV and syphilis testing 224 (20.5%) *Lambda* participants were HIV-positive. HIV prevalence was 11.8% (36 participants) in Ottawa and 23.8% (188 participants) in Toronto.

Seven (2.3%) participants from Ottawa and 38 (4.9%) participants from Toronto tested positive for HCV. The prevalence of syphilis was 10.5% in Toronto and 6.4% in Ottawa.

The overall prevalence of syphilis among *Lambda* participants was 9.4%. Among Ottawa participants who provided a DBS, 19 (6.9%) tested positive for syphilis. This was not different from Toronto, where 82 (10.5%) participants tested positive for syphilis.

Figure 16 shows that the prevalence of HIV was higher among participants who were had HCV or syphilis than among those who did not have HCV or syphilis. HIV prevalence was higher among participants who tested positive for HCV and syphilis antibodies than among those who were tested negative.

**Figure 16: HIV prevalence by HCV and syphilis status**

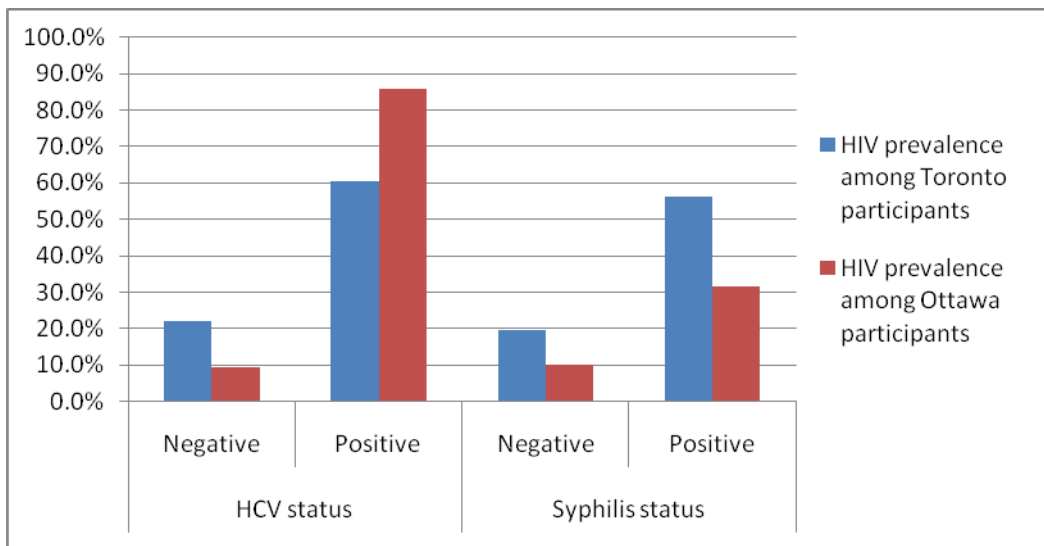


Table 63 shows the prevalence of HIV among participants recruited from each venue type. Among Toronto participants the prevalence was 42.1% among those recruited from associations, 26.2% among those recruited from bathhouses and 19.6% among those recruited from bars. The HIV prevalence among Ottawa participants recruited from associations was 16.1% and 16.5% among those recruited from bars.

**Table 63: HIV prevalence of participants by recruitment venue**

Venue where survey took place	Toronto		Ottawa		Both sites	
	n	Prev	n	Prev	n	Prev
Association	152	42.1	93	16.1	245	32.2
Fixed-site (Office)	12	33.3	—	N/A	13	30.8
Bathhouse	61	26.2	11	0.0	72	22.2
Bar	271	19.6	85	16.5	356	18.8
Other	8	25.0	12	8.3	20	15.0
Event	157	17.8	78	7.7	235	14.5
Coffee shop	—	N/A	—	N/A	7	14.3
Church	49	10.2	—	N/A	49	10.2
<b>Total excluding missing</b>	<b>712</b>	<b>90.0</b>	<b>285</b>	<b>93.8</b>	<b>997</b>	<b>91.1</b>
Venue missing	79	10.0	19	6.2	98	8.9
<b>Total</b>	<b>791</b>	<b>100.0</b>	<b>304</b>	<b>100.0</b>	<b>1,095</b>	<b>100.0</b>

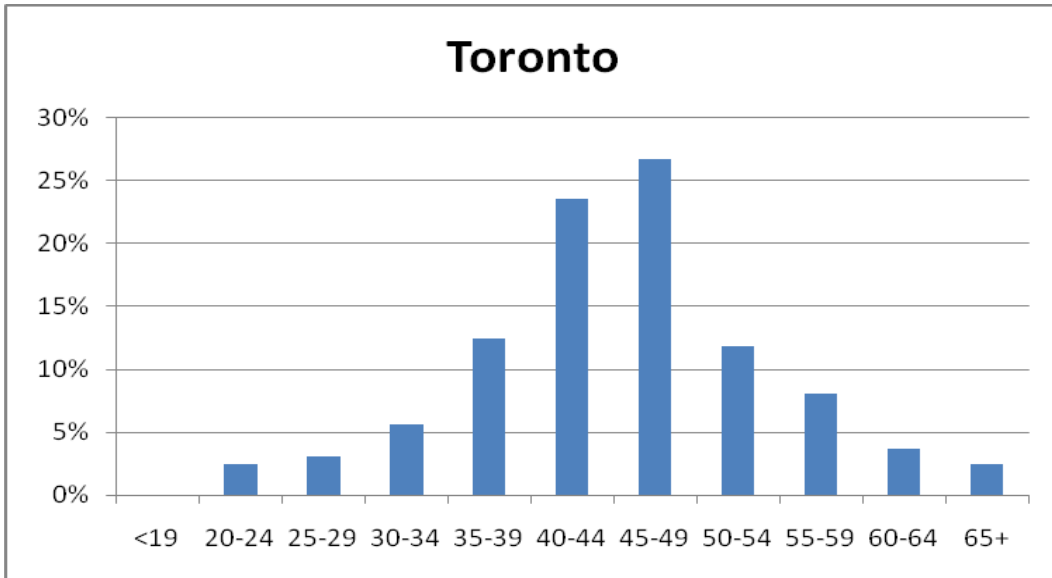
Note: n refers to the total number of people from each venue providing a DBS

### 3.7.1 HIV prevalence by demographic characteristics

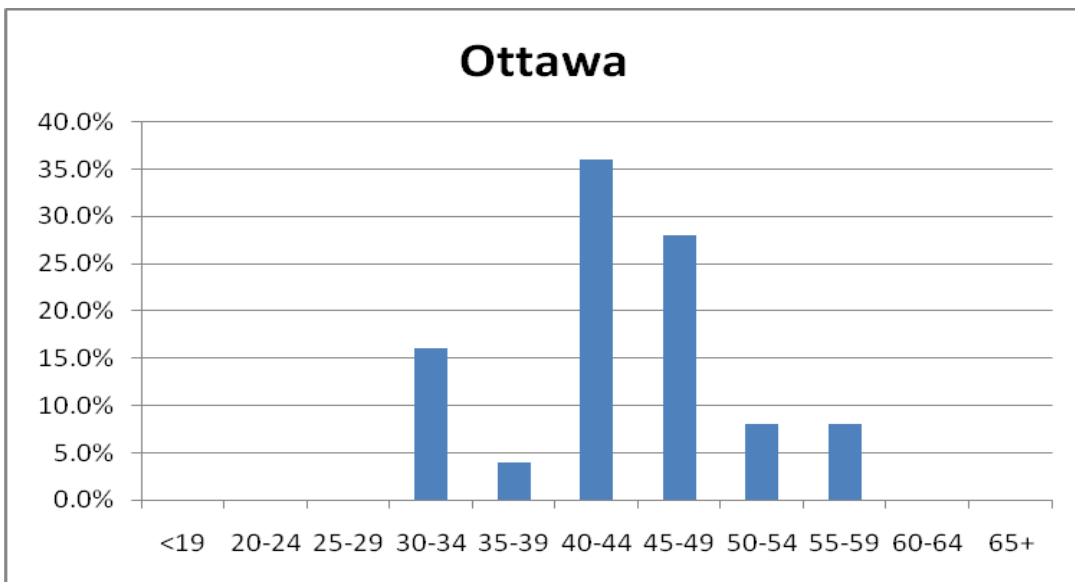
As shown in Figure 17a and Figure 17b, the observed prevalence varied by age. This was particularly evident in Toronto, where the prevalence increased from 13.2% 30-34 years old participants to 21.7% among those who were 35-39 years old, 27.3% among those who were 40-44 years old and reached a peak of 34.1% and 34.5% among those who were 45-59 years old and those who were 50-54 years old respectively. After this, declines in prevalence were observed in each successive age category reaching 18.2% among those who were 65 years of age or more at the time of the survey.

**Figure 17: HIV prevalence by age in years**

a.



b.



HIV prevalence among both Ottawa and Toronto participants appeared to decrease with increasing education (Table 64). In Toronto, HIV prevalence was 34.7% among participants who had completed elementary/primary school and 14.9% among participants who had completed graduate education.

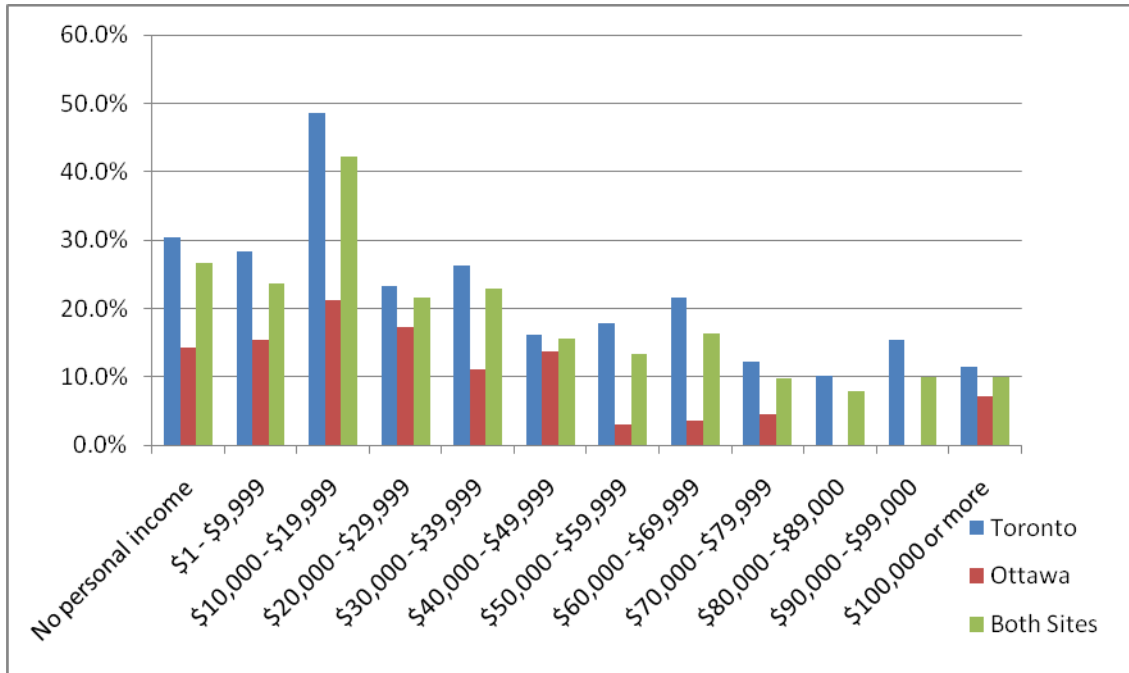
**Table 64: HIV prevalence among participants by educational status**

	Toronto		Ottawa		Both sites	
	n	Prev	n	Prev	n	Prev
<b>Elementary/primary school</b>	—	N/A	—	N/A	—	N/A
<b>Some secondary/high school</b>	49	34.7	14	28.6	63	33.3
<b>Completed secondary/high school</b>	70	38.6	25	20.0	95	33.7
<b>Some college or university</b>	174	26.4	63	7.9	237	21.5
<b>Completed college or university</b>	281	19.6	118	9.3	399	16.5
<b>Some graduate education</b>	47	23.4	17	17.6	64	21.9
<b>Completed graduate education</b>	101	14.9	48	4.2	149	11.4
<b>Total excluding missing</b>	724	91.5	285	93.8	1009	92.1
<b>Missing</b>	67	8.5	19	6.2	86	7.9
<b>Total</b>	791	100.0	304	100.0	1095	100.0

— Insufficient number

In Toronto, but not in Ottawa, the HIV prevalence decreased with increasing income ( $p < 0.0001$ ; see Figure 18). The prevalence of HIV was 48.6% among participants reporting an annual income between \$10,000-\$19,999. This decreased to 23.4% among those with an income \$20,000-\$29,999 and 26.4% among those with incomes from \$30,000- \$39,999. The prevalence was 16.3% among participants reporting an income between \$40,000- \$49,999, 17.8% among those with incomes from \$50,000-\$59,999, 21.5% among those who made \$70,000-\$79,000, 10.3% among those who made \$80,000-\$89,999, 15.4% among those who made \$90,000-\$99,999 and 11.5% among those who made \$100,000 or more.

**Figure 18: HIV prevalence among participants by income**



Among Toronto participants, HIV prevalence varied significantly by ethnicity ( $p = 0.04$ ). In Toronto, the HIV prevalence was highest among Aboriginal (39.2%) and Latin American (36.4%) participants (see Table 65). Among Ottawa participants, no significant difference in HIV status was observed between participants by ethnic origin.

**Table 65: HIV prevalence of participants by self-reported ethnicity**

	Toronto*		Ottawa		Both sites**	
	n	Prev	n	Prev	n	Prev
<b>Latin</b>	22	36.4%	—	N/A	24	33.3%
<b>Aboriginal</b>	51	39.2%	—	N/A	65	32.3%
<b>Arab/West Asian</b>	—	N/A	—	N/A	22	27.3%
<b>North American</b>	154	25.3%	88	11.4%	121	20.2%
<b>Europe</b>	374	22.7%	140	8.6%	514	18.9%
<b>Multi-ethnic</b>	—	N/A	—	N/A	16	18.8%
<b>Afro-Caribbean</b>	35	17.6%	—	N/A	40	16.7%
<b>South Asian/ Southeast Asian</b>	52	10.5%	—	N/A	64	11.5%
<b>Oceania</b>	—	N/A	—	N/A	—	N/A
<b>Mean</b>		21.7%		7.9%		18.6%
<b>Total excluding missing</b>	715	90.4	275	90.5	990	90.4
<b>Missing</b>	76	9.6	29	9.5	105	9.6
<b>Total</b>	791	100.0	304	100.0	1095	100.0

— Insufficient numbers

\*p<0.05, \*\*p<0.0001

HIV prevalence was higher ( $p<0.0005$ ) among men ( $n=891$ ) self-identifying as gay or homosexual (20.3%) than among men ( $n=84$ ) identifying as bisexual (13.1%) (data on HIV prevalence by sexual orientation is not shown). HIV prevalence among the 20 men who identified as being straight or heterosexual was 15.0%. 18 participants identified as being two-spirit and the HIV prevalence among these participants was 50%. Among gay/homosexual participants in Toronto, the observed prevalence was 23.9%. HIV prevalence was 17.5% among Toronto participants who identified as bisexual. The number of participants in Ottawa was small, making it difficult to interpret prevalence rates by sexual identity. The HIV prevalence among the 247 men who identified as gay or homosexual was 10.9%.

HIV prevalence among participants who reported using different venues to look for sex in the previous six months is given in Table 66. HIV prevalence was highest among men who reported that they met male sex partners at sex parties, on bicycle paths and in public restrooms. While the HIV prevalence was higher among participants using telephone chat lines in Toronto, the prevalence was lower among participants reporting the same venue in Ottawa.

In Toronto, HIV prevalence was higher than the overall prevalence observed (23.8%) among participants reporting that they looked for sex in the following places: straight bars at least once a month (55.6%); raves/circuit parties 2-3 times per week; saunas and bathhouses two-three times per month (42.6%) or at least once per week (37.0%); and, 33.8% among those who attended sex parties, with the highest prevalence (75.0%) among those who reported attending sex parties at least once per week.

**Table 66: HIV prevalence among participants by venues used to meet sexual partners in the previous six months**

	Toronto		Ottawa		Both sites	
	n	Prev	n	Prev	n	Prev
<b>Sex parties</b>	80	33.8	18	27.8	98	32.7
<b>Bicycle paths</b>	50	30.0	17	35.3	67	31.3
<b>Public Restrooms</b>	90	20.0	35	17.1	125	29.2
<b>Community organizations</b>	58	29.3	14	21.4	72	27.8
<b>After-hours clubs/parties</b>	77	29.9	34	20.6	111	27.0
<b>Telephone chat line</b>	54	31.5	17	5.9	71	25.4
<b>Saunas/baths</b>	332	27.7	84	13.1	416	24.8
<b>Parks</b>	108	25.9	34	14.7	142	23.2
<b>Gay associations</b>	88	27.3	29	10.3	117	23.1
<b>Rave/circuit parties</b>	73	26.0	19	10.5	92	22.8
<b>Gym/health club</b>	113	15.1	33	15.2	146	21.2
<b>Personal ads</b>	66	25.8	19	5.3	85	21.2
<b>Coffee shops</b>	73	24.7	32	12.5	105	21.0
<b>Community events for gay and lesbians</b>	88	25.0	38	10.5	126	20.6
<b>Straight bars</b>	84	26.2	44	9.1	128	20.3
<b>Gay bars</b>	348	22.7	135	10.4	483	19.3
<b>Internet*</b>	324	21.6	119	9.2	443	18.3
<b>Recreational groups</b>	61	23.0	27	7.4	88	18.2
<b>Total excluding missing</b>	734	92.8	284	93.4	1018	93.0
<b>Missing</b>	57	7.2	20	6.6	77	7.0
<b>Total</b>	791	100.0	304	100.0	1095	100.0

\*Chat rooms, etc

### 3.8 HIV incidence

Among Toronto participants the incidence rate was 5.1 (95%CI: 2.3-7.9) per 100 person-years. The incidence rate was 3.5 (95%CI: 1.8-5.3) per 100 person-years among Ottawa participants.

### 3.9 Exploratory analysis of correlates of HIV infection

Table 67 shows HIV prevalence among *Lambda* participants who reported unprotected anal sex. Among Toronto participants the prevalence was higher among men reporting unprotected anal sex with an HIV-negative partner, partner of unknown status or an HIV-positive partner than among men reporting no unprotected anal sex with these partners. In Ottawa, HIV prevalence was higher only among men reporting unprotected anal sex with HIV-positive partners.

**Table 67: HIV prevalence among participants reporting unprotected anal sex with at least one partner in the previous six months by partner's HIV status**

	Toronto		Ottawa		Both sites	
	n	Prev	n	Prev	n	Prev
<b>HIV-negative -partner</b>	169	16.6*	61	6.6	230	13.9*
<b>Partner's HIV status unknown</b>	127	43.3	39	12.8	166	36.1*
<b>HIV-positive partner</b>	91	71.4*	17	58.8*	108	69.4*
<b>Total excluding missing</b>	271	93.8	103	94.5	374	94.0
<b>Missing</b>	18	6.2	6	5.5	24	6.0
<b>Total</b>	289	100.0	109	100.0	398	100.0

\*p<0.0001

Table 68 presents the HIV prevalence among *Lambda* participants by the number of casual partners reported in the previous six months. HIV prevalence varied by the number of casual partners reported in Ottawa (p<0.01); however, in Toronto the distribution did not vary by the number of casual partners reported. Among Toronto participants, there may be a threshold whereby HIV prevalence increases among men with at least 10 casual partners in the previous six months compared to those with fewer than 10 partners.

**Table 68: HIV prevalence among participants by number of casual partners in the previous six months**

	Toronto		Ottawa*		Both sites*	
	n	Prev	n	Prev	n	Prev
<b>None</b>	126	14.3	70	7.1	196	11.7
<b>Only one</b>	62	22.6	34	2.9	96	15.6
<b>Two to five</b>	183	22.4	69	7.2	252	18.3
<b>Six to nine</b>	68	22.1	23	8.7	91	18.7
<b>10-29</b>	102	31.4	36	22.2	138	29.0
<b>≥ 30</b>	65	30.8	—	N/A	72	27.8
<b>Casual partner(s) reported, number unknown</b>	—	N/A	—	N/A	—	N/A
<b>Mean</b>		22.5		16.4		21.6
<b>Total excluding</b>	613	97.9	242	96.4	855	97.5
<b>Missing</b>	13	2.1	9	3.6	22	2.5
<b>Total</b>	626	100.0	251	100.0	877	100.0

\*p<0.01

The distribution of prevalence by frequency of condom use varied by *Lambda* site. HIV prevalence among *Lambda* participants by the frequency of condom use with casual male partners is presented in Table 69 and Table 70. HIV prevalence was highest among Toronto participants who reported less frequent condom use (never, rarely or sometimes) during both insertive and receptive anal intercourse. The HIV prevalence is much lower among men who report using condoms most of the time or almost every time during insertive sex with casual partners. For receptive anal sex with casual partners the decrease in HIV prevalence is observed only among men who report condom use all of the time. The highest prevalence observed among Ottawa participants was among those who reported that they sometimes use condoms during insertive anal sex and among those who reported that they use condoms sometimes or most of the time; however the absolute number of participants from Ottawa was small.

**Table 69: HIV prevalence of participants by frequency of condom use during insertive anal sex with casual male partners in the previous six months**

	Toronto**		Ottawa*		Both Sites**	
	n	Prev	n	Prev	n	Prev
Never	28	67.9	13	7.7	41	48.8
Rarely	29	55.2	8	12.5	37	45.9
Sometimes	30	73.3	—	N/A	35	68.6
Most of the time	25	16.0	10	20.0	35	17.1
Almost every time	46	21.7	12	0.0	58	17.2
All the time	115	7.8	42	4.8	157	7.0
Total excluding missing	273	96.1	82	98.8	363	96.8
Missing	11	3.9	1	1.2	12	3.2
<b>Total</b>	284	100.0	83	100.0	375	100.0

— Insufficient numbers

\*p<0.01, \*\*p<0.0001

**Table 70: HIV prevalence of participants by frequency of condom use during receptive anal sex with casual male partners in the previous six months**

	Toronto*		Ottawa		Both Sites*	
	n	Prev	n	Prev	n	Prev
Never	25	56.0	8	0.0	33	42.4
Rarely	20	65.0	6	0.0	26	50.0
Sometimes	34	67.6	6	50.0	40	65.0
Most of the time	16	43.8	6	50.0	22	45.5
Almost every time	31	22.6	11	9.1	42	19.0
All the time	97	9.3	53	9.4	150	9.3
Total excluding missing	223	97.0	90	95.7	313	96.6
Missing	7	3.0	4	4.3	11	3.4
<b>Total</b>	230	100.0	94	100.0	324	100.0

\*p<0.0001

HIV prevalence among *Lambda* participants who reported having protected anal intercourse with casual partners who were HIV negative, of unknown HIV status and HIV positive is shown in Table 71. The HIV prevalence among Toronto participants reporting protected casual partnerships with partners who were HIV-positive or of unknown positivity was 35.3%. Among Ottawa participants reporting protected anal sex encounters with partners who were HIV-positive or of unknown positivity the HIV prevalence was 18.1%.

**Table 71: HIV prevalence among men reporting protected anal sex with HIV-negative casual partners, casual partners of unknown HIV and HIV-positive casual partners in the previous six months**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>HIV-negative partner</b>	157	25.5	41	12.2	198	22.7
<b>Partner's HIV status unknown</b>	198	27.8	72	15.3	270	24.4
<b>HIV-positive partner</b>	88	52.3**	16	31.3~	104	49.0*
<b>Total excluding missing</b>	288	94.1	98	92.5	386	93.7
<b>Missing</b>	18	5.9	8	7.5	26	6.3
<b>Total</b>	306	100.0	106	100.0	412	100.0

\*p<0.01, \*\*p<0.0001, ~p=0.055

Table 72 presents HIV prevalence among participants who reported unprotected anal sex with partners who were HIV-negative, of unknown HIV status or were HIV-positive. The HIV prevalence among participants reporting unprotected anal sex with partners who were HIV positive or of unknown HIV status was 56.4% in Toronto and 23.4% in Ottawa. Thus, 43.6% of Toronto participants and 76.6% of Ottawa participants reporting this behaviour were HIV-negative.

**Table 72: HIV prevalence among participants reporting unprotected anal sex with HIV-negative casual partners, casual partners of unknown HIV status and HIV-positive casual partners in the previous six months**

	Toronto		Ottawa		Both sites	
	n	%	n	%	n	%
<b>HIV-negative partner</b>	17	37.7	74	17.6	91	35.2
<b>Partner's HIV status unknown</b>	35	47.1	121	14.3	156	39.7
<b>HIV-positive partner</b>	12	69.9*	83	50.0**	95	67.4*
<b>Total excluding missing</b>	50	96.2	171	94.0	223	95.3
<b>Missing</b>	2	3.8	11	6.0	11	4.7
<b>Total</b>	52	100.0	182	100.0	234	100.0

\*p<0.0001, \*\*p<0.001

Among participants providing a DBS, the proportion who reported having a regular, HIV-positive partner was 21.3% in Toronto and 12.4% in Ottawa (The proportion among all participants was 17.5% and 16.7% in Toronto and Ottawa, respectively). Table 73 provides HIV prevalence among *Lambda* participants by the number of regular male sex partners in the previous six months. HIV prevalence appeared to increase among men who had six or more regular male sex partners in the previous six months.

**Table 73: HIV prevalence among participants by number of regular male sex partners in the previous six months**

Number of regular male sex partners	Toronto		Ottawa*		Both sites *	
	n	%	n	%	n	%
<b>None</b>	104	26.9	33	12.1	137	23.4
<b>Only one</b>	269	20.1	128	7.0	397	15.9
<b>2 to 5</b>	173	20.2	62	8.1	235	17.0
<b>6 or more</b>	53	35.8	14	35.7	67	35.8
<b>Regular partner(s) reported, number unknown</b>	16	18.8	—	N/A	20	25.0
<b>Total excluding missing</b>	615	98.2	241	96.0	856	97.6
<b>Missing</b>	11	1.8	10	4.0	21	2.4
<b>Total</b>	626	100.0	251	100.0	877	100.0

— Insufficient numbers

p<0.01

HIV prevalence by frequency of condom use with regular partners known to be HIV-positive is shown in Table 74 and Table 75. Differences in HIV prevalence by frequency of condom use during insertive anal sex were not observed among Toronto participants. However, differences were observed by frequency of condom use during receptive anal sex among Toronto participants. Prevalence varied by frequency of use during both insertive and receptive anal sex among Ottawa participants; however interpretation is difficult due to small sample cell sizes. For both sites, there appeared to be a threshold for frequency of condom use during both insertive and receptive anal sex with HIV-positive partners where HIV-prevalence was lower among men reporting condom use almost every time and all of the time.

**Table 74: HIV prevalence by frequency of condom use during insertive anal sex with regular HIV-positive partners in the previous six months**

	Toronto		Ottawa*		Both Sites**	
	n	Prev	n	Prev	n	Prev
<b>Never</b>	29	62.1	10	70.0	39	64.1
<b>Rarely</b>	11	90.9	—	N/A	13	84.6
<b>Sometimes</b>	9	100.0	—	N/A	9	100.0
<b>Most of the time</b>	—	N/A	—	N/A	6	66.7
<b>Almost every time</b>	—	N/A	—	N/A	—	N/A
<b>All the time</b>	19	26.3	8	12.5	27	22.2
<b>Total excluding missing</b>	73	97.3	24	96.0	97	97.0
<b>Missing</b>	2	2.7	1	4	3	3.0
<b>Total</b>	75	100.0	25	100.0	100	100.0

— Insufficient numbers

\*p<0.05, \*\*p<0.0001

**Table 75: HIV prevalence by frequency of condom use during receptive anal sex with regular HIV-positive partners in the previous six months**

	Toronto**		Ottawa*		Both Sites*	
	n	Prev	n	Prev	n	Prev
<b>Never</b>	26	73.1	8	75.0	34	73.5
<b>Rarely</b>	8	87.5	—	N/A	8	87.5
<b>Sometimes</b>	9	88.9	—	N/A	9	88.9
<b>Most of the time</b>	—	N/A	—	N/A	7	85.7
<b>Almost every time</b>	—	N/A	—	N/A	—	N/A
<b>All the time</b>	17	47.1	6	16.7	23	39.1
<b>Total excluding missing</b>	67	95.7	16	100.0	83	96.5
<b>Missing</b>	3	4.3	0	0.0	3	3.5
<b>Total</b>	70	100.0	16	100.0	86	100.0

— Insufficient numbers

\*p<0.05, \*\*p<0.01

37.8% of Toronto participants and 34.5% of Ottawa participants providing DBS also reported regular partnerships with men whose status they did not know (38.7% and 34% of all Toronto and Ottawa survey participants, respectively). Table 76 and Table 77 indicate HIV prevalence by reported frequency of condom use with regular partners whose HIV status is unknown. Although the number of participants was small, the highest observed prevalence in Toronto and Ottawa was among participants reporting inconsistent condom use, with the HIV prevalence being lower among participants reporting condom use almost every time and lowest among participants reporting that they used condoms all the time with regular partners of unknown HIV status.

**Table 76: HIV prevalence by frequency of condom use during insertive anal sex with regular partners of unknown HIV status in the previous six months**

	Toronto*		Ottawa		Both Sites*	
	n	Prev	n	Prev	n	Prev
Never	19	31.6	—	N/A	23	30.4
Rarely	11	81.8	—	N/A	14	64.3
Sometimes	15	46.7	—	N/A	16	50.0
Most of the time	15	53.3	—	N/A	20	50.0
Almost every time	13	30.8	—	N/A	15	26.7
All the time	45	8.9	25	12.0	70	10.0
Total excluding missing	118	93.7	40	100.0	158	95.2
Missing	8	6.3	0	0.0	8	40.8
<b>Total</b>	126	100.0	40	100.0	166	100.00

— Insufficient numbers

\*p<0.0001

**Table 77: HIV prevalence by frequency of condom use during receptive anal sex with regular partners of unknown HIV status in the previous six months**

	Toronto**		Ottawa*		Both Sites**	
	n	Prev	n	Prev	n	Prev
Never	10	40.0	7	28.6	17	35.3
Rarely	17	70.6	—	N/A	19	68.4
Sometimes	11	54.5	—	N/A	14	57.1
Most of the time	9	88.9	—	N/A	13	76.9
Almost every time	12	25.0	—	N/A	16	25.0
All the time	41	12.2	22	4.5	63	9.5
Total excluding missing	100	96.2	42	97.7	142	96.6
Missing	4	3.8	1	2.3	5	3.4
<b>Total</b>	104	100.0	43	100.0	147	100.0

— Insufficient numbers

\*p<0.06, \*\*p<0.0001

Table 78 and Table 79 show HIV prevalence by the reported frequency of condom use during anal intercourse with regular partners known to be HIV negative. Again, the highest HIV prevalence was observed among men reporting inconsistent condom use, with an apparent threshold at condom use almost every time. With respect to condom use during insertive anal intercourse, HIV prevalence is similar among men reporting condom use almost every time and all of the time with regular partners known to be HIV-negative regular. However, looking at condom use during receptive anal intercourse the lowest prevalence is observed among men reporting condom use all of the time.

**Table 78: HIV prevalence by frequency of condom use during insertive anal sex with regular HIV-negative partners in the previous six months**

	Toronto*		Ottawa		Both Sites*	
	n	Prev	n	Prev	n	Prev
Never	57	3.5	27	7.4	84	4.8
Rarely	16	31.3	—	N/A	21	23.8
Sometimes	17	23.5	—	N/A	20	20.0
Most of the time	14	42.9	6	33.3	20	40.0
Almost every time	23	17.4	6	0.0	29	13.8
All the time	78	17.9	32	3.1	110	13.6
Total excluding missing	205	91.9	79	96.3	284	93.1
Missing	18	8.1	3	3.7	21	6.9
Total	223	100.0	82	100.0	305	100.0

— Insufficient numbers

\*p<0.01

**Table 79: HIV prevalence by frequency of condom use during receptive anal sex with regular HIV-negative partners in the previous six months**

	Toronto*		Ottawa		Both Sites*	
	n	Prev	n	Prev	n	Prev
Never	63	12.7	26	11.5	89	12.4
Rarely	18	27.8	—	N/A	22	22.7
Sometimes	16	31.3	8	0.0	24	20.8
Most of the time	16	37.5	5	60.0	21	42.9
Almost every time	12	33.3	7	14.3	19	26.3
All the time	73	20.5	37	5.4	110	15.5
Total excluding missing	198	93.0	87	95.6	285	93.8
Missing	15	7.0	4	4.4	19	6.3
Total	213	100.0	91	100.0	304	100.0

— Insufficient numbers

\*p<0.05

HIV prevalence among participants reporting a history of injection drug use is shown in Table 80. HIV prevalence was higher among both Toronto and Ottawa participants with a history of injection drug use, with the exception of Toronto participants reporting a history of injecting heroin. There appeared to be a threshold in HIV prevalence between participants with a history of injection drug use compared to those who had never injected drugs with an approximately three-fold increase in prevalence among ever versus never. There was little difference between those reporting recent (in the last six months) versus non-recent injection of drugs.

**Table 80: HIV prevalence among participants reporting injection drug use in the previous six months**

	Toronto		Ottawa		Both Sites	
	n	%	n	%	n	%
<b>Ever injected any drug</b>						
Never	627	18.7	260	7.3	887	15.3
Yes, but not in past 6 months	69	52.2	14	50.0	83	51.8
Yes, in past 6 months	43	51.2	10	40.0	53	49.1
<b>Ever injected any drug (excluding steroids)</b>						
Never	663	20.4	266	8.3	929	16.9
Yes, but not in past 6 months	54	51.9	9	44.4	63	50.8
Yes, in past 6 months	22	54.5	9	44.4	31	51.6
<b>Injected crystal methamphetamine</b>						
Never	709	22.0	277	9.4	986	18.5
Yes, but not in past 6 months	21	52.4	6	50.0	27	51.9
Yes, in past 6 months	9	88.9	—	N/A	10	90.0
<b>Injected steroids</b>						
Never	692	22.0	275	8.7	967	18.2
Yes, but not in past 6 months	23	47.8	7	71.4	30	53.3
Yes, in past 6 months	24	50.0	—	N/A	26	50.0
<b>Injected cocaine</b>						
Never	679	21.4	269	8.2	948	17.6
Yes, but not in past 6 months	45	51.1	8	50.0	53	50.9
Yes, in past 6 months	15	46.7	7	57.1	22	50.0
<b>Injected heroin</b>						
Never	712	23.3	280	9.3	992	19.4
Yes, but not in past 6 months	23	39.1	4	100.0	27	48.1
Yes, in past 6 months	—	N/A	—	N/A	—	N/A
<b>Injected other drugs</b>						
Never	725	23.3	282	10.6	1007	19.8
Yes, but not in past 6 months	12	41.7	—	N/A	12	41.7
Yes, in past 6 months	—	N/A	—	N/A	—	N/A

p<0.001 for all but heroin injection among Toronto participants.

Note: Categories are not mutually exclusive. Participants could report injection of more than one drug.

HIV prevalence was also higher among participants reporting use of recreational drugs in the two hours prior to sex than that observed among those reporting no history of recreational drug use prior to sex (Table 81). Recreational drug use in the two hours prior to sex was higher among Toronto participants (58.8% in Toronto) than Ottawa participants (53.5%). Table 82 provides HIV prevalence by frequency of use of specific recreational drugs.

**Table 81: HIV prevalence by frequency of recreational drug use, excluding alcohol, in the two hours prior to sex in the previous six months**

	Toronto*		Ottawa*		Both sites*	
	n	%	n	%	n	%
Never	211	9.5	112	2.7	323	7.1
Less than half the time	188	21.3	79	11.4	267	18.4
More than half the time	224	37.5	61	26.2	285	35.1
Total excluding missing	623	91.5	252	92.3	875	91.7
Missing	58	8.5	21	7.7	79	8.3
Total	681	100.0	273	100.0	954	100.0

\*p<0.0001

**Table 82: HIV prevalence among participants by frequency of drug use in the two hours prior to sex in the previous six months**

		Toronto	Ottawa	Both sites
<b>Marijuana/hash/pot/grass</b>	<b>Never</b>	16.8	8.1	14.2
	<b>Less than half the time</b>	30	9.1	24.1
	<b>More than half the time</b>	36.4	27.8	34.3
<b>Poppers</b>	<b>Never</b>	15.7	7.3	13.1
	<b>Less than half the time</b>	34.7	16.7	29.7
	<b>More than half the time</b>	37.5	26.9	35.4
<b>Special K/Ketamine</b>	<b>Never</b>	19.6	9.4	16.6
	<b>Less than half the time</b>	53.3	26.7	46.7
	<b>More than half the time</b>	50	66.7	52.0
<b>Ecstasy/MDMA</b>	<b>Never</b>	20.3	10	17.2
	<b>Less than half the time</b>	32.9	15.4	28.7
	<b>More than half the time</b>	52.2	28.6	46.7

**Table 82, continued**

		<b>Toronto</b>	<b>Ottawa</b>	<b>Both sites</b>
<b>Crystal Meth</b>	<b>Never</b>	19.5	9.1	16.4
	<b>Less than half the time</b>	43.2	50	44.2
	<b>More than half the time</b>	76.2	100	78.3
<b>Other amphetamines/stimulants</b>	<b>Never</b>	21.6	10.2	18.4
	<b>Less than half the time</b>	43.3	23.1	37.2
	<b>More than half the time</b>	66.7	25	50.0
<b>Viagra, Levitra, Cialis, or other erectile drugs</b>	<b>Never</b>	17.3	9.8	15.0
	<b>Less than half the time</b>	39.3	11.4	31.5
	<b>More than half the time</b>	45.8	30.8	43.1
<b>Cocaine/crack/free base</b>	<b>Never</b>	19.9	8.8	16.5
	<b>Less than half the time</b>	35	27.8	33.7
	<b>More than half the time</b>	52	37.5	48.5
<b>Heroin (smack)</b>	<b>Never</b>	23.1	10	19.3
	<b>Less than half the time</b>	14.3	100	33.3
	<b>More than half the time</b>	100	100	100.0
<b>Other opioids (percocet, dilaudid, oxycontin)</b>	<b>Never</b>	22.5	10.6	19.0
	<b>Less than half the time</b>	31.6	33.3	32.0
	<b>More than half the time</b>	75	-	75.0
<b>GHB</b>	<b>Never</b>	20.7	10	17.5
	<b>Less than half the time</b>	46.2	40	44.9
	<b>More than half the time</b>	61.5	-	53.3
<b>Psychedelics (LSD, acid, mescaline, mushrooms)</b>	<b>Never</b>	22.1	10.5	18.7
	<b>Less than half the time</b>	45.8	40	44.8
	<b>More than half the time</b>	33.3	-	33.3
<b>Tranquilizers or benzos</b>	<b>Never</b>	22.4	11	19.1
	<b>Less than half the time</b>	38.5	20	33.3
	<b>More than half the time</b>	66.7	-	50.0
<b>Any drugs excluding alcohol</b>	<b>Never</b>	9.5	2.7	7.1
	<b>Less than half the time</b>	21.3	11.4	18.4
	<b>More than half the time</b>	37.5	26.2	35.1

Note: Categories are not mutually exclusive. Participants could check each applicable drug

### 3.10 Multivariate analysis of variables associated with HIV infection

In multivariate analysis of incident HIV infection, the odds of HIV infection was higher among participants who identified as homosexual than bisexual participants (OR= 5.7, 95% CI: 1.0-31.1), were injection drug users (OR= 10.7, 95% CI= 4.7-24.4), had UAI with casual partners (OR= 2.9, 95% CI= 1.1-7.2), had UAI with HIV-positive regular partners or regular partners of unknown HIV status (OR= 4.7, 95% CI= 1.8-11.7). Although there was not a significant increase in the odds of infection in participants 30—49 years of age compared to participants less than 30 years of age (2.9; p=0.09) there is a suggestion of increased odds of infection with increasing age group. The odds of infection among participants 50 years of age and older were 3.6 times higher (p=0.05) than participants less than 30 years of age. Site, unprotected oral sex and delayed condom application were controlled for in the multivariate analysis (Table 83).

**Table 83: Association of selected variables with HIV infection among participants**

	Odds ratio	95% Confidence Limits	
	Point Estimate	Lower Limit	Upper Limit
<b>Site</b>			
Ottawa (referent)	1.0	—	—
Toronto	1.6	0.67	3.8
<b>Age</b>			
< 30 years of age (referent)	1.0	—	—
30—49 years of age	2.8	0.85	8.9
50 years of age and older	3.6*	1.0	12.9
<b>Sexual orientation</b>			
Bisexual (referent)	1.0	—	—
Homosexual	5.7†	1.0	31.1
<b>History of injection drug use</b>			
No (referent)	1.0	—	—
Yes	10.7†††	4.7	24.4
<b>Unprotected anal sex with casual partners</b>			
No (referent)	1.0	—	—
Yes	2.9†	1.1	7.2
<b>Unprotected anal sex with HIV-positive regular partners or regular partners of unknown HIV status</b>			
No (referent)	1.0	—	—
Yes	4.7††	1.8	11.7
<b>Unprotected oral sex</b>			
No (referent)	1.0	—	—
Yes	0.57	0.23	1.4
<b>Delayed condom application</b>			
No (referent)	1.0	—	—
Yes	1.3	0.46	4.0

\*p=0.05, † p<0.05, †† p<0.01, ††† p<0.0001

### 3.11 Transgendered participants

Twenty-two transmen (four from Ottawa and eighteen from Toronto) completed the *Lambda* survey. Their data were not included in the overall analysis as reported above because they represent a distinct group. Therefore, their data was analysed separately. Table 84 presents the demographic characteristics of these participants. The mean age of transmen was 31.8 with the youngest being 16 years of age and the oldest 48 years of age.

Of the 21 participants with appropriate data, 17 (81%) had had a previous HIV test. None of the 17 transmen reported themselves be HIV-positive. Further, none of 14 participants tested within the study were found to be HIV-positive. Four (20%) of 20 transmen reported having injected with drugs other than steroids. Four (33%) of 12 transmen with available data reported having had unprotected receptive anal sex with a casual partner or a regular partner who was HIV-positive or of unknown status within the previous six months.

**Table 84: Demographic characteristics of transgendered participants**

Variables		N	%
<b>Total</b>		22	
<b>Education</b>	<b>Completed high school or less</b>	4	21.1%
	<b>Some college/university or above</b>	15	78.9%
<b>Personal income</b>	<b>Less than \$40,000</b>	13	65.0%
	<b>\$40,000 or more</b>	7	35.0%
<b>Ethnicity</b>	<b>Europe/North American</b>	17	85.0%
	<b>African/Caribbean</b>	1	5.0%
	<b>South/Southeast Asian</b>	1	5.0%
	<b>Mixed/Oceania/Arab/West</b>	1	5.0%
<b>Ever injected any drug excluding steroids</b>	<b>Yes</b>	4	20.0%
	<b>No</b>	16	80.0%

## 4 Discussion

The findings from the *Lambda* (2007) survey provide updated information on the social and sexual behaviours of MSM in Ontario and contribute to the national picture compiled by the M-Track second generation surveillance system. The methods used build on previous studies in Ontario such as the Ontario Men's Survey (OMS) and employ similar methodology to those used at other M-Track sites in Canada. With repeated M-Track surveys planned for every two to three years, this baseline information will be useful to compare trends over time within Ontario and in other Canadian epi-centers to inform programming and policy development.

2,438 participants took part in the *Lambda* survey and 45.3% (1,104 participants) provided a DBS. The average age of participants was approximately 40 years. Most participants were born in Canada and spoke English as their first language. The majority completed at least some college or university and the median income reported was approximately \$45,000 per year. More than 80% of participants reported sex with a male partner and almost three-quarters reported at least one male casual partner in the previous six months. HIV prevalence was 11.3% in Ottawa and 23.8% in Toronto. Casual partners were reported by more than 70% of HIV-seronegative participants and, among these, 56.6% from Toronto and 42.2% from Ottawa reported at least one episode of unprotected sex with a casual partner.

### 4.1 Summary of key findings

As noted, HIV prevalence among *Lambda* (M-Track Ontario) participants was 23.8% in Toronto and 11.3% in Ottawa. ARGUS (M-Track Montreal) found HIV prevalence to be 12.5% among Montreal participants in 2005 [17]. The HIV prevalence among M-Track Victoria (2007) participants was 13.2% [18]. Thus, the HIV prevalence observed among Ottawa (11.3%), Montreal and Victoria participants was similar, while that observed among Toronto (23.8%) participants was almost twice that of the other sites. *Lambda* (both sites) had a slightly older population, with more participants in the 40-49 year old category than did ARGUS [17]. However, the average age of participants recruited in Ottawa, Toronto and Victoria was similar [18].

In Ottawa, the prevalence of syphilis was 6.4% and the prevalence of HCV was 2.3%. In Toronto, the prevalence of syphilis and HCV were 10.5% and 4.9%, respectively. The laboratory testing methods used for syphilis and HCV cannot discriminate between acute, chronic or resolved cases. Therefore, a positive test result may indicate either past or present infection. The prevalence of syphilis and HCV were 5.1% and 5.4% among ARGUS participants, respectively [17]. M-Track Victoria found the prevalence of syphilis to be 3.1% and the prevalence of HCV to be 2.7% [18]. In Toronto and Ottawa the prevalence of syphilis was approximately twice that of HCV; however in Montreal and Victoria syphilis and HCV prevalence were similar.

Despite recent syphilis epidemics among MSM in Toronto more than one third of participants had never tested for syphilis (33.5% of Toronto participants and 36.7% of Ottawa participants). This is of concern for many reasons, including the ease with which syphilis can be treated and cured.

The OMS, conducted in 2002, was the first major study among MSM in Ontario to determine HIV prevalence using biologic specimens. The OMS found HIV prevalence among MSM in Ontario who provided biologic samples to be 9.4%, with the prevalence in Toronto 12.7% and the prevalence in Ottawa 4.9% [11]. HIV prevalence is still higher in Toronto than in Ottawa; however, both sites appear to experience an approximately three-fold increase in HIV prevalence between the 2002 OMS survey and the 2007 *Lambda* survey. Increases in the prevalence of HIV among MSM in Toronto and Ottawa between these surveys may be artefactual and attributed to other factors, such as an older population in *Lambda* [11]. Although older, *Lambda* participants were also more educated and reported higher incomes than did OMS participants, which would be expected to bias the prevalence downward [11]. With respect to recruitment, OMS recruited a higher proportion of participants from bars than did *Lambda*, however, the proportion of participants recruited from bathhouses was similar between the studies [11]. Further, OMS recruited participants from only three venue types (bars, bathhouses and community groups), while *Lambda* recruited from eight different types. This may have contributed to an apparent higher level of recruitment from bars in OMS relative to *Lambda*. The increase in HIV prevalence between OMS and *Lambda* appear, in fact, to be real. Increases in HIV prevalence are consistent with those observed and modelled in the *Report on HIV/AIDS in Ontario 2007* [19]. Although part of the increase can be explained by improved survival among HIV-positive individuals some of the observed increase in prevalence can be attributed to sustained and/or increasing incidence [12, 19].

Based on a detuned assay the observed incidence rate among *Lambda* participants was 5.1 (95%CI: 2.3—7.9) per 100 person-years in Toronto and 2.6 (95%CI:1.8—5.3) per 100 person years in Ottawa. These rates are higher than HIV incidence estimates, also based on detuned assays from the *2007 Report on HIV in Ontario*. This report found the adjusted HIV incidence among MSM in Toronto and Ottawa from 2001-2007 to be 1.33 and 1.36 per 100 person-years, respectively [19]. Incidence rates modelled for the urban centres of Toronto and Ottawa were higher than the HIV incidence rates modelled for the rest of Ontario (0.56 per 100 person-years respectively) [19]. HIV incidence among Ontario MSM-IDU was highest in Ottawa (2.28 per 100 person-years) [19] with HIV incidence among MSM-IDU in Toronto being 1.28 per 100 person-years [19].

The modelled incidence estimates from the *Report on HIV/AIDS in Ontario 2007* coincide with modest annual decreases in incidence among MSM in Toronto (11.5%) and Ottawa (10.5%) [19]; however, HIV incidence among repeat testers indicates an increase in HIV incidence among Ontarian MSM from 0.68 per 100 person-years in 1996 to 1.41 per 100 person-years in 2006 [20]. Increased incidence is consistent with findings from Australia, where both modelling and surveillance show increases in incidence among MSM [21-23]. A recent meta-analysis of HIV incidence among urban MSM in North America, Western Europe, Australia and New Zealand found the mean HIV incidence among MSM in the US to be 2.4% and that HIV incidence had remained stable between 1995-2005 [24].

The proportion of men who engage in unprotected anal intercourse (UAI) remains high in Toronto and Ottawa and is higher than what has been observed in similar surveys conducted in other geographic locations. Among *Lambda* participants reporting sex with a male partner in the previous six months, the proportion who reported at least one

episode of UAI was 56.5% in Toronto and 60.3% in Ottawa. At 33.6%, the proportion of ARGUS participants reporting unprotected anal sex was 40%, less than that observed among *Lambda* participants [17]. In 2006, the proportion of Australian men who engaged in any unprotected anal sex (unprotected anal sex and/or delayed condom application) ranged from 45.4% to 65.3% depending on region [8]. The majority of regions in this study reported the prevalence of UAI to be approximately 45% [8]. Further, the Australian study used a broader definition of UAI suggesting that UAI may be higher in Toronto and Ottawa. The 2006 *Sigma* survey in the UK found that 57.4% of participants had at least one episode of unprotected anal intercourse, which is similar to that observed in *Lambda*[5]; however, in the *Sigma* survey participants were asked about sexual behaviour in the previous year [5] while *Lambda* participants were asked about sexual behaviours in the previous six months.

More than 30% of participants who reported casual sex reported unprotected anal intercourse with their casual male partner(s). This was less than the proportion of M-Track Victoria participants (40%) reporting the same [18]. Similarly, among HIV-seronegative *Lambda* participants approximately 30% reported unprotected anal sex with casual partners. 18.6% of HIV-seronegative Toronto participants and 20.1% of HIV-seronegative Ottawa participants reported unprotected anal intercourse with a casual partner of unknown HIV status highlighting the presence of sub-set of MSM who are at increased risk of HIV acquisition.

In addition to UAI, *Lambda* participants were asked about the practice of delayed condom application, another high risk behaviour. 47.1% of participants who had sex in the previous six months reported at least one episode of delayed condom application during receptive anal sex and 32.0% reported delayed condom application on more than one occasion during the same time period. Calzavara, *et al.* found the adjusted odds of HIV infection were 5.8 (95%CI: 1.4-24) times higher among men reporting delayed condom application during receptive anal sex than that observed among men not reporting this behaviour (unprotected anal intercourse was accounted for through the adjustment) [1]. Socio-demographic variables traditionally associated with more risky sexual behaviours have not been associated with delayed condom application during insertive or receptive anal sex [25-26]. The high prevalence of delayed condom application and the odds of infection associated with it indicate that it may contribute to the epidemic in this population. There is need to better understand contributing factors and the context in which delayed condom application takes place. Prevention initiatives targeting delayed condom application are needed and should emphasize that delayed condom application should not be considered a harm reduction strategy.

As a result of the high prevalence of unprotected anal sex and delayed condom application, the proportion of men reporting large numbers of sex partners is of concern. 30.1% of Toronto participants and 23.4% of Ottawa participants report more than five male sex partners in the previous six months. While approximately one-quarter of participants reported no casual partners in the previous six months, 35.3% of Toronto participants and 26.7% of Ottawa participants reported more than five casual partners. This is similar to the 34% of Argus participants reporting more than five casual male sex partners in the previous six months [17]. It is also similar to that observed in other MSM populations, but direct comparisons are often difficult because studies report behaviours

over different lengths of time and categorise the number of partners differently [5, 11, 18]. The proportion of men reporting multiple partners may directly contribute to the HIV epidemic. As the number of partners a man has increases the probability of overlap in the sequencing of partnerships also increases. Therefore, multiple partnerships may also indirectly contribute to the epidemic through concurrency, which has been shown to be a major driver of rapid HIV transmission [27-29].

Participants in the *Lambda* study were more likely than those in the OMS to report looking for sexual partners through the internet. This appears to be consistent with trends elsewhere. Approximately 35% of Ottawa and Toronto participants in the OMS, and ARGUS participants looked for sexual partners using the internet. With, over 40% of participants from *Lambda* and M-Track Victoria reporting that they look for sexual partners using the internet, this avenue of finding partners appears to be more common than observed in the past [18]. It has been suggested that increased usage of the internet to look for casual sexual partners may increase “serosorting” by allowing men to choose their sexual partners based on the HIV status provided on the partners internet profile [8, 18]. It will be necessary to incorporate the increasingly important role of the internet in the design and implementation of future studies.

In addition to evolving methods of finding sexual partners, evolving HIV treatment and care opportunities have been observed in recent years. It has been suggested that the availability of treatment, including anti-retroviral drugs (particularly protease inhibitors) has decreased the probability of transmission as well as the perceived risk of HIV infection and that treatment optimism may explain, in part, continued high risk behaviours among MSM [30-32]. The strength of the association between treatment optimism and HIV risk behaviour has been found to vary according to socio-demographic variables, including education level [30]. The *Lambda* survey found that the availability of treatment has not been accompanied by a decreased concern around contracting HIV. This is consistent with findings from other Ontario-based studies as well as studies from other regions and indicates that there are factors other than treatment optimism contributing to the continuing HIV risk behaviours among MSM [5, 33]. The lack of association may reflect the importance of other factors, the effectiveness of prevention and education campaigns targeting treatment awareness in Ontario or a more educated population in *Lambda*.

Risk of HIV acquisition is not uniform among all MSM. Increased incidence has been found to be differential, with the magnitude of increase being different among sub-groups of MSM [8, 12, 21, 34-35]. This differential increase has been attributed to the combination of risk behaviours, particularly unprotected anal intercourse with HIV-positive partners, and the HIV “transmission increasing” factor of increased STI prevalence in some, but not all MSM populations [8, 12, 21, 34-35]. The strategies utilized to decrease sexual risk often vary according to context, including both the physical situation and partner. Evidence suggests that men modify sexual behaviours according to the nature of the relationship (casual vs regular) and the assumed serostatus of their partner<sup>[36]</sup>. The meaning and implications of a given behaviour often depend on whether it is with a regular partner or during a casual sexual encounter [8, 15, 22].

## 4.2 Ethno-cultural representation

The Ontario MSM community is ethno-culturally diverse. To ensure that *Lambda* captured this diversity, community representatives were involved throughout the study and recruitment was conducted at venues targeted at different ethno-cultural groups. To collect information on ethno-cultural background and self-identification, the questionnaire asked participants about which ethno-cultural group they most strongly identified with as well as the ethno-cultural origins of their ancestors. The *Lambda* sample differed from the general population (as indicated by the 2006 census) in several ways. Approximately 30% of Toronto participants and 15% of Ottawa participants reported ancestry outside of North America and Europe. Likewise, approximately 30% of Toronto participants and 15% of Ottawa participants reported that they were born outside of Canada. However, the majority of *Lambda* participants were born in Western industrialized countries and reported British, French or European ancestry making these regions and ethnic groups over-represented in the survey relative to their representation in the general population.

The proportion of participants reporting that they were born in Asia or were of Asian descent was significantly lower than that in the general population. However, the proportion of Aboriginal participants was significantly greater than the proportion of Aboriginal men in the general population. *MaBwana* (the Black Men's study) was conducted in Toronto during the same time period as the *Lambda* Toronto site survey [37]. This may have led to increased participant burden and decreased participation among those who also qualified to participate in *MaBwana*. In the past, ethnicity was ascertained by querying participants about their racial origin making comparison with previous studies difficult. However, approximately 25% of Toronto respondents in the OMS were from an ethnic or racial minority [11] suggesting an increase in the ethnic diversity of the *Lambda* sample as compared to the OMS.

A previous study found that the majority of participants in Ontario chose to fill out the questionnaire in English or French, even when other options were available [11] and therefore the M-Track questionnaire was offered only in English and French. The majority of participants spoke English or French. In fact, few participants reported that they spoke languages other than English or French in Toronto (17.0%) and Ottawa (8.4%). This is significantly less than the general population (40.8% and 19.7% in Toronto and Ottawa respectively).

## 4.3 Study limitations

This study recruited participants from gay targeted venues and therefore was more likely to recruit participants who identify with the gay community [8, 11]. Men who socialise in the gay community may tend to have more gay friends and spend more time with gay men than do MSM not frequenting these venues [8]. In addition, they tend to only have sex with other men [8]. Recruitment from gay venues and associations may have introduced selection bias, which could inflate the observed prevalence rates. Although efforts were made to obtain a diverse sample, participants were recruited from the gay community and therefore may not represent the diversity within the population of MSM.

Social and behavioural data were collected by self-report in a public setting. This may have resulted in self-reporting bias; however, the use of a standardized and validated questionnaire was likely to minimize the effect of this type of bias. Some of the sub-groups which were analysed had small sample sizes that may not have allowed significant differences between groups to be observed. This was particularly evident in the descriptive analysis by HIV status among Ottawa participants.

DBS have been widely used and are particularly useful when collecting biologic samples from high risk populations and in non-clinical settings. Although standardized procedures were put in place during *Lambda*, DBS were not always consistent in terms of size and volume. This affects the concentration of sera in the eluate (refer to [Glossary](#)). Serological syphilis testing is more sensitive to sera concentrations than HIV because it can be affected by the presence of red blood cells. However, the Serodia-TP-PA has been successfully used with DBS and its validity is well documented. Validation of commercially available laboratory tests on DBS specimens for HCV and syphilis testing is ongoing.

In addition to the technical limitations of DBS, fewer than 50% of *Lambda* participants provided a DBS. This low response rate may have affected the observed prevalence. According to bivariate analysis, participants who provided a DBS were older, less educated, had a lower income, more likely to be Canadian-born and more likely to be an IDU than participants who did not provide a DBS. The OMS, which used saliva rather than DBS, had a response of greater than 70% for the biologic portion of the survey. Several contextual factors may affect differences in provision rates between studies; however, feasibility studies indicated that acceptance of DBS in this community would be low[38]. Pain, real and perceived and the associated fear in conjunction with the significance of blood in this community may be barriers to DBS acceptance[38].

HIV incidence was calculated using results from the detuned assay, a method that has been validated for use in different settings [39-40]. This method has been shown to overestimate incidence due to misclassification of individuals with low viral load resulting from ART use and/or atypical progression of the disease [39, 41]. However, the effect of this was minimised by removing from the analysis participants who reported a history of ART use.

Other M-Track studies required that participants consent to providing a DBS in order to participate in any part of the survey and therefore report higher DBS response rates. However, this approach is not able to capture the same amount of behavioural data and if overall response rates are considered (i.e. those providing DBS over those approached), there may not be differences in the proportion of men consenting to provide DBS between *Lambda* and other M-Track sites.

#### **4.4 Conclusions**

*Lambda* was successful in the recruitment of almost 2,500 participants from diverse backgrounds. High numbers of casual sexual partnerships, concurrently or serially, and unprotected anal sex encounters constitute high risk of HIV infection and are ongoing among MSM in Ontario. The high prevalence of delayed condom application and the likelihood of HIV infection associated with this behaviour suggest that it may be an important risk factor at the population level. It is important to note that not all MSM

engage in these “higher-risk” behaviours. Rather, it is a subset of MSM who are at increased risk of HIV infection and should be targeted for prevention efforts.

The observed changes in behaviour over time and the increase in apparent prevalence between the OMS and *Lambda* indicate the need to maintain surveillance systems among MSM in Ontario specifically and Canada more generally. These descriptive studies are useful in not only monitoring trends in behaviour and health over time and between sites but also are useful in evaluating interventions and prevention campaigns and for generating hypotheses which can be more specifically tested using analytic research designs.

## Glossary

Bisexual	For the purposes of this study, bisexual is defined as someone who has participated in sex with both men and women within his or her lifetime
Casual sexual partner	A casual partner is a man with whom the participant had sex only once (a “one night stand” or an encounter in a bathhouse, for example). Casual partners do not include men to whom the participant gave or received money, drugs or other goods or other services in exchange for sex.
Cross-sectional	A study that examines the relationship between disease and/or other health characteristics and other variables of interest simultaneously as they exist in a defined population at a particular time point in time (Source: Last)
Eluate	The solution of solvent and dissolved matter resulting from elution. Elution is the process of extracting a substance that is absorbed by washing it with a solvent.
Face validity	The extent to which a measurement appears reasonable based on superficial inspection (Source: Last)
Incidence	The number of new cases of a disease in a defined population, within a specified period of time (Source: Last)
Prevalence	The number of instances of a disease in a defined population, within a specified period of time (Source: Last)
Regular sexual partner	A regular partner is a man with whom the participant had had sex with at least twice. It can be a life partner, a boyfriend, a “fuckfriend”, a lover, etc. Regular partners do not include men to who or from who the participant gave or received money, drugs, or other goods or services in exchange for sex.
Reliability	The degree to which the results of a measurement can be replicated under identical conditions (Source: Last)
Surveillance	Systematic ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know so that action can be take (Sources: Last, WHO)
Surveillance, aggregate	The surveillance of a disease or health event by collection summary data on groups of cases (Source: Last)
Surveillance, enhanced	Surveillance, generally in sentinel sites and populations, involves the cooperation and systematic data collection from a limited number of facilities, leading to higher quality and more consistent

	information (WHO, Control of STD's handbook)
Surveillance, sentinel	Surveillance based on selected population samples chosen to represent the relevant experiences of particular groups (Sources: Last)
Validity, measurement	The degree to which a measurement measures what it sets out to measure.

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