THE HIV EPIDEMIC AMONG MEN WHO HAVE SEX WITH OTHER MEN: THE SITUATION IN ONTARIO IN THE YEAR 2000

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EXECUTIVE SUMMARY

Studies in the United States, Europe and Australia have recently reported that high risk sexual behaviour and STD incidence[1] have increased among men who have sex with men (MSM). A multistate study in the USA found widespread practice of unprotected receptive anal sex (RAS) and unprotected insertive anal sex (IAS) among MSM participants, some of whom were HIV-positive. A Dutch study found similar high risk sexual behaviours among MSM as well as increased incidence of gonorrhea, particularly among MSM who were HIV-positive. Increasing numbers of gonorrhea cases in the UK have been reported among heterosexuals as well as MSM.

While the research has not identified all the reasons for such increases in risky sexual behaviour, some studies have found a correlation between a decreased concern about becoming HIV infected in the light of highly active antiretroviral therapy (HAART) and the practice of unsafe sex. Some studies have also found that high risk sexual behaviour and incidence of sexually transmitted diseases (STD) began to increase after the introduction of HAART in 1996.

In Ontario, the HIV diagnostic testing database of the HIV Laboratory, Ministry of Health and Long-Term Care (MOHLTC) provides important useful epidemiologic data on HIV-positive diagnoses since 1985 and all HIV tests since 1992. The database, however, has a number of limitations: (1) information can only be collected on persons who choose to be tested, (2) data is limited to risk-related information recorded on the HIV test requisition and (3) identifying information on testers is often not provided, making it difficult to link sequential HIV tests from the same person.

Several behavioural and epidemiologic studies of MSM have been conducted in Ontario, although most date from the 1980s or early to mid 1990s. Currently, there is a lack of detailed behavioural research and seroprevalence studies in this population. The Polaris HIV Seroconversion Study, which began recruitment in 1998, examines recent seroconverters and is designed to help understand the demographics and incidence of new infections as well as behavioural and social factors.

Analyses of HIV laboratory diagnostic data, including the analyses of repeat testers carried out by the Polaris study, numbers and rates of first-time HIV diagnoses and HIV incidence calculations using the detuned assay, suggested a recent increase in HIV incidence among MSM. Based on these observations and the international context, in July 2000, the AIDS Bureau, MOHLTC, requested the authors of the present report to review available data on the HIV epidemic among MSM in the province.

For this report, data was extracted from the HIV diagnostic database as well as the Laboratory Enhancement Study (LES). The LES was initiated in October 1999 and is designed to capture risk factor information and previous HIV testing history among persons with an HIV-positive test and a random selection of persons who test HIV-negative. Information requested on the study questionnaire includes gender, date(s) of previous HIV test(s) and corresponding result(s) and risk factors for HIV acquisition. Results of the LES were used to assign exposure categories to HIV testers for whom risk information had not been recorded on their test requisition. In this way, HIV-positive and HIV-negative diagnoses initially classified as unknown exposure were “adjusted” to produce estimates for each year of HIV diagnoses from 1985 to June 2000.

HIV incidence was calculated based on results of the "detuned assay", a test which can determine if HIV infection likely occurred within the four months preceding the HIV-positive diagnostic result. AIDS incidence was based on cases reported to the Ontario AIDS Surveillance Program, Public Health Branch of the MOHLTC.

Historically, data on reported STDs has been used as an indicator of sexual behaviour linked with HIV infection. In this report, we examined incidence of rectal and pharyngeal gonorrhea and primary and secondary syphilis diagnosed during1993 to June 2000 among Ontario men.

A statistical model was developed using estimates of the MSM population in Ontario (approximately 2.5% of the adult male population) to determine approximate measures of HIV incidence, cumulative incidence[2] and prevalence[3]. The model also estimated AIDS incidence, prevalence and HIV-related mortality.

Our analyses indicated that the number of HIV-positive diagnoses among MSM peaked in 1990 at 1,552 cases then decreased thereafter to 431 in 1999 when HIV-positives among MSM accounted for 47% of first-time positives that year. During the first six months of 2000, 262 or 55% of HIV-positive diagnoses were among MSM, the first time the proportion of MSM cases increased since testing began in 1985. The number of diagnoses in 2000 represented an increase of 22% over the number expected among MSM based on the previous year. Overall, HIV-positives among MSM-IDU represented 1.8% of first-time diagnoses; positives among this group have been decreasing since 1993.

Fully 76% of HIV-positive diagnoses from 1985 to June 2000 among MSM were diagnosed in Metro Toronto, 7.3% were diagnosed in Ottawa-Carleton. Metro Toronto reported more cases in 1999 compared to 1998 (330 vs. 320) and more cases in the first half of 2000 than expected (192 vs. 165). Overall, 76% of new infections among MSM were in men aged 25 to 44 years; 24% of infections among MSM were in men aged 30 to 34 years at time of diagnoses.

HIV incidence density among MSM repeat testers increased from a low of 0.86 in 1996 to 2.56 per 100 person-years[4] in 1999. Increases from 1998 to 1999 were greatest in MSM from 20 to 39 years of age. Based on results of the detuned assay (October 1999 to May 2000), HIV incidence density among MSM in Ontario was 2.7 per 100 person-years; in Metro Toronto it was 4.8 per 100 person-years and in Ottawa-Carleton it was 0.42. Incidence was similar among men aged 25 to 49 at approximately 3.8 per 100 person-years but lower in younger men (less than 25) and older men (50+ years).

AIDS incidence among MSM peaked in 1992 when 520 cases were diagnosed then declined in subsequent years to 49 cases in 1999. The proportion of cases among MSM declined from 88% of all cases diagnosed in 1985 to 44% of cases diagnosed in 1999. Two-thirds (67%) of cases among MSM were reported from Metro Toronto, followed by Central West at 7.6%. AIDS diagnoses among MSM from HIV-endemic countries represented 3.6% of MSM cases during the study period; diagnoses among these men increased in later years, although the numbers remain small.

Overall, rates of infectious (primary & secondary) syphilis among males aged 15 years and older have decreased or remained stable during 1993 to June 2000, though rates were seen to increase from 1997 to 1999 in younger men (15 to 34 years of age). Overall rates of rectal gonorrhea have remained stable since 1997, although cases reported in the first six months of 2000 indicate increased rates in Metro Toronto, Ottawa-Carleton, Central East, Other and

Central West. In spite of the small number of cases, rates of pharyngeal gonorrhea appear to have increased in Metro Toronto from 1999 to 2000.

Based on the statistical model, we estimated that HIV incidence among Ontario MSM in 1999 was 1.0%[5], or 970 new infections that year. HIV incidence was estimated to be highest in Metro Toronto (1.5%, or 718 new infections) and 0.5% in Ottawa-Carleton and the rest of the province as a whole.

Clearly, there is reason for concern about the increase of HIV transmission among MSM in Ontario, particularly MSM in Metro Toronto. At the end of 1999, we estimated HIV prevalence among this population to be 11.5% or 12,638 men and HIV incidence to be 1.0% representing almost 1,000 new infections among MSM in 1999 alone. The increased rate of HIV incidence compared to previous years represents an additional 400 new infections among MSM in 1999 compared to the estimated numbers of HIV infections just three years ago (970 vs. 537). The number of MSM living with HIV continued to rise due in part to increasing HIV incidence and decreasing HIV-related mortality; in 1999, 19% more MSM were HIV-infected compared to estimates in 1996 (12,636 men vs. 10,656).

Preliminary data indicates that HIV incidence may also be increasing among MSM in Vancouver, though apparently not in Montreal. In Ontario, it is difficult to draw definitive conclusions about HIV incidence among MSM due in part to the lack of epidemiologic studies which might provide data on HIV prevalence or incidence. It will be important to address the lack of good data related to HIV infection among MSM, a population which continues to be disproportionately affected by this epidemic. Despite the preliminary nature of our findings, HIV incidence appears to be increasing among MSM in Ontario and the HIV epidemic is not yet under control in this population.

1 Incidence is the rate of new infections during a specific time period.
2 Cumulative incidence is the sum of incidence.
3 Prevalence is the proportion of a given condition or disease (e.g. HIV) in a population at a specific point in time.
4 Person-years is a unit of measure used for the denominator in expressing incidence. It indicates the population at risk, e.g. 100 persons followed for one year or 50 persons followed for two years is equivalent to 100 person- years of observation.
5 In other words, approximately 1% of the MSM population in Ontario seroconverted this year, based on a total population of approximately 110,300 MSM.

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1. BACKGROUND

1.1 International overview

Therapies to control the replication of HIV have been available for over 10 years in Canada, beginning with zidovudine in 1987 and followed soon after by the nucleoside analogs ddI and ddC. Nevertheless, the benefits of these drugs, alone or in combination, were limited until the mid 1990's with the discovery of more potent inhibitors of HIV replication, including non-nucleoside analogs, new nucleoside analogs such as 3TC and, most importantly, protease inhibitors. Taken in combination of two to three drugs, progression to AIDS and mortality was remarkably reduced <*1*>. The use of surrogate end-points such as CD4+ counts and, more recently, viral load added to the effectiveness of combination antiretroviral therapy. Consequently, drug combinations, referred to as highly active antiretroviral therapy (HAART) have had a dramatic effect on the prognosis of HIV-infected persons since 1995. The scientific evidence supporting the efficacy of these therapeutic regimens was presented for the first time at the International AIDS Conference in Vancouver in July 1996 and led to a new wave of optimism in the HIV treatment field.

Despite these advances, it was discovered soon after the development of HAART that, though combination therapy can often reduce viral loads to below detectable levels, it does not appear able to eradicate the virus such that therapy could be stopped without subsequent viral rebound. Thus, despite the initial hopes that these therapies might represent a cure, it is now clear this is not the case, at least for the time being.

Coincident with the development of new, more effective antiretroviral therapy was the concern that the removal of the threat of a severe, often fatal disease might have a negative impact on high risk sexual behaviour, giving populations at risk the mistaken impression that HIV infection has become a chronic, manageable disease. Though the benefits of therapy are clearly dramatic, antiretroviral drugs are expensive, often toxic, have serious side effects (such as disturbances in lipid metabolism) and are associated with the ever-present risk of emerging resistance. For these reasons, such therapies must be seen as one stage in the long process of evolving scientific knowledge.

About the same time as the arrival of HAART was the development of post-exposure prophylaxis (PEP). Antiretroviral treatment administered soon after a significant exposure to HIV appeared to provide some protection against infection. There was also the suggestion that some persons receiving HAART and achieving low viral loads may be engaging in unprotected sexual intercourse in the mistaken belief that they are not infectious. Both these factors have been hypothesized to have contributed to complacency and relapse in risky sexual behaviour. Nevertheless, there is no persuasive scientific evidence for these hypotheses and they remain speculative at present.

Finally, qualitative evidence from several scientific studies have suggested that, although the adoption of safe sex practices was dramatic in the early to mid 1980's with the widespread knowledge of the evolving HIV epidemic, some persons at risk have since become less vigilant about avoiding HIV infection and have experienced what has been referred to as “safe sex burnout”.

In light of the above-noted developments, it is perhaps not surprising that an increase in high risk sexual behaviour, sexually transmitted disease (STD) incidence ("incidence" is the rate of new infections during a given time period) and HIV incidence has been observed in many cities in the United States, Europe and Australia. Lehman recently presented results of studies in the United States of attitudes of men who have sex with men (MSM), injection drug users (IDU) and high-risk (HR) heterosexuals <*2*>. MSM were recruited in gay bars, IDU on the street and heterosexuals at STD clinics. Overall, 31% of the men (range according to state of residence 21%-43%) reported that they were less concerned about becoming HIV infected and 17% indicated they were less careful about sex or drug use because of better treatments. Of the 71% of MSM who had a recent non-primary partner, 65% of those who reported being less concerned had engaged in unprotected receptive anal sex (RAS) compared to 41% who did not report being less concerned. Similarly, 71% of those who reported being less careful engaged in RAS compared to 29% who did not.

In a study from the Multicentre AIDS Cohort Study (MACS) of MSM in Chicago, Baltimore, Pittsburgh, Los Angeles and Syracuse <*3*>, investigators found a significant number of gay men reporting unprotected receptive anal sex (RAS) and insertive anal sex (IAS). Among HIV-negative men, those who agreed that HAART lessened their concern about becoming HIV infected were more likely to report unprotected RAS (odds ratio of 2.6). (The "odds ratio" measures the probability of an outcome [e.g. a behaviour, event, or disease] among those with a certain characteristic compared to the probability among those without the characteristic; an odds ratio greater than 1.0 means the outcome is *more* likely to occur in the group *with* the characteristic.) Among HIV-positive men, the differences were even more dramatic, with those agreeing that HAART reduced concern about infecting someone being more likely to report unprotected IAS, with an odds ratio of 8.8, and RAS with an odds ratio of 3.5. Interestingly, "safe sex burnout" was independently associated with a four-fold increase in the odds of IAS and RAS among HIV-positive men.

A study from the Netherlands observed a similar phenomenon <*4*>. The investigators observed relatively high rates of unprotected anal intercourse among HIV-negative men and also showed a significant increase around the time HAART became available. Specifically, unprotected IAS increased from 60% in 1992-96 to 65% after July 1996 (p=0.002). The researchers also examined the incidence of STD and HIV. Self-reported gonorrhea among HIV-negative MSM increased from 1.4 per 100 person-years in the period 1992-96 to 2.1 per 100 person-years after July 1996 (difference not statistically significant) and among HIV-positive MSM, from 4.9 to 13.3 per 100 person-years (p=0.025). In 1999, the observed HIV incidence was 2.9 per 100 person-years. In the abstract of their study, the authors indicate that "these findings urgently called for HIV prevention interventions".

A similar phenomenon has been observed in the United Kingdom. Martin and Ison published a report in the Lancet in February 2000 <*5*> indicating an alarming 35% overall increase in the number of gonococcal infections diagnosed in the same three-month study period over three years. From 1997 and 1998, a 12% increase was observed and from 1998 to 1999, a 20% increase was observed. Similar observations were subsequently reported from other centres in the UK <*6,7*> and in Australia <*8*>.

A study among homosexual men in Sydney, Australia in 1996-1998 <*9*> administered surveys at six-month intervals from February 1996 to February 1998. The proportion of men who had had unprotected anal intercourse with regular partners was relatively stable among both HIV-negative and HIV-positive men, though there was a trend toward an increase among HIV-negative men

and toward a decrease in HIV-positive men. However, the proportion of men who had engaged in unprotected anal intercourse with casual partners increased substantially in both HIV infected and uninfected men. Among HIV-negative MSM, the proportion reporting unprotected anal intercourse rose from 9.3% in February 1996 to approximately 20% in February 1997, August 1997 and February 1998. Among HIV-positive men, this proportion also increased, but less dramatically, from about 26% in February 1996 to approximately 40% in August 1997 and February 1998.

In Canada, an outbreak of infectious syphilis beginning in July 1997 was observed in the downtown east side of Vancouver <*10*>, with the annual number of cases increasing from about 20 in 1996 to 50 in 1997, 115 in 1998 and 130 in 1999. The epidemic is largely focused on IDU and sex trade workers. It is unclear to what extent the advent of HAART may be playing in this epidemic; only 6% of cases have apparently been among MSM. Nevertheless, given the phenomena being observed elsewhere as discussed above, the potential for spread into the MSM population, including those in Ontario, is not insignificant.

1.2 Overview of behavioural and epidemiologic research among MSM in Ontario

Most of what we know about the HIV epidemic among Ontario's MSM comes from research studies conducted early in the epidemic, the HIV diagnostic testing database of the Laboratories Branch, Ontario Ministry of Health and Long Term Care (MOHLTC), anecdotal information and experiences and focus groups. The following is a brief overview of the major sources of epidemiologic and behavioural information pertaining to MSM in Ontario; it is not a comprehensive review of all research.

Since HIV testing began in November 1985, the diagnostic database has provided information on the characteristics and proportion of MSM testing HIV-positive in Ontario. While the database is an inexpensive and accessible source of useful data, it has several important limitations: (1) it includes information only from persons who choose to be tested; (2) available data is limited to that recorded on the test requisition, of which key information on risk for HIV is often missing, and (3) identifying information is often missing thus making it difficult to link serial HIV tests from the same person.

Early in the epidemic, Ontario took the lead in epidemiologic and behavioural research on MSM. The first research project, the Toronto Sexual Contact Study (TSCS) started in March 1984 and ended in March 1992 <*11-16*>. This study, along with the Vancouver AIDS/Lymphadenopathy Study, were the first two studies of HIV infection among MSM in Canada. When the TSCS began, only 119 cases of AIDS had been reported in Canada, most of which were among MSM. The virus had just been identified but serologic tests were not yet available; testing for HIV-antibody began in many Canadian provinces in November 1985. Little was known about HIV at that time.

The TSCS was designed to identify the modes of disease transmission, quantify the level of risk associated with each risk behaviour, understand the natural history of disease progression and identify co-factors for disease progression. Researchers at the University of Toronto, with the support and co-operation of the AIDS Committee of Toronto and physicians treating HIV-positive men, recruited 249 MSM who had had sexual contact with a man diagnosed with AIDS or ARC.

The health and behaviours of these men were monitored through interviews, physical examinations and laboratory analyses of specimens, conducted every three months for a period of six years. The TSCS contributed to our understanding of HIV transmission, the degree of risk associated with each sexual behaviour, how HIV-related risk behaviours changed in response to HIV and prevention efforts, and the factors associated with continued risk behaviours. The TSCS also measured the incidence of new infections in the cohort, documented the natural history of disease progression and co-factors for progression and assisted in the refinement of laboratory testing for HIV, established the validity of self-reported sexual measurements and estimated the degree of under-reporting of AIDS.

In 1987, the Talking Sex Project was initiated to evaluate group interventions designed to promote knowledge, attitude and behaviour change in gay and bisexual men in Toronto <*17,18*>. This was one of the very few randomized control design studies of a prevention intervention carried out to date in Canada. Six-hundred-and-twelve gay and bisexual men were recruited and randomized into two intervention groups: (1) single session groups, led by volunteer peer-group members and hosted in gay men's homes, and (2) serial session groups, held in the offices of the AIDS Committee of Toronto and led by paid professionals over four consecutive weeks. The latter groups were less structured than single session groups and placed greater emphasis on group process. The change to safer behaviour was greatest in the single-session group, whereas changes in knowledge of AIDS risk and the attitude 'condom efficacy' were significantly higher in both treatment groups than among a group of wait-list controls. Along with the randomized control design, the study permitted several exploratory analyses that highlighted determinants of risk behaviour, particularly the association between substance use and risk behaviour.

At about the same time, a community venue-based survey known as Men's Survey '90 was conducted in bars and bathhouses in Toronto, with a study sample of 1,295 gay and bisexual men. The study gave an initial understanding of sexual behaviour in the context of venue attendance and patterns of socialization. This research provided the prototype for National Men's Survey conducted in 1991.

In July 1991, a Canada-wide survey of knowledge, attitudes and behaviour (KAB) was conducted to measure the prevalence of HIV-related risk and obtain a better understanding of the extent to which educational initiatives and the HIV epidemic had affected MSM from different cultures and regions of Canada. ["Prevalence" refers to the proportion of a given condition [e.g. behaviour, disease] in the population at one point in time.] The Canadian Survey of Gay and Bisexual Men (The Men's Survey) was conducted by researchers at the University of Toronto, Laval University, University of Montreal and by the Canadian AIDS Society <*19*>. It was the first national study of MSM in Canada and the second to examine a non-clinical population. Over 4,800 MSM in 35 cities across Canada completed questionnaires in gay-identified venues (e.g. bars, bathhouses, dances). Ontario cities included in the survey were Toronto, Ottawa-Hull, Hamilton, London, St. Catharines, Windsor, Sudbury, Thunder Bay, Kitchener, Oshawa, Kingston, Guelph and Peterborough for a sample size of 1,381 men. The study contributed to understanding regional and cultural differences in KAB, factors associated with the continuation of high-risk behaviours, intentions to seek HIV testing and use condoms and access to health services among those living with HIV. The study design of the Men's Survey was based on that of the Toronto Men's Survey, an earlier pilot conducted in that city.

In September 1995, the first HIV-related survey of bisexual men in Canada was undertaken. The Bisex Survey administered telephone interviews of 1,314 men using a 1-800 telephone number to understand the nature of bisexual activity in Ontario, assess the risk of HIV transmission and determine whether education, interventions and health services directed at homosexuals and heterosexuals were effective for bisexual men <*20*>. Among MSM with regular partners, 52% reported protected IAS and 55% protected RAS whereas 19% and 21% unprotected IAS and RAS, respectively. Protected sex was also the norm with casual partners: 42% of men reported using condoms during IAS and 45% during RAS, whereas 10% and 11% reported unprotected IAS and RAS, respectively, with their casual partners.

In the summer of 1998, recruitment began for a longitudinal study in Ontario, the Polaris HIV Seroconversion Study, an open-cohort of documented recent seroconverters and HIV-negative controls <*21*>. While Polaris includes all affected populations in Ontario, MSM represent 78% of the study participants to date. Participants are followed to assess evolving patterns of HIV acquisition and within individuals. Sources of data for this multidisciplinary study include qualitative and quantitative interviews, medical chart extractions and analysis of specimens. Polaris is designed to help understand HIV seroconversion in several key areas, namely, the changing demographics and incidence of new infections, contributing social, behavioural and demographic factors, transmission of viral subtypes, prevalence of primary antiretroviral drug resistance in recent seroconverters, the impact of HIV-positive and HIV-negative status on persons' lives, disparities in treatment access and uptake, the characteristics of acute retroviral syndrome, the effect of early versus later antiretroviral therapy on disease progression, and compliance to antiretroviral therapy in early infection and its impact on progression.

Behavioural and epidemiologic research on MSM in Ontario has not kept pace with its early history or with that in other provinces. For example, in Ontario there has never been a study of HIV prevalence among MSM but there have been for other affected populations. Ontario researchers were successful in piloting an anonymous, unlinked HIV prevalence study among MSM in Winnipeg but were unable to gain the support for such a study in Ontario. There appears to be limited support in this province for repeated, cross-sectional surveys similar to those which are being conducted elsewhere to effectively and inexpensively monitor HIV-related behaviours (e.g. risk, HIV testing, access to services). Analyses from the Polaris study have observed an increasing HIV incidence among MSM who repeatedly test for HIV (see Section 3.1.4), however, we lack information on patterns of testing among MSM to determine whether the observed increase is generalizable to all MSM. Shifting priorities among community-based organizations, fear of stigmatization that may result from research findings and the perception that the epidemic is no longer affecting MSM have all contributed to the lack of necessary information on MSM in Ontario.

Analyses of HIV laboratory diagnostic data, including the analyses of repeat testers carried out by the Polaris study, numbers and rates of first-time HIV diagnoses and HIV incidence calculations using the detuned assay, suggested a recent increase in HIV incidence among MSM. Based on these observations and the international context, in July 2000, the AIDS Bureau, MOHLTC, requested the authors of the present report to review available data on the HIV epidemic among MSM in the province.

2. METHODS

The following sections describe the databases used to prepare this report, selection of cases within that database, analytic methodology and analyses completed appropriate to that database. Each data source contained cases diagnosed among the entire Ontario population from which cases among MSM were selected for more detailed analyses.

2.1 Data sources, selection of cases and analyses

2.1.1 HIV diagnoses (positives, positivity rates and tests)

Almost all HIV diagnostic tests performed in Ontario are carried out by the Central Public Health Laboratory (CPHL) and six regional HIV laboratories of the Laboratories Branch, MOHLTC. Limited non-diagnostic testing is performed by private laboratories for the purposes of life insurance eligibility, travel visa application and organ and tissue donation. Testing is also carried out by the Canadian Blood Services (CBS), who test approximately 350,000 blood donations annually at one of five regional centres in Ontario. Test results from private laboratories and CBS remain separate from the diagnostic database located at the CPHL.

HIV tests are provided free of charge and are prescribed through a physician or anonymous testing centre. Blood specimens collected for diagnostic purposes are submitted with a test requisition to the nearest HIV laboratory. Specimens which test HIV-positive at a regional laboratory are forwarded to the CPHL for confirmatory testing. The computerized information system, LAByrinth, operates from a single server and links the CPHL with the six regional HIV laboratories and allows access to real time data through a secure system. In 1996, LAByrinth back-entered data on HIV-positive test results since 1985 and all HIV test results (including negative) since 1992. The HIV laboratories test more than 280,000 specimens annually.

Information on gender, date of birth and risk factors related to HIV infection are requested on the test requisition but not always provided. In 1999, 5.3% of the 263,268 tests performed were missing information on gender, 4.3% were missing date of birth and 66% were missing risk factor information. Since final exposure category classification is assigned by a standardized statistical procedure (referred to as an “algorithm”) in LAByrinth using a hierarchy based on reported risk factors, the majority of HIV tests cannot be assigned an exposure category and therefore provide limited insight into the Ontario epidemic.

In October 1999, the Laboratory Enhancement Study (LES) was initiated to capture risk factor information and previous HIV testing history among persons with an HIV-positive test result and a random selection of persons who test HIV-negative <*22*>. A short questionnaire similar to the test requisition is included with the test report when the report is mailed to the prescribing physician. Risk factors reported on returned questionnaires were used to assign exposure categories to testers for whom risk information was missing on their original requisition. For the purposes of this report, data from the LES collected from October 1999 to June 2000 was used to assign exposure categories to HIV testers who had been assigned ‘No Indicated Risk’, ‘Other’, ‘Unknown’ or ‘Missing’ exposure by the LAByrinth algorithm.

For the present report, HIV-positive diagnoses from 1985 and HIV tests (i.e., positive and negative results) from 1992 to June 30, 2000 were provided by the HIV Laboratory of the CPHL, Laboratories Branch, MOHLTC. Persons who could be identified as testing more than once within the same year were counted only once during that year; a positive test result superseded previous negative result(s) within the same year. Variables provided were test result (positive, repeat positive, seroconversion, early seroconversion, recent seroconversion, weak positive, negative), age (including unknown), gender (male, female, unknown), modified health region of prescribing physician (Northern, Central West, Central East separated into Metro Toronto and Central East Other, Southwest, Eastern separated into Ottawa-Carleton and Eastern Other, unknown), original risk factors, exposure category (as assigned by LAByrinth) and year of HIV diagnosis (January to June in 2000). The database was provided in DBF format and analyzed using SAS Version 6.12 and Lotus 1-2-3, Release 5.01 for Windows.

First-time HIV-positive diagnoses were examined by year of diagnosis and exposure category. Cases with unknown health region were assigned to one of the seven modified regions in accordance with the distribution among those with known region that year. Cases of unknown exposure category were reassigned according to proportions among the known and results of the LES (see Appendix for a detailed description of the method used). Briefly, adjusting for diagnoses among unknown exposure was important and necessary since data on risk factors was missing for over 50% of HIV-positive diagnoses. Since the distribution by exposure category among those with known exposure differs from that among those with unknown exposure <*22*>, it would be inappropriate to assign those with unknown exposure using the proportions among the known. Using results from the LES, we developed a methodology which took into account differences in the distribution by exposure category among HIV-positive and HIV-negative diagnoses. "Adjusted" numbers of HIV-positive diagnoses were then examined by year of diagnosis and exposure category and modified health region and exposure category. Next, HIV-positive diagnoses among MSM (adjusted) were examined by year of diagnosis and modified health region, as were HIV-positive diagnoses among MSM-IDU (adjusted). The number of HIV-positives, adjusted for unknown age, were examined by age group and exposure category.

HIV positivity rates (%) were calculated using both unadjusted and adjusted numbers of HIV-positive and negative tests among MSM and MSM-IDU for each health region for each year 1992 to June 2000. [The HIV-positivity rate, calculated here as a percent, measures the proportion of persons who test HIV-positive among those test either positive or negative.] Unadjusted positivity rates were calculated using the formula:

$$\text{HIV positivity rate (\%), unadjusted} = \frac{\text{\# of HIV-positive diagnoses (unadjusted)}}{\text{\# of HIV-positive + \# of HIV-negative diagnoses (unadjusted)}} \times 100\%$$

Adjusted HIV positivity rates (%) were calculated using the same formula, substituting adjusted numbers of HIV-positive and HIV-negative diagnoses for unadjusted. Positivity rates (%) were calculated for MSM by year and modified health region and again for MSM-IDU.

The number of HIV tests (adjusted) was calculated as the sum of adjusted positive and adjusted negative diagnoses. HIV tests (adjusted) were examined by year of test and exposure category. Adjusted numbers of tests among MSM and MSM-IDU were examined by year of test and health region.

The number of HIV-positive diagnoses by public health unit is available though not typically presented in summary reports. We included one table which shows the number of HIV-positive diagnoses among MSM by public health unit and year of diagnosis. In this table, HIV-positives have not been adjusted for unknown exposure category or unknown region.

2.1.2 Estimation of incidence among repeat testers

The HIV Laboratory at the CPHL provided data used to calculate incidence among persons in Ontario who could be identified as testing for HIV on more than one occasion. Name or code, date of birth and gender recorded on the test requisition was used to search the database for the same information recorded on an earlier requisition. If a match was found, the person was identified as a repeat tester and their earlier result(s) were "linked" to their current test result. A person with a previous negative result who later tested HIV-positive was considered to have "seroconverted" in HIV status. In some instances, seroconversions are captured in progress when diagnostic results are indeterminate due to incomplete antibody formation. Persons identified as having tested for HIV more than once from January 1992 to June 2000 were included in the analysis.

HIV incidence was calculated among repeat testers who had been classified with MSM exposure by the LAByrinth algorithm. The effects of age and geographic region were examined where appropriate. Incidence was calculated using the method described by Kitayaporn and colleagues <*23*>. Briefly, the numerator was based on the number of seroconverters. Incidence was assumed to be uniformly distributed during the time interval from the date of the last negative to the date of the first positive test with a total sum of one. If either of date fell outside of the set interval (a,b) (e.g. one year), the incident case was apportioned over time so that it contributed a fraction less than one to the interval (a,b). The denominator consisted of the total number of person-years of observation during the interval (a,b); both seroconverters and negative testers contributed person-time. Incidence was the ratio of the numerator and the denominator; 95% confidence limits were calculated using incidence per person-years to estimate the variance. We used Poisson regression to evaluate differences in incidence over time.

2.1.3 HIV incidence determined by the detuned assay

The methodology to estimate HIV incidence using the detuned assay was first described in 1998 <*24*>. This technique permits detection of HIV infections which occurred within the four months previous to the HIV-positive test. The reduced sensitivity of the detuned assay allows the test to intentionally fail to detect low levels of antibody detected by highly sensitive diagnostic assays. Thus, a specimen which is HIV-positive according to the diagnostic assay but HIV-negative on the detuned assay likely indicates the person acquired the virus within approximately 129 days prior to their HIV-positive diagnostic result. (The 129 days represents the estimated time period necessary for antibodies to develop in sufficient titre to be detected by the detuned assay.)

In 1999, detuned assay test kits became available to the CPHL and first-time HIV-positive specimens diagnosed in October 1999 and later were tested and detuned results entered in the LES database. Risk factor information collected through the LES was used to assign exposure

categories to HIV-positives and HIV-negatives included in this analysis. HIV incidence per 100 person-years among MSM and MSM-IDU was calculated for aggregated health regions (Metro Toronto, Ottawa-Carleton, rest of Ontario) using the formula:

$$\text{HIV incidence} = \frac{\#\text{ HIV-negative on detuned}}{\#\text{ HIV tests (positive + negative)}} \times \frac{365 \text{ days}}{129 \text{ days}} \times 100 \text{ person-years}$$

2.1.4 AIDS incidence

AIDS case reporting began in 1982 and expanded into the Ontario AIDS Surveillance Program (OASP) when the syndrome became a reportable condition in August 1983. Cases reported to local public health units are forwarded electronically to the Public Health Branch, MOHLTC via the Reportable Disease Information System (RDIS). The Public Health Branch provided data on AIDS cases diagnosed from 1981 and reported to December 14, 1999. Due to delays in case reporting, the number of cases in 1999 and, to a lesser extent, in earlier years are likely incomplete at the time the data was extracted. Variables in the dataset included gender, age, public health unit, original risk factor(s) and year of diagnosis.

Risk factor information collected for each reported AIDS case reflects one or more routes though which the person may have acquired HIV. An algorithm in RDIS based on a hierarchy of risk assigns each case to one of 20 possible exposure categories. Cases for which risk factor information has not been transmitted to the Ministry are assigned the exposure category of 'did not code', 'unknown', or 'no indicated risk'. A recent report *<25>* discussed issues related to the RDIS algorithm which may lead to potential misclassification of AIDS cases by exposure category. For these reasons, the RDIS algorithm was not used; instead, a hierarchy based on reported risk factors, country of birth and gender determined final exposure category classification for each case in the dataset. Analyses were completed using SAS Version 6.12.

Reported AIDS cases were examined by year of diagnosis and exposure category, then by modified health region and exposure category. Cases among MSM were examined by year of diagnosis and modified health region, as were cases among MSM-IDU. Lastly, cases among MSM who were born in an HIV-endemic region (sub-Saharan Africa, Caribbean) were examined by year of diagnosis and modified health region.

2.1.5 Sexually transmitted diseases

It has been historically useful to use the incidence bacterial STDs and, in particular, gonorrhea and syphilis, as indicators of high risk sexual behaviours in populations potentially at risk for HIV infection. As discussed in the Background section above, many regions around the world have experienced increases in gonorrhea, particularly among MSM.

The Public Health Branch, MOHLTC provided data on gonorrhea and syphilis cases diagnosed from 1993 to June 30, 2000. Cases were unique if reported prior to December 1, 1999; cases reported following this date were possibly duplicated (removal of duplicates at the public health unit level had not been completed at the time of data extraction). Variables provided included gender, date of diagnosis, public health unit, age group, disease (gonorrhea, syphilis), site

(gonorrhea) and stage (syphilis). Risk factors for HIV are not captured in this database; hence, analyses were also carried out on adult male cases.

We examined the number of syphilis cases by stage and year of diagnosis; infectious (primary & secondary) syphilis among men aged 15 years and older by age group and year of diagnosis, and infectious syphilis among men by modified health region and year of diagnosis. (Primary and secondary syphilis cases are useful indicators since they reflect recent transmission; this indicator is used extensively in Canada and the United States for this purpose). Gonorrhea cases were examined by site and year of diagnosis. For the small proportion of cases which had more than one site indicated, we used a hierarchy in the following order: rectal, pharyngeal, genitourinary, disseminated, other and unknown. Rectal gonorrhea cases (identified by the hierarchy) among men aged 15 years and older were examined by modified health region and year of diagnosis, as were cases of pharyngeal gonorrhea (as identified by the hierarchy). We calculated rates per 100,000 person-years, based on population estimates provided by Statistics Canada using Lotus 1-2-3 Release 5.01 for Windows. Population estimates for 2000 were calculated by multiplying the 1999 population estimate by the average rate of annual population growth from 1993 to 1999.

2.1.6 MSM statistical model

We attempted to determine the prevalence and incidence of HIV among MSM from 1978 to 1999 using an iterative spreadsheet model constructed using Lotus 1-2-3 Release 5.01 for Windows. The methodology for the model is briefly presented below and has been presented elsewhere *<28>*.

2.1.6.1 Population of MSM in Ontario

The number of MSM in Ontario was determined based on the results of surveys and studies, including one carried out in Ontario. Combined, these provide for plausible limits of 2% to 3% of the adult male population. A midpoint of 2.5% for Ontario as a whole was used for the present analysis; however, this varies markedly across the province, being much higher in urban compared to rural centres.

2.1.6.2 Indicators for the MSM model

Incidence, cumulative incidence and prevalence were determined for HIV infection, HIV diagnoses, AIDS and HIV-related mortality. Cumulative incidence was the sum of the annual incidences from the beginning of the epidemic to the current year and the prevalence was the cumulative incidence less the cumulative mortality.

Data to construct the model were obtained from several sources: HIV serodiagnostic database, HIV seroprevalence studies among MSM, HIV incidence studies among comparable populations, reported AIDS cases and AIDS-related mortality. In addition to the data sources discussed above, AIDS-related mortality data was provided by Vital Statistics, Office of the Registrar General of Ontario. HIV cases were adjusted using provisional estimates of duplicate reporting.

AIDS cases were adjusted for under reporting and delayed reporting using the results of studies carried out in Ontario *<26,27>* and parameters developed at the HIV/AIDS Epidemiology Division, Laboratory Centre for Disease Control. AIDS deaths were adjusted for under ascertainment of HIV-related cause of death based on previous studies.

The initial values as noted above were entered into a spreadsheet model and the HIV incidence, the only parameter for which there was no direct data, adjusted to best fit the available data. Guidance in this regard was provided by estimates of the proportion of infected persons estimated to have been diagnosed according to several studies in Ontario MSM.

3. RESULTS

3.1 HIV diagnoses

3.1.1 HIV-positive diagnoses

In Table 1.1, we present the distribution of first-time HIV positive diagnoses by year of diagnosis and exposure category. In this table, unknown exposure category has been reassigned based on a model using the results of the Laboratory Enhancement Study (see Methods above). Overall, the number of HIV infections rose from 1,365 in 1986, the first full year in which HIV diagnostic testing was available, to a peak of almost 2,100 in 1990 and decreased thereafter. For the years 1997 to 1999, the number of new HIV diagnoses decreased somewhat from about 1,100 to slightly more than 900 diagnoses. In the first six months of 2000, 479 first-time HIV diagnoses were made, representing a slight increase of about 4% over that expected based on the previous year; this increase was not statistically significant.

Among MSM, the proportion of HIV diagnoses has constantly decreased, from about 90% in 1985 to approximately 50% for the years 1996 to 1999. For the year 2000, the 262 first time HIV diagnoses in this exposure category represents an increase in the proportion of HIV diagnoses in Ontario. The increase from 47% to 55% was statistically significant ($p=0.005$) and is the first time such an increase has been observed since testing began. In addition, the 262 first-time diagnoses represents an increase of 46 cases (or 21%) over the 215 cases expected among this group based on the previous year. Positive diagnoses among MSM-IDU represented 1.8% of all diagnoses and have been decreasing since about 1993. This represents approximately 3% of cases diagnosed among MSM as a whole.

Table 1.2 shows the distribution by health region and exposure category for first-time HIV diagnoses from 1985 to June 2000. The vast majority of infections among MSM were diagnosed in Metro Toronto, representing 75% of cases in Ontario. Metro Toronto also represents the region in which the highest proportion of cases are among MSM, notably 76%. Cases among MSM represent from 30% to 66% of cases diagnosed in the other six regions. Three regions, namely Northern, Ottawa-Carleton and Central East, Other, were lower than 50%.

Table 1.3 shows the first-time HIV positive diagnoses among MSM by year of diagnosis and health region. For the individual health regions, the trends in HIV diagnoses has paralleled that of the province as a whole, increasing to a peak in 1990 and decreasing thereafter. In Metro Toronto, the number of diagnoses increased slightly in 1999 over 1998 and apparently again in

the year 2000. In the first six months of the year 2000, 192 cases were diagnosed compared to an expected number of 165 based on the previous year, an increase of 16%. Figure 1a shows the number of HIV infections in Metro Toronto by year and Figure 1b for the other health regions.

Table 1.4 presents similar data among MSM-IDU by year of diagnosis and health region. The number of cases appeared to peak slightly later than for MSM, with the highest number observed in 1993; no significant increase was observed in 1999 or 2000.

Table 1.5 shows the distribution of HIV infections by age group and exposure category. The majority of infections among MSM were observed in persons 25 to 44 years old which accounted for 76% of positive diagnoses with this exposure. Men aged 30 to 34 had the highest number of HIV diagnoses, representing almost 24% of HIV diagnoses in this population.

Table 1.6 presents the number of HIV-positive diagnoses by public health unit and year of diagnosis. Note that the table does not reallocate HIV-positives with unknown exposure, some of whom would be MSM, since adjustments at the public health unit level were not feasible.

3.1.2 HIV positivity rates

Table 2.1 displays the proportion of HIV tests that are positive (HIV positivity rates) by year of diagnosis and health region among MSM. First-time positives and only one negative test in each year from each patient (where matching is possible) are counted in this analysis. For Ontario as a whole, the adjusted positivity rate increased in the year 2000, the first year in which it did not decrease. Increases were observed in five of the seven health regions, that is, all but Ottawa-Carleton and Eastern Other. The increase in rates were most marked in the Northern region (a four-fold increase) and Central East Other (an almost three-fold increase). The increase in Metro Toronto was approximately 1.4% (not evident in table due to rounding). Figure 2 shows the adjusted HIV positivity rates among MSM by year and by health region.

Table 2.2 shows a similar analysis for MSM-IDU; the small numbers make it difficult to draw any definitive conclusions.

3.1.3 HIV tests

Table 3.1 presents the estimated number of HIV tests by year of test and exposure category since 1992. The number of tests prescribed for MSM varied in the range of 13,000 to 14,000 for the last six years, with a slightly decreasing trend but increased in the year 2000 by a modest amount (5.3%).

Table 3.2 shows the number of tests among MSM by year of test and modified health region. An increase in HIV testing among MSM in 2000 (projected for one full year) was observed in two regions, Metro Toronto and Central West, with increases of 15% and 5%, respectively. Figure 3 shows the number of HIV tests among MSM by year and by health region.

HIV testing patterns among MSM-IDU (Table 3.3) increased 4.2% overall from 1999 to June 2000 and specifically in the Northern, Metro Toronto, Central West and Southwest health regions.

3.1.4 HIV incidence among repeat testers

The results of HIV incidence calculations among repeat testers are shown in Figure 4. Overall, there was a decreasing trend in incidence among MSM from 1992 to a low in 1996 when the rate was 0.86. There was a modest increase to 1.18 in 1997 and 1998 and a marked increase to 2.56 per 100 person-years in 1999. The increase from 1996 was statistically significant ($p<0.001$).

Figure 5 shows HIV incidence among MSM in the eight-year study period by age group. Incidence increased dramatically from 1998 to 1999 among younger men aged 20 to 29 and 30 to 39 and increased slightly among men aged 40 to 49 years. Among men 50 years of age or older, the rate declined during the study period. The increase among those aged 30 to 39 years was statistically significant and among those aged 20 to 29 and 40 to 49, the increase was borderline significant ($0.05 < p < 0.10$).

Figure 6 displays HIV incidence by aggregated health region. Ottawa-Carleton showed a substantial increase in later years, from 0.72 in 1997 to 2.77 per 100 person-years in 1999. Metro Toronto also reflected an increase; from 1.44 in 1998 to 3.56 in 1999. In the rest of the province (Ontario, other), the rate decreased from 1.04 in 1992 to 0.19 in 1999.

3.1.5 HIV incidence determined by the detuned assay

Table 4.1 shows the HIV incidence among MSM and MSM-IDU during the eight-month period from October 1999 to June 2000. Among MSM in Ontario, HIV incidence was 2.7 per 100 person-years. This was highest in Metro Toronto with a rate of 4.8 per 100 person-years, followed by a rate of 1.1 in the rest of Ontario and 0.42 in Ottawa-Carleton. Overall, HIV incidence among MSM-IDU was substantially higher than that among MSM, being 6.2 per 100 person-years for Ontario as a whole, and 15.4, 26.2 and 0.0 for Metro Toronto, Ottawa-Carleton and the rest of Ontario, respectively.

Figure 7 illustrates HIV incidence density among MSM by age group. Incidence was similar among the five-year age groups for men aged 25 to 49 (range 3.6 to 3.9 per 100 person-years) but lower in men less than 25 years, at 1.4 per 100 person-years, and in men 50 years of age or older at 0.90 per 100 person-years.

3.2 AIDS incidence

In Table 5.1, we present the number and proportion of AIDS cases by year of diagnosis from 1981 to 1999 and exposure category (cases reported to October 10, 2000). Overall, 6,811 cases have been reported in Ontario to date, of which 4,949 (or 75%) have been reported among MSM and 278 (or 4.2%) have been among MSM-IDU. As was observed in HIV testing data, the proportion of AIDS cases comprised by MSM has decreased over time, particularly in recent years.

Table 5.2 displays cases by health region and exposure category. The highest proportion of cases among MSM (67%) were reported from Metro Toronto.

Table 5.3 shows the number of reported AIDS cases among MSM by year of diagnosis and health region. The number of cases reported by each health region has continued to decrease since 1996. Similar results were found among MSM-IDU (Table 5.4).

Table 5.5 presents reported AIDS cases among MSM who were born in HIV-endemic countries. A total of 178 such cases have been diagnosed in Ontario, representing 3.6% of the MSM cases in Ontario. This is approximately the proportion of the adult population born in sub-Saharan Africa and Caribbean countries living in Ontario. The vast majority of cases have been diagnosed among residents of Metro Toronto, representing 88.8% of cases diagnosed among MSM from HIV-endemic countries.

3.3 Sexually transmitted diseases

Tables 6.1 to 6.6 present results of the analysis of reported syphilis and gonorrhea cases in Ontario from January 1993 to June 2000.

Table 6.1 shows the number and rate per 100,000 person-years of reported cases of syphilis by stage and year of diagnosis for the period January 1993 to June 2000. During this 7.5-year period, 2,632 cases of syphilis were reported; of these, 1,873 (or 71%) were late latent. The rate of reported syphilis decreased over the study period, from 5.7 in 1993 to 1.3 per 100,000 in the year 2000. The data for year 2000 should be considered provisional. Though a decrease was observed over this period of observation, the rate appeared stable at about 2.3 per 100,000 person-years from 1997 to 1999.

Table 6.2 shows an analysis limited to reported infectious (primary & secondary) syphilis among adult males 15 years of age and older by age group. Overall, the rates increased somewhat from 1993 to 1995 and decreased to below 0.5 per 100,000 in 1997 and 1998. There was an increase of 13% in the syphilis rate in 1999. The rate appeared to decrease in the first six months of year 2000 compared to previous years but the reporting of cases for this latest period is likely incomplete. From 1998 to 1999, the increases were most marked in the 15 to 24 and 25 to 34 year age group who experienced a five-fold and a 1.5 fold increase, respectively, over these two years.

Table 6.3 shows the number and rate of infectious syphilis cases among men by health region and year of diagnosis. The rates stabilized or decreased in most regions with the exception of Metro Toronto which experienced a doubling of infectious syphilis rates from 1999 compared to 1998 and the Southwest region which experienced a 50% increase. This latter difference is not statistically significant; there is an “excess” of only one additional case.

Tables 6.4 to 6.6 show the rates of reported gonorrhea from 1993 to June 2000 by site of infection and year of diagnosis. The rate of rectal gonorrhea showed no overall increasing or decreasing trend since 1993, though there was an increase of 32% in 2000 (Table 6.4). Similarly, the rate of pharyngeal gonorrhea was relatively stable at around 0.1 per 100,000 person-years but increased for the first time in the year 2000, doubling compared to the rate in

1999. The rate of genito-urinary gonorrhea was stable at about 27 per 100,000 person-years in 1993 to 1995, then decreased to a low of 15.9 in 1997 and appeared to increase since then, to just over 18 in 1998 and 1999 to 19.6 per 100,000 in 2000. Few cases of disseminated gonorrhea were reported during the study period.

Table 6.5 examines cases of rectal gonorrhea among men aged 15 years and older by health region and year of diagnosis. In most regions, there was a stable or decreasing rate during the study period. However, the rate in Metro Toronto increased in the last three and half years from 2 to 3 per 100,000 in the period 1993-96 to between 3.2 and 4.0 per 100,000 from 1997 to 2000.

Table 6.6 shows the rate of pharyngeal gonorrhea among adult men by health region and year of diagnosis. The absolute number of cases in this category was relatively low. For Ontario as a whole, rates increased from 1993 to a peak in 1997 and 1998. The rate of pharyngeal gonorrhea decreased in 1999 but increased 2.6-fold in the first six months of 2000. The increase observed in 2000 was limited to the Metro Toronto and Central West regions, where the increase was 2.6-fold and 5.8-fold, respectively.

Figure 8 illustrates the incidence of rectal and pharyngeal gonorrhea in Metro Toronto from 1993 to 2000.

3.4 MSM statistical model

The results of the MSM statistical model for Ontario as a whole appears in Table 7.1. Of the population of 11,546,000 as of December 1999, an estimated 110,300 were MSM. The cumulative number of HIV infections from 1977 to 1999 among these men was 17,300. Of those, approximately 4,700 have died to date, for an estimated 12,600 MSM living with HIV in Ontario as of December 1999. This corresponds to an HIV prevalence of approximately 11%.

Overall, using data from the HIV laboratory adjusted for 5% duplicate counting, we estimate that 13,000 MSM have been diagnosed with HIV to date. Of these, 8,500 MSM diagnosed with HIV infection were still alive as of December. 5,905 cases of AIDS have been reported and 4,700 MSM have died of HIV-related causes.

Based on the model and data coming from other sources including incidence among repeat testers and the detuned assay, we estimate that annual HIV incidence was 1.0% in 1999. This translates into approximately 1,000 new HIV infections among MSM in 1999.

The distribution of prevalent and incident HIV infections by modified health region (Metro Toronto, Ottawa-Carleton, rest of Ontario) is presented in Table 7.2. Clearly, the highest rates of infection are among residents of Metro Toronto, although the rates among MSM in Ottawa-Carleton and in the rest of Ontario are not negligible.

4. DISCUSSION

In an overview of the situation with respect to HIV infection among MSM in Ontario, we examined and analysed data from several surveillance systems. The source for most of these analyses was the HIV diagnostic database in which we examined the number and distribution of first-time

HIV-positive tests, HIV positivity rates, the rate of HIV testing, incidence among repeat testers and incidence as determined by the detuned assay. In addition, we examined rates of reported syphilis and gonorrhea as indicators of unsafe sexual behaviour in this population, focusing on infectious syphilis and rectal and pharyngeal gonorrhea among adult men.

Overall, we may conclude that there are reasons for concern about increasing HIV transmission among MSM in Ontario, especially in Metro Toronto. The incidence analysis among repeat testers demonstrated a statistically significant increase of over two-fold from 1996 to 1999. The increase of 117% from 1998 to 1999 was particularly dramatic. The increase was greatest in men 20 to 29 and 30 to 39 years of age and less in men aged 40 to 49 years. Rates were highest in Metro Toronto and Ottawa-Carleton. The high incidence rate observed from the detuned assay reinforces our conclusion. The age-specific pattern showing the risk distribution across ages 20 to 49 years were consistent. Nevertheless, in the detuned analysis, the incidence in Toronto was substantially higher than in Ottawa-Carleton. This could be explained by a "crossover effect" during the period January 1999 to June 2000. The repeat tester analysis examined calendar year 1999 and the detuned analysis the period October 1999 to May 2000. The different results obtained may be due to the fact that HIV incidence is increasing in Toronto and decreasing in Ottawa; preliminary analysis of repeat testers by quarter from January 1999 to June 2000 suggests this may be the case (data not shown). Finally, the number of HIV diagnoses among MSM increased for the first time ever in Ontario in 2000, both as a proportion of all diagnoses and in absolute terms. The proportion was decreasing in every year from 89% in 1985 to 47% 1999 and increased to 55% in the first six months of 2000. Similarly an increase of 22% in the number of cases was observed in 2000 compared to 1999.

The HIV diagnostic database is limited to persons who undergo HIV testing. Data from studies and surveys, however, show that a large proportion of MSM have tested for HIV and many of these men test regularly. Estimates of 13,000 to 15,000 HIV tests per year among MSM, however, are somewhat perplexing. If indeed the population of MSM in Ontario is approximately 100,000, this means that only 15% of this population is testing every year, which is lower than that projected through modeling carried out by one of the above authors (RSR).

Data from the HIV diagnostic database does not fully take into account the possibility of unrecognized duplicates. Identifying duplicates is challenging in this database since a large proportion of tests among positive persons especially are carried out anonymously or using identifier codes. In a preliminary analysis of the Laboratory Enhancement Study, we estimated this overcount was in the range of 5% to 10%; we used a conservative 5% adjustment for the MSM model.

Several possible sources of bias must be taken into account when interpreting the results of the incidence analysis among repeat testers. Aside from bias involved in who decides to undergo testing, it must be noted that only a small proportion of seroconverters can be recognized as such, given the limited quality of identifying information in the HIV diagnostic database. Thus, those for whom a match can be found (and therefore identified as a seroconverter based on a previous negative test result) may be different from other seroconverters who are "missed" simply because their current positive result could not be linked to an earlier negative test.

The occurrence of STDs may provide some insight into high risk sexual behaviours. Nevertheless, the numbers of reported cases for the first six months of 2000 must be considered provisional and thus, minimum estimates, since additional cases will likely be

reported for this period. Nevertheless, rates of reported gonorrhea overall showed a change in Ontario in recent years; the decreasing trend has been reversed and suggests increasing infection rates since 1997. Incidence increased somewhat in Ontario in the period 1998-2000 compared to 1997, which was an historic low. Specifically, the incidence rate in 1998, 1999 and 2000 was 19.7, 19.3 and 21.1 per 100,000, respectively, compared to 17.0 per 100,000 in 1996, an increase of 16%. Though the absolute numbers of rectal and especially pharyngeal gonorrhea were relatively low, the incidence of these infections increased in Metro Toronto in the past few years. Rectal gonorrhea in adult males increased from its historic low of 2.1 per 100,000 in 1995 to about 3.3 per 100,000 in 1997-99 and to 4.0 per 100,000 in 2000. The rate of pharyngeal gonorrhea in adult males varied in the range of 0.7 to 1.3 from 1994 to 1999, but was 1.8 per 100,000 in 2000.

Rates of gonorrhea in Ontario are comparable to rates observed in the rest of Canada. However, the Incidence of reported gonorrheal infections in Ontario was substantially lower than in the United States. The U.S. rate of 132.9 per 100,000 in 1998 was 6.7 times higher than the rate of 19.7 per 100,000 in Ontario in the same year. The difference may in part be related to differences in health service delivery systems and in reporting practices.

Incident cases of infectious syphilis reflect recent transmission of the infection. The rate of these infections has been low and apparently stable in Ontario the past few years, both overall and among adult males in particular. Nevertheless, there may now be no reservoir of infectious syphilis in Ontario and, as a result, high risk sexual behaviour among MSM may not translate into an increased incidence of this increasingly rare infection. The incidence of bacterial STDs may not always move in parallel with HIV incidence in this population <*29*>.

The rate of syphilis in the United States is 10-fold higher than in Ontario. In 1998, the rate of infectious syphilis was 2.6 per 100,000 compared to 0.26 per 100,000 in the same year in Ontario. Nonetheless, it is somewhat difficult to compare rates of reported infections in Ontario to those in the United States for the reasons noted above. The rate of syphilis in the rest of Canada as a whole was comparable to that in Ontario in 1997, the latest year for which data were available, with the exception of British Columbia, which experienced an outbreak at the time.

With respect to HIV incidence, preliminary data suggests that increase in HIV incidence similar to that observed in Ontario may also be occurring in Vancouver but not in Montreal. More risky sexual behaviour was documented among MSM participating in the AIDSVAX HIV vaccine trial in Toronto and Vancouver than in Montreal <*30*>. The Vanguard study among MSM aged less than 30 years recently observed an increase in HIV incidence, from 0.7 per 100 person-years in the period May 1995-April 1999 to 2.1 per 100 person-years in May 1999-April 2000. This almost three-fold increase was not, however, statistically significant <*31,32*>. In Montreal, an HIV incidence of 0.8 per 100 person-years was observed among MSM in the Omega study cohort <*33*>; this appears to have been relatively stable over the past year <*34*>.

Clearly, there are limitations to the databases we used for these analyses. In spite of these limitations, however, we have developed a model which provides plausible estimates for the scope of HIV infection in the MSM population. Based on these analysis, we estimate that approximately 12,600 or 11% of MSM are infected with HIV in Ontario, representing by far the largest group of persons affected by the HIV epidemic to date. We also estimate that about

1,000 MSM in Ontario are newly infected every year. This increase in HIV incidence represents an excess of about 400 more HIV infections each year among MSM over that of three years previously. This will exact an enormous toll in terms of human suffering and health care costs in the years to come. Aside from considerable preventable human suffering that this represents, this would result in additional direct medical costs of $215,000 for each HIV-infected person <*35*> or $86 million for the excess HIV infections occurring among MSM in a single year.

It is difficult to draw an entirely clear picture of HIV spread among MSM in Ontario. This is an important and pre-occupying public health concern that calls urgently for epidemiologic studies to better understand the scope and evolution of this epidemic. It is somewhat surprising that no HIV prevalence or incidence study has ever been carried out in homosexual men in Ontario to date. The lack of good data must be addressed in an urgent manner. Despite the preliminary nature of our findings, available data suggest that the incidence of HIV is likely increasing among MSM in Ontario and that the HIV epidemic is not yet under control. Thus, awaiting further data should not impede the taking of decisive action to address this important public health problem.

REFERENCES

1. Palella FJ Jr, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. *N Engl J Med* 1998; 338:853-60.

2. Lehman JS, Hecht FM, Wortlry P, Lansky A, Stevens M, Fleming P. Are at-risk populations less concerned about HIV infection in the HAART era? *7th Conference on Retroviruses and Opportunistic Infections*, San Francisco, California, USA, January 30-February 2, 2000 (Abstract 198).

3. Ostrow DG, Fox K, Chmiel JS. Attitudes toward highly active antiretroviral therapy predict sexual risk-taking among HIV infected and uninfected gay men in the Multicenter AIDS Cohort Study (MACS). *13th International Conference on AIDS*, Durban, South Africa, July 9-14, 2000 (Abstract ThOrC719).

4. Dukers N, de Wit J, Goudsmit J, Coutinho R. Recent increase in sexual risk behaviour and sexually transmitted diseases in a cohort of homosexual men: the price of highly active antiretroviral therapy? *13th International Conference on AIDS*, Durban, South Africa, July 9-14, 2000 (Abstract ThOrC715).

5. Martin IM, Ison CA. Rise in gonorrhoea in London UK. London Gonococcal Working Group. *Lancet* 2000; 355:623.

6. Fenton KA, Rogers PA, Simms I, Maguire H, Catchpole M. Increasing gonorrhoea reports--not only in London. *Lance*t 2000 May 27;355(9218):1907.

7. Browning MR, Blackwell AL, Joynson DH. Increasing gonorrhoea reports--not only in London. *Lancet* 2000;355(9218):1908-9.

8. Donovan B, Bodsworth NJ, Rohrsheim R, McNulty A, Tapsall JW. Increasing gonorrhoea reports--not only in London. *Lancet* 2000; 355(9218):1908.

9. Van de Ven P, Prestage G, French J, Knox S, Kippax S. Increase in unprotected anal intercourse with casual partners among Sydney gay men in 1996-98. *Aust N Z J Public Health* 1998; 22:814-8.

10. Rekart M, Patrick D, Jolly A et al. Mass treatment/prophylaxis during an outbreak of infectious syphilis, Vancouver, British Columbia. *Can Comm Dis Report* 2000; 26:101-5.

11. Coates RA, Soskolne CL, Read SE, et al. A prospective study of male sexual contacts of men with AIDS-related conditions (ARC) or AIDS: HTLV-III antibody, clinical, and immune function status at induction. *Can J Public Health* 1986; 77 Suppl 1:26-32.

12. Coates RA, Calzavara LM, Read SE, et al. Risk factors for HIV infection in male sexual contacts of men with AIDS or an AIDS-related condition. *Am J Epidemiol* 1988; 128:729-39.

13. Coates RA, Farewell VT, Raboud J, et al. Cofactors of progression to acquired immunodeficiency syndrome in a cohort of male sexual contacts of men with human immunodeficiency virus disease. *Am J Epidemiol* 1990; 132:717-22.

14. Calzavara LM, Coates RA, Johnson K, et al. Sexual behaviour changes in a cohort of male sexual contacts of men with HIV disease: a three-year overview. *Can J Public Health* 1991; 82:150-6.

15. Farewell VT, Coates RA, Fanning MM, et al. The probability of progression to AIDS in a cohort of male sexual contacts of men with HIV disease. *Int J Epidemiol* 1992; 21:131-5.

16. Coates RA, Farewell VT, Raboud J, et al. Using serial observations to identify predictors of progression to AIDS in the Toronto Sexual Contact Study. *J Clin Epidemiol* 1992; 45:245-53.

17. Myers T, Rowe CJ, Tudiver FG, et al. HIV, substance use and related behaviour of gay and bisexual men: An examination of the talking sex project cohort. *Br J Addict* 1992; 87:207-14.

18. Myers T, Tudiver FG, Kurtz RG, et al. The Talking Sex Project: descriptions of the study population and correlates of sexual practices at baseline. *Can J Public Health* 1992; 83:47-52.

19. Myers T, Godin G, Calzavara L, Lambert J, Locker D in collaboration with the Canadian AIDS Society. The Canadian Survey of Gay and Bisexual Men and HIV Infection: Men's survey. Canadian Cataloguing in Publication Data, ISBN 0-921906-14-5, 1993.

20. HIV Social, Behavioural and Epidemiological Studies Unit. Bisex Survey. Final Report. Faculty of Medicine, University of Toronto. July 1998.

21. The Ontario HIV Seroconverter Study. Phase I Community Report. HIV Social, Behavioural and Epidemiological Studies Unit. Canadian Cataloguing in Publication Data, ISBN 0-772708710-7.

22. Remis RS, Major C, Fearon M, Whittingham E, Degazio T, Wallace E. Enhancing HIV diagnostic data for surveillance of HIV infection: Use of the detuned assay. *9th Annual Conference of the Canadian Association for HIV/AIDS Research*, Montreal, Quebec, April 27-30, 2000 (Abstract C336) and *XIIIth International Conference on AIDS*, Durban, South Africa, July 9-14, 2000 (Abstract MoPeC2340).

23. Kitayaporn D, Uneklabh C, Weniger BG, et al. HIV-1 incidence determined retrospectively among drug users in Bangkok, Thailand. *AIDS* 1994; 8:1443-50.

24. Janssen, RS, Satten GA, Stramer SL, et al. New testing strategy to detect early HIV-1 infection for use in incidence estimates and for clinical and prevention purposes. *JAMA* 1998; 280:42-8 (Published erratum appears in JAMA 1999 May 26; 281: 1893).

25. Remis RS, Whittingham EP. The HIV/AIDS epidemic among persons from HIV-endemic countries in Ontario, 1981-98. Situation report. Department of Public Health Sciences, University of Toronto, November 1999.

26. Johnson RJ, Montano BL, Wallace EM. Using death certificates to estimate the completeness of AIDS case reporting in Ontario in 1985-87. *Can Med Assoc J* 1989;141:537-40.

27. Calzavara LM, Coates RA, Craib KJ, et al. Underreporting of AIDS cases in Canada: a record linkage study. *Can Med Assoc J* 1990; 142:36-9.

28. Remis RS, Major C. Estimating HIV diagnosis rates among men who have sex with men (MSM), Ontario, 1985-98. *Eighth Annual Conference of the Canadian Association for HIV/AIDS Research*, Victoria, British Columbia, May 1-4, 1999 (Abstract C316).

29. Aral S. Personal communication. July 12, 2000.

30. Hogg RS, Willoughby B, Montaner J, et al. The baseline sexual behaviour and substance use of 291 Canadian men enrolled in the phase III preventive HIV-1 vaccine trial. *9th Annual Conference of the Canadian Association for HIV/AIDS Research*, Montreal, Quebec, April 27-30, 2000 (Abstract 416).

31. Hogg RS, Strathdee SA, Chan K, Martindale SL, Craib KJP. HIV infection and risk behaviours in young gay and bisexual men. *Can Med Assoc J* 2000;163:14.

32. Hogg RS. Personal communication. October 2, 2000.

33. Alary M, Remis RS, Otis J, et al. HIV incidence among homosexual and bisexual men in the Montreal Omega Study: Unprotected anal sex remains the main risk factor if properly defined. *9th Annual Conference of the Canadian Association for HIV/AIDS Research*, Montreal, Quebec, April 27-30, 2000, 1997 (Abstract 318).

34. Otis J. Personal communication. September 2000

35. McMurchy D, Palmer RWH. The economic impact of HIV antiretroviral therapy in Canada. *9th Annual Canadian Conference on HIV/AIDS Research*, Montreal, Quebec, April 27-30, 2000 (Abstract 323).

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APPENDIX

Methodology used to adjust for unknown exposure category and unknown region among first-time HIV-positive diagnoses, 1985 to June 2000 is described.

Adjustments were completed using four main steps; similar steps were carried out for each health region then added together to obtain provincial totals.

Step 1: Distribute diagnoses with unknown health region among the seven health regions.

i) Obtain the distribution of HIV-positives by year and exposure category for each region, including Unknown region

ii) For each year and exposure category, assign HIV-positives with unknown region to the seven health regions in accordance with the distribution among the known.

Example:

In 1992, 17 cases of MSM were in Unknown region, 420 were in Metro Toronto and a total of 568 MSM were diagnosed HIV-positive in Ontario that year. Therefore, the proportion of MSM with known health region who were in Metro Toronto was;

420/(568-17) x 100% = 76.2%

Therefore, 76.2% of the MSM cases with unknown region were allocated to Metro Toronto such that:

17 (MSM, Unknown region) x 76.2% = 12.95, or 13 cases

and the number of MSM in Metro Toronto, adjusted for Unknown region, was;

420 + 13 = 433

This procedure was repeated for each year and each exposure category, including unknown exposure.

Steps 2 through 4 were completed *within* each of the seven health regions.

Step 2: Calculate the proportion of cases with known exposure for each exposure category for each year.

Example:

In 1992, 433 HIV-positive cases among MSM were diagnosed in Metro Toronto (Step 1), 629 cases in Metro Toronto had unknown exposure and a total of 1,171 HIV-positives were diagnosed in Metro Toronto that year. Thus, the proportion of cases with MSM exposure was;

433/(1,171-629) = 79.88% or 80%

This procedure was repeated for each year and each exposure category.

Step 3: Using 1999 and 2000, compare the proportion of cases in each exposure category among those with known exposure to the LES results for that region.

Example:

In 1999 and the first half of 2000, the proportion of cases among MSM in Metro Toronto was 68% and 72% respectively. The average of these two proportions was 69.9%. Based on results of the LES, 54.2% of HIV-positive testers in Metro Toronto who did not indicate risk information on the test requisition were subsequently found to be MSM. An adjustment factor was derived which would account for these different proportions, that is, the discrepancy between the results of the LES (54.2%) and the averaged proportion among the known (69.9%). Hence, for each year and in each exposure category, an adjustment factor was calculated by multiplying the proportion among the known in that particular year

by the LES proportion then dividing by the 1999/2000 average proportion. For MSM in Metro Toronto in 1992, the calculation was;

0.80 (from Step 2) x (0.542/0.699) = 0.620 or 62%

Step 4: Sum the adjustment factors for each exposure category within each year then standardize the sum to 1.0.

Since the sum of the proportions calculated in Step 3. in each exposure category did not necessarily add to 1.0, the final step standardized the sum to 1.0.

Example:

In 1992 in Metro Toronto, the sum of the proportions calculated in Step 3, that is, 0.62 for MSM + 0.019 for MSM-IDU etc. was 0.93. The proportions in each exposure category were "normalized to 1.0" by dividing the proportion in that exposure category by the sum of the proportions that year. For MSM in Metro Toronto in 1992, the calculation was;

0.620 (Step 3) / 0.93 = 0.667 = 67%

The process was repeated for each exposure category for each year and in this manner, final adjustment factors were generated.

To calculate the adjusted number of HIV-positive diagnoses for a given exposure category in a given year, the final adjustment factor calculated in Step 4 was multiplied by the number of HIV-positive tests with unknown exposure that year and added to the HIV-positive tests with known exposure.

Example:

In 1992, Metro Toronto had 433 HIV-positive diagnoses among MSM, 629 diagnoses with unknown exposure and a total of 1,171 HIV-positives that year. Therefore, the number of HIV-positives among MSM adjusted for unknown region and unknown exposure was;

433 + 67% x 629 = 854 HIV-positives among MSM in 1992.

The process was repeated for each exposure category and each year. Ontario totals, by year and exposure category (as seen in Table 1.5), were obtained by summation across the regions.

One minor variation to this methodology was required for those regions for which LES results were based on small numbers. To stabilize LES adjustment factors in preparation for comparison to the averaged 1999-2000 proportions in Step 3, LES results for Southwest, Central West and Eastern Other were combined and adjustment factors based on these combined results were used in Step 3. Similarly, LES results for Northern and Central East Other were combined and used in Step 3 for these two regions.

The same methodology was used to assign HIV-negative diagnoses of unknown region and unknown exposure category for each year 1992 to 2000 to the seven modified health regions. LES adjustment factors based on results of HIV-negative tests from Metro Toronto and Ottawa-Carleton were used in Step 3 for each region respectively. Combined results for Southwest, Central West and Eastern Other were used in Step 3 for these regions, as were combined results for Northern and Central East Other. Regionally adjusted HIV-negative tests per exposure category were summed to provide provincial totals. HIV positivity rates for each modified health region by year of diagnosis (1992, 1993, etc., 2000) and exposure category were calculated using adjusted figures such that the number of HIV tests (adjusted) was the sum of HIV-positives + HIV-negative diagnoses adjusted as described above.

Table 1.1 Number and proportion[1] of first-time HIV-positive diagnoses (adjusted[2]) by year of diagnosis and exposure category, Ontario, 1985 to June 2000

	MSM		MSM-IDU		IDU		Clotting factor		Transfusion		HIV-endemic		HR hetero		LR hetero		Perinatal[3]		Other[4]		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
1985	301	89.8	8	2.4	2	0.4	15	4.4	8	2.5	0	0.0	2	0.6	0	0.0	0	0.0	0	0.0	335
1986	1,177	86.3	26	1.9	38	2.8	69	5.1	19	1.4	30	2.2	5	0.4	0	0.0	0	0.0	0	0.0	1,365
1987	1,301	83.9	26	1.7	31	2.0	78	5.0	62	4.0	34	2.2	5	0.3	13	0.8	2	0.1	0	0.0	1,551
1988	1,116	76.7	31	2.1	68	4.7	76	5.2	65	4.4	51	3.5	29	2.0	9	0.6	9	0.6	0	0.0	1,454
1989	1,348	78.8	36	2.1	94	5.5	54	3.1	47	2.7	54	3.2	47	2.8	23	1.4	7	0.4	0	0.0	1,710
1990	1,552	74.2	29	1.4	159	7.6	84	4.0	15	0.7	127	6.0	91	4.3	15	0.7	20	1.0	0	0.0	2,091
1991	1,323	71.9	12	0.7	145	7.9	61	3.3	1	0.1	160	8.7	107	5.8	21	1.1	8	0.4	0	0.0	1,839
1992	1,204	66.0	34	1.9	177	9.7	34	1.8	38	2.1	155	8.5	90	4.9	85	4.7	7	0.4	0	0.0	1,823
1993	902	60.0	48	3.2	114	7.6	36	2.4	41	2.7	103	6.8	98	6.5	146	9.7	16	1.1	0	0.0	1,503
1994	752	55.9	28	2.1	171	12.7	13	1.0	28	2.1	97	7.2	65	4.8	157	11.6	33	2.5	3	0.2	1,346
1995	756	55.6	31	2.3	137	10.1	21	1.5	27	2.0	115	8.5	78	5.8	168	12.3	25	1.8	3	0.2	1,360
1996	564	52.3	20	1.9	114	10.6	11	1.0	15	1.4	126	11.7	56	5.1	135	12.5	33	3.1	6	0.6	1,079
1997	500	51.8	17	1.7	100	10.4	11	1.1	19	1.9	74	7.7	84	8.7	150	15.5	10	1.0	2	0.2	965
1998	482	48.4	18	1.8	108	10.8	4	0.4	20	2.0	124	12.4	54	5.4	158	15.8	24	2.4	6	0.6	996
1999	431	46.6	12	1.2	118	12.7	2	0.2	8	0.9	107	11.6	56	6.0	155	16.7	15	1.6	22	2.3	925
2000	262	54.7	7	1.4	32	6.7	0	0.0	9	1.9	54	11.2	22	4.7	81	16.9	12	2.5	0	0.0	479
Total	13,969	67.1	382	1.8	1,607	7.7	567	2.7	422	2.0	1,409	6.8	888	4.3	1,315	6.3	221	1.1	41	0.2	20,821

1 Row percent
2 According to proportion with known exposure that year and LES results (see text for more details.)
3 Includes infants with maternal antibodies who are not infected
4 Includes needlestick, acupuncture, tattoo, etc.

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 1.2 Number and proportion[1] of first-time HIV-positive diagnoses (adjusted[2]) by modified health region and exposure category, Ontario, 1985 to June 2000

Modified health region	MSM		MSM-IDU		IDU		Clotting factor		Transfusion		HIV-endemic		HR hetero		LR hetero		Perinatal[3]		Other[4]		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Northern	121	29.9	6	1.5	97	23.8	40	9.8	3	0.74	13	3.1	56	13.7	61	15.0	10	2.4	0	0.0	406
Ottawa-Carleton	1,022	44.3	33	1.4	347	15.0	39	1.7	28	1.2	581	25.1	47	2.0	168	7.3	40	1.7	6	0.26	2,309
Eastern, other	298	56.2	10	1.9	89	16.7	43	8.0	7	1.3	8	1.5	22	4.1	45	8.6	6	1.2	2	0.43	530
Metro Toronto	10,543	75.5	279	2.0	861	6.2	258	1.8	281	2.0	667	4.8	319	2.3	602	4.3	131	0.93	21	0.15	13,959
Central East, other	262	29.7	13	1.5	115	13.1	34	3.9	63	7.1	44	5.0	140	15.9	195	22.2	7	0.81	8	0.89	881
Central West	761	66.4	23	2.0	63	5.5	45	4.0	19	1.6	49	4.3	63	5.5	104	9.1	18	1.5	2	0.17	1,147
Southwest	961	60.5	18	1.1	36	2.3	109	6.8	22	1.4	48	3.0	243	15.3	140	8.8	10	0.65	2	0.13	1,589
Total	13,969	67.1	382	1.8	1,607	7.7	567	2.7	422	2.0	1,409	6.8	888	4.3	1,315	6.3	221	1.1	41	0.20	20,821

1 Row percent
2 According to proportion with known exposure that year and LES results (see text for more details.)
3 Includes infants with maternal antibodies who are not infected
4 Includes needlestick, acupuncture, tattoo, etc.

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 1.3 Number and proportion[1] of first-time HIV-positive diagnoses among MSM (adjusted)[2] by year of diagnosis and modified health region, Ontario, 1985 to June 2000

	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
1985	0	0.0	20	6.6	5	1.6	212	70.5	15	5.0	23	7.7	26	8.6	301
1986	6	0.5	107	9.1	19	1.6	871	73.9	34	2.9	76	6.4	66	5.6	1,178
1987	14	1.1	105	8.1	14	1.1	990	76.1	31	2.4	67	5.1	80	6.2	1,301
1988	15	1.3	102	9.1	19	1.7	867	77.7	15	1.4	49	4.4	49	4.4	1,116
1989	6	0.4	68	5.0	19	1.4	1,127	83.6	24	1.8	48	3.5	57	4.2	1,348
1990	9	0.6	104	6.7	21	1.4	1,237	79.7	21	1.4	61	4.0	98	6.3	1,551
1991	20	1.5	58	4.4	32	2.4	974	73.6	23	1.7	55	4.1	162	12.2	1,323
1992	10	0.8	78	6.5	36	3.0	854	71.0	16	1.3	102	8.5	107	8.9	1,204
1993	7	0.8	71	7.9	18	2.0	680	75.4	15	1.6	44	4.9	66	7.3	902
1994	4	0.5	44	5.9	27	3.6	524	69.7	10	1.4	78	10.4	65	8.6	752
1995	7	0.9	52	6.8	25	3.2	587	77.6	8	1.1	40	5.3	38	5.0	756
1996	2	0.4	33	5.8	20	3.6	417	74.0	16	2.9	24	4.2	51	9.1	564
1997	10	2.1	35	6.9	10	2.0	362	72.3	12	2.4	42	8.3	30	6.0	500
1998	4	0.8	80	16.6	15	3.1	320	66.5	5	1.0	25	5.3	32	6.7	482
1999	3	0.6	48	11.1	12	2.9	330	76.4	6	1.4	13	3.0	20	4.5	431
2000	6	2.1	19	7.3	6	2.2	192	73.0	9	3.4	15	5.8	16	6.1	262
Total	121	0.9	1,022	7.3	298	2.1	10,543	75.5	262	1.9	762	5.5	962	6.9	13,969

1 Row percent

2 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.)

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 1.4 Number and proportion[1] of first-time HIV-positive diagnoses among MSM-IDU (adjusted)[2] by year of diagnosis and modified health region, Ontario, 1985 to June 2000

	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
1985	0	0.0	0	0.0	0	0.0	6	73.8	1	12.5	0	0.0	1	12.5	8
1986	0	0.0	0	0.0	1	3.9	22	83.7	0	0.0	2	8.6	1	3.9	26
1987	0	0.0	2	7.7	0	0.0	19	70.9	1	3.8	4	13.8	1	3.8	26
1988	0	0.0	0	0.0	0	0.0	28	91.6	0	0.0	2	5.2	1	3.2	31
1989	0	0.0	1	3.1	1	3.1	31	84.7	1	3.1	0	0.0	2	6.1	36
1990	0	0.0	3	11.9	1	3.9	23	80.4	0	0.0	0	0.0	1	3.9	29
1991	0	0.0	2	16.3	0	0.0	9	75.6	1	8.1	0	0.0	0	0.0	12
1992	2	4.9	3	9.3	2	6.1	24	70.3	2	6.1	0	0.0	1	3.2	34
1993	0	0.0	4	8.3	0	0.0	43	89.6	0	0.0	0	0.0	1	2.1	48
1994	4	15.5	4	14.8	0	0.0	11	38.7	2	7.4	5	16.2	2	7.4	28
1995	0	0.0	6	19.2	1	3.9	16	50.3	2	7.8	3	11.0	2	7.8	31
1996	0	0.0	1	5.4	0	0.0	16	80.7	0	0.0	2	8.4	1	5.4	20
1997	0	0.0	0	0.0	3	14.9	11	62.5	1	7.7	3	14.9	0	0.0	17
1998	0	0.0	4	22.6	0	0.0	10	56.5	0	0.0	4	20.9	0	0.0	18
1999	0	0.0	1	8.7	1	8.7	8	65.2	1	8.7	0	0.0	1	8.7	12
2000	0	0.0	1	15.2	0	0.0	4	54.5	0	0.0	0	0.0	2	30.3	7
Total	6	1.6	33	8.6	10	2.6	279	72.9	13	3.4	23	6.1	18	4.7	382

1 Row percent

2 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.)

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 1.5 Number and proportion[1] of first-time HIV-positive diagnoses (adjusted[2]) by age group and exposure category, Ontario, 1985 to June 2000

Age group	MSM		MSM-IDU		IDU		Clotting factor		Transfusion		HIV-endemic		HR hetero		LR hetero		Perinatal[3]		Other[4]		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
< 1	58	0.42	1	0.16	14	0.86	0	0.0	2	0.38	19	1.4	4	0.47	12	0.87	184	83.1	0	0.73	293
1 - 14	39	0.28	0	0.10	7	0.46	112	19.7	10	2.4	12	0.83	4	0.46	9	0.65	37	16.9	0	0.73	231
15 - 19	125	0.89	8	2.1	23	1.4	64	11.3	8	1.8	17	1.2	21	2.4	20	1.5	0	0.0	0	1.0	285
20 - 24	1,092	7.8	51	13.4	157	9.8	82	14.4	26	6.2	107	7.6	91	10.2	111	8.4	0	0.0	3	7.5	1,720
25 - 29	2,831	20.3	89	23.3	328	20.4	73	12.8	69	16.4	269	19.1	163	18.4	244	18.5	0	0.0	8	18.5	4,074
30 - 34	3,316	23.7	101	26.4	375	23.3	69	12.1	74	17.4	318	22.6	214	24.1	306	23.2	0	0.0	9	21.7	4,780
35 - 39	2,707	19.4	55	14.5	341	21.2	36	6.4	68	16.1	266	18.9	148	16.7	238	18.1	0	0.0	8	19.2	3,867
40 - 44	1,813	13.0	42	11.1	182	11.3	19	3.4	55	13.0	177	12.5	103	11.6	169	12.9	0	0.0	5	13.1	2,565
45 - 49	978	7.0	23	6.0	92	5.8	36	6.4	29	6.9	101	7.2	63	7.1	98	7.4	0	0.0	3	8.3	1,424
50 - 54	504	3.6	5	1.4	45	2.8	19	3.4	22	5.2	58	4.1	37	4.1	51	3.9	0	0.0	2	4.1	742
55 - 59	270	1.9	3	0.76	22	1.4	31	5.4	22	5.2	33	2.4	19	2.1	31	2.4	0	0.0	1	2.7	431
60 +	236	1.7	3	0.73	21	1.3	27	4.8	38	9.0	33	2.4	21	2.4	29	2.2	0	0.0	1	2.4	409
Total	13,969	100.0	382	100.0	1,607	100.0	567	100.0	422	100.0	1,410	100.0	888	100.0	1,315	100.0	221	100.0	41	100.0	20,821

1 Column percent
2 Unknown age assigned according to the proportion with known age, unknown exposure category assigned according to LES results (see text for more details.)
3 Includes infants with maternal antibodies who are not infected
4 Includes needlestick, acupuncture, tattoo, etc.

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 1.6 Number of first-time HIV-positive diagnoses (unadjusted[1]) among MSM by health unit and year of diagnosis, Ontario, 1985 to June 2000

Health unit	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
NORTHERN																	
Algoma	0	0	2	0	1	1	0	1	0	0	0	0	1	0	0	0	6
Muskoka	0	1	0	1	0	0	0	0	2	1	0	1	2	2	0	1	11
North Bay	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	4
Northwestern	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	6
Porcupine	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sudbury	0	0	5	4	2	4	1	5	1	2	3	1	1	1	1	2	33
Thunder Bay	0	3	2	1	1	0	0	1	1	0	2	0	1	0	0	0	12
Timiskaming	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
OTTAWA-CARLETON	13	37	68	87	55	72	27	46	49	24	33	21	19	36	26	10	623
EASTERN, OTHER																	
Eastern Ontario	2	2	3	4	1	1	3	5	2	4	4	4	0	0	2	1	38
Hastings-Prince	2	2	1	1	2	0	0	0	0	1	1	0	1	1	0	0	12
Kingston-Frontenac	0	6	5	5	6	7	2	4	6	4	4	3	2	4	4	0	62
Leeds-Grenville	0	1	0	1	1	3	1	0	0	0	0	1	0	0	0	1	9
Renfrew	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
METRO TORONTO	112	344	660	592	744	637	330	420	342	263	275	229	167	170	185	112	5,582
CENTRAL EAST, OTHER																	
Durham	5	5	1	1	2	1	1	0	0	1	1	2	0	0	0	1	21
Haliburton	0	0	1	2	0	0	0	0	1	0	0	0	1	0	0	0	5
Peel	3	9	16	5	10	10	5	5	3	4	4	7	4	2	3	4	94
Peterborough	0	3	0	0	2	1	1	1	1	0	0	0	0	2	0	0	11
Simcoe	0	1	0	0	1	1	0	4	0	1	0	1	2	0	0	0	11
York Region	0	0	5	3	3	1	1	1	6	1	2	3	2	0	1	1	30
CENTRAL WEST																	
Brant	0	3	1	1	0	0	0	3	1	1	0	0	0	0	0	0	10
Haldimand	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Halton	1	5	6	2	3	1	0	2	2	1	1	2	2	0	0	0	28
Hamilton-Wentworth	4	3	8	6	2	4	7	9	6	9	3	6	7	2	4	1	81
Niagara	4	4	7	6	6	3	1	10	0	6	3	1	1	2	1	0	55
Waterloo	2	4	1	4	1	2	0	4	2	5	0	1	2	0	0	2	30
Wellington-Dufferin	1	2	2	2	4	5	2	0	0	1	1	1	1	0	0	1	23
SOUTHWEST																	
Bruce-Grey-Owen	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	7
Elgin-St Thomas	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Huron	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Kent-Chatham	0	1	0	1	0	0	0	0	1	0	0	1	0	0	1	1	6
Lambton	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	4
Middlesex-London	9	13	30	19	30	51	28	23	7	5	7	8	8	6	5	3	252
Oxford	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	4
Perth	0	1	0	0	1	0	0	0	1	1	0	0	0	1	0	0	5
Windsor-Essex	4	11	14	12	2	6	4	4	8	3	3	7	1	6	2	2	89
Unknown	2	6	11	15	10	16	11	17	12	6	11	8	22	0	0	0	147
TOTAL	166	471	856	778	894	830	427	568	456	346	359	310	247	235	236	144	7,323

1 Unadjusted for unknown region and unknown exposure category

Sources of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care

Table 2.1 **First-time HIV-positivity rates (%), unadjusted and adjusted[1], among MSM by year of HIV diagnosis and modified health region, Ontario, 1992 to June 2000**

Year of HIV diagnosis	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Ontario	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.[2]	Adj.
1992	4.1	1.7	5.1	2.3	5.9	5.3	9.3	11.2	3.6	1.4	6.2	6.4	5.7	5.8	7.3	7.1
1993	2.6	1.5	4.3	2.5	4.4	3.0	8.2	10.0	3.1	1.4	2.5	3.6	3.2	4.2	5.8	6.2
1994	1.8	1.1	2.2	1.6	4.8	4.9	6.7	8.2	2.0	1.0	5.4	6.7	2.9	6.0	4.6	5.6
1995	2.6	1.6	2.7	1.7	3.9	3.3	7.0	9.1	2.2	0.9	1.8	3.5	2.3	3.0	4.4	5.4
1996	0.8	0.5	1.8	1.1	3.6	2.8	6.0	6.6	3.9	1.6	2.1	1.8	3.9	4.1	3.8	4.0
1997	2.2	2.0	1.6	1.2	1.4	1.5	4.4	5.9	2.5	1.1	2.6	3.3	2.0	2.5	3.2	3.6
1998	1.3	0.9	3.2	2.9	1.8	2.0	3.9	5.3	1.0	0.4	0.8	2.1	2.4	2.5	3.2	3.5
1999	0.9	0.6	2.2	1.7	2.5	2.0	4.5	5.8	1.0	0.5	1.0	1.1	1.7	2.0	3.3	3.3
2000	3.9	2.9	1.8	1.5	1.5	1.9	4.7	5.8	2.9	1.5	1.4	2.4	2.3	3.1	3.7	3.9
Overall	2.1	1.3	2.7	1.9	3.2	3.0	6.2	7.8	2.4	1.1	2.6	3.6	3.0	3.9	4.4	4.9

1 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.).
2 Includes unknown health region

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care; Laboratory enhancement study

Table 2.2 **First-time HIV-positivity rates (%), unadjusted and adjusted[1], among MSM-IDU by year of HIV diagnosis and modified health region, Ontario, 1992 to June 2000**

Year of HIV diagnosis	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Ontario	
	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.[2]	Adj.
1992	6.3	7.8	10.7	8.6	13.3	10.8	12.9	19.6	22.2	18.3	0.0	0.0	4.6	3.6	8.0	12.4
1993	0.0	0.0	8.0	6.3	0.0	0.0	17.8	25.4	0.0	0.0	0.0	0.0	3.2	2.5	7.3	12.7
1994	11.8	18.1	7.1	5.8	0.0	0.0	5.3	8.4	9.1	7.4	7.1	11.7	7.1	5.8	5.1	7.8
1995	0.0	0.0	10.4	9.0	4.2	3.6	6.7	11.8	9.1	7.8	2.9	7.0	12.5	10.8	5.9	8.8
1996	0.0	0.0	2.2	1.7	0.0	0.0	8.7	12.2	0.0	0.0	2.5	3.0	5.3	4.2	3.4	5.6
1997	0.0	0.0	0.0	0.0	9.1	8.9	5.6	10.7	6.3	6.1	2.3	4.2	0.0	0.0	3.4	5.5
1998	0.0	0.0	8.3	8.3	0.0	0.0	6.4	11.9	0.0	0.0	2.3	7.8	0.0	0.0	3.4	5.9
1999	0.0	0.0	2.6	2.6	2.1	2.1	5.1	9.1	1.4	1.4	0.0	0.0	2.6	2.6	2.4	3.5
2000	0.0	0.0	9.1	9.1	0.0	0.0	4.6	7.9	0.0	0.0	0.0	0.0	7.4	7.4	2.9	3.8
Overall	2.1	3.5	6.2	5.3	2.6	2.5	8.8	14.2	3.3	3.2	2.0	4.2	4.3	3.9	4.7	7.5

1 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.)

2 Includes unknown health region

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care; Laboratory enhancement study

Table 3.1 Number and proportion[1] of HIV tests (adjusted[2]), by year of test and exposure category, Ontario, 1992 to June 2000

	MSM		MSM-IDU		IDU		Clotting factor		Transfusion		HIV-endemic		HR hetero		LR hetero		Perinatal		Other[3]		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
1992	16,893	8.0	276	0.13	18,237	8.7	3,598	1.7	3,849	1.8	13,265	6.3	19,544	9.3	133,680	63.5	55	0.03	1,164	0.55	210,560
1993	14,620	5.8	378	0.15	15,289	6.0	10,140	4.0	26,596	10.5	9,423	3.7	18,234	7.2	157,358	62.1	70	0.03	1,230	0.49	253,338
1994	13,346	5.5	364	0.15	12,615	5.2	9,780	4.1	29,389	12.2	8,819	3.7	16,056	6.7	148,521	61.7	116	0.05	1,665	0.69	240,671
1995	14,024	5.8	350	0.15	12,759	5.3	5,316	2.2	13,512	5.6	7,413	3.1	17,216	7.1	162,177	67.2	106	0.04	8,308	3.4	241,180
1996	14,080	5.3	363	0.14	13,278	5.0	3,488	1.3	8,124	3.1	7,027	2.6	19,171	7.2	186,852	70.3	119	0.04	13,199	5.0	265,700
1997	13,769	5.4	304	0.12	13,111	5.1	1,670	0.66	4,355	1.7	7,194	2.8	16,381	6.4	185,238	72.7	58	0.02	12,740	5.0	254,818
1998	13,632	5.0	300	0.11	14,195	5.2	1,414	0.52	4,710	1.7	8,932	3.3	15,070	5.5	198,961	72.9	67	0.02	15,567	5.7	272,848
1999	12,906	4.9	333	0.13	12,967	4.9	782	0.30	4,161	1.6	9,231	3.5	11,598	4.4	192,365	73.1	63	0.02	18,863	7.2	263,268
2000	6,806	5.3	173	0.13	6,839	5.3	307	0.24	1,445	1.1	4,586	3.5	5,398	4.2	93,822	72.4	50	0.04	10,168	7.8	129,592
Total	120,076	5.6	2,840	0.13	119,290	5.6	36,494	1.7	96,141	4.5	75,888	3.6	138,666	6.5	1,458,974	68.4	704	0.03	82,902	3.9	2,131,975

1 Row percent

2 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.)

3 Includes needlestick, acupuncture, tattoo, etc.

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care, Ontario Ministry of Health and Long Term Care

Table 3.2 **Number and proportion[1] of HIV tests among MSM (adjusted[2]) by year of test and modified health region, Ontario, 1992 to June 2000**

Year of test	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
1992	573	3.4	3,348	19.8	687	4.1	7,637	45.2	1,199	7.1	1,600	9.5	1,849	10.9	16,893
1993	450	3.1	2,889	19.8	606	4.1	6,830	46.7	1,032	7.1	1,245	8.5	1,568	10.7	14,620
1994	374	2.8	2,781	20.8	551	4.1	6,424	48.1	982	7.4	1,156	8.7	1,079	8.1	13,346
1995	426	3.0	3,023	21.6	739	5.3	6,474	46.2	934	6.7	1,142	8.1	1,286	9.2	14,024
1996	534	3.8	2,900	20.6	716	5.1	6,369	45.2	1,039	7.4	1,276	9.1	1,247	8.9	14,080
1997	506	3.7	2,945	21.4	648	4.7	6,139	44.6	1,075	7.8	1,267	9.2	1,188	8.6	13,769
1998	440	3.2	2,733	20.1	733	5.4	6,042	44.3	1,183	8.7	1,234	9.1	1,266	9.3	13,630
1999	410	3.2	2,784	21.6	630	4.9	5,733	44.4	1,133	8.8	1,241	9.6	977	7.6	12,906
2000	188	2.8	1,269	18.6	315	4.6	3,288	48.3	587	8.6	651	9.6	508	7.5	6,806
Total	3,901	3.2	24,672	20.5	5,624	4.7	54,935	45.8	9,163	7.6	10,812	9.0	10,968	9.1	120,074

1 Row percent

2 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year and LES results (see text for more details.)

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care; Laboratory enhancement study

Table 3.3 Number and proportion[1] of HIV tests among MSM-IDU (adjusted[2])by year of test and modified health region, Ontario, 1992 to June 2000

Year of test	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
1992	22	7.9	37	13.2	20	7.1	123	44.6	12	4.2	35	12.6	29	10.5	276
1993	14	3.8	64	16.9	22	5.9	170	44.9	26	6.9	42	11.0	40	10.6	378
1994	24	6.7	74	20.2	31	8.4	131	35.9	29	7.9	39	10.8	37	10.1	365
1995	18	5.1	66	18.7	33	9.5	132	37.7	30	8.6	49	14.1	22	6.2	350
1996	28	7.7	63	17.3	32	8.9	134	36.9	24	6.6	56	15.5	26	7.2	363
1997	14	4.7	63	20.8	28	9.3	98	32.3	21	6.8	58	19.0	22	7.2	304
1998	22	7.4	49	16.2	34	11.5	84	28.0	30	10.1	47	15.7	33	11.1	300
1999	18	5.4	38	11.5	48	14.5	83	25.0	72	21.8	34	10.3	38	11.5	332
2000	14	8.1	11	6.4	21	12.2	46	26.4	34	19.7	20	11.6	27	15.6	173
Total	175	6.2	463	16.3	270	9.5	1,000	35.2	278	9.8	380	13.4	275	9.7	2,840

1 Row percent

2 Unknown region assigned according to the distribution among known region that year, unknown exposure category assigned according to the proportion with known exposure that year, Call back study and Lab enhancement study results (June 2000). (See text for more details.)

Source of data: HIV Laboratory, Laboratories Branch, Ontario Ministry of Health and Long Term Care; Laboratory enhancement study

Table 4.1 HIV incidence density per 100 person-years (determined by detuned assay), by exposure category and region of HIV test, Laboratory Enhancement Study, October 1999 to May 2000

Exposure category	Metro Toronto		Ottawa-Carleton		Ontario, other[1]		Ontario	
	Tested	Incidence density	Tested	Incidence density	Tested	Incidence density	Tested	Incidence density
MSM	3,855	4.8	1,577	0.42	2,650	1.1	8,082	2.7
MSM-IDU	57	15.4	20	26.2	157	0.0	235	6.2

1 Ontario less Metro Toronto and Ottawa-Carleton regions

Table 5.1 Number and proportion[1] of reported AIDS cases by year of diagnosis and exposure category, Ontario, 1981 to 1999

	MSM		MSM-IDU		IDU		HIV-endemic		Heterosexual		Clotting factor		Transfusion		Perinatal		Other[2]		NIR	Total
Year	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	No.
<1984	22	81.5	2	7.4	0	0.0	2	7.4	0	0.0	1	3.7	0	0.0	0	0.0	0	0.0	1	28
1984	48	87.3	3	5.5	0	0.0	1	1.8	3	5.5	0	0.0	0	0.0	0	0.0	0	0.0	3	58
1985	138	87.9	5	3.2	1	0.6	3	1.9	2	1.3	4	2.5	4	2.5	0	0.0	0	0.0	5	162
1986	237	86.5	9	3.3	3	1.1	7	2.6	4	1.5	4	1.5	10	3.6	0	0.0	0	0.0	9	283
1987	357	81.3	18	4.1	12	2.7	6	1.4	19	4.3	7	1.6	18	4.1	2	0.46	0	0.0	9	448
1988	382	81.1	19	4.0	7	1.5	8	1.7	34	7.2	7	1.5	10	2.1	3	0.64	1	0.21	8	479
1989	437	79.0	23	4.2	20	3.6	19	3.4	42	7.6	2	0.4	7	1.3	2	0.36	1	0.18	17	570
1990	491	77.8	21	3.3	19	3.0	19	3.0	59	9.4	12	1.9	8	1.3	2	0.32	0	0.0	22	653
1991	468	79.3	20	3.4	21	3.6	16	2.7	40	6.8	11	1.9	11	1.9	3	0.51	0	0.0	28	618
1992	520	74.4	33	4.7	35	5.0	25	3.6	61	8.7	9	1.3	10	1.4	6	0.86	0	0.0	28	727
1993	514	75.5	33	4.8	26	3.8	21	3.1	72	10.6	7	1.0	3	0.4	5	0.73	0	0.0	27	708
1994	448	75.4	30	5.1	24	4.0	20	3.4	61	10.3	3	0.51	4	0.67	3	0.51	1	0.17	27	621
1995	384	69.6	30	5.4	26	4.7	26	4.7	67	12.1	6	1.1	7	1.3	6	1.1	0	0.0	17	569
1996	233	64.9	17	4.7	29	8.1	33	9.2	37	10.3	3	0.84	4	1.1	3	0.84	0	0.0	13	372
1997	129	59.4	9	4.1	10	4.6	24	11.1	32	14.7	2	0.92	7	3.2	3	1.4	1	0.46	10	227
1998	92	56.4	4	2.5	13	8.0	29	17.8	23	14.1	0	0.0	1	0.61	1	0.61	0	0.0	6	169
1999	49	44.1	2	1.8	15	13.5	20	18.0	20	18.0	1	0.9	1	0.90	3	2.7	0	0.0	8	119
Total	4,949	75.3	278	4.2	261	4.0	279	4.2	576	8.8	79	1.2	105	1.6	42	0.64	4	0.06	238	6,811

1 Row percent of cases with known exposure category
2 Includes occupational exposure

Source of data: Ontario AIDS Surveillance Program, Public Health Branch, Ontario Ministry of Health and Long Term Care

Table 5.2 Number and proportion[1] of reported AIDS cases by modified health region and exposure category, Ontario, 1981 to 1999

Modified health region	MSM		MSM-IDU		IDU		HIV-endemic		Heterosexual		Clotting factor		Transfusion		Perinatal		Other[2]		NIR		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Northern	100	58.1	13	7.6	16	9.3	8	4.7	15	8.7	10	5.8	7	4.1	0	0.0	0	0.0	3	1.7	172
Ottawa-Carleton	366	64.3	14	2.5	32	5.6	58	10.2	39	6.9	13	2.3	10	1.8	9	1.6	2	0.35	26	4.6	569
Eastern, other	90	49.7	11	6.1	28	15.5	1	0.55	14	7.7	8	4.4	9	5.0	1	0.55	0	0.0	19	10.5	181
Metro Toronto	3,337	80.0	173	4.1	105	2.5	169	4.1	264	6.3	8	0.19	26	0.62	22	0.53	2	0.05	64	1.5	4,170
Central East, other	318	53.5	19	3.2	27	4.5	16	2.7	114	19.2	18	3.0	32	5.4	5	0.84	0	0.0	45	7.6	594
Central West	378	65.1	21	3.6	30	5.2	17	2.9	72	12.4	10	1.7	12	2.1	3	0.52	0	0.0	38	6.5	581
Southwest	360	66.2	27	5.0	23	4.2	10	1.8	58	10.7	12	2.2	9	1.7	2	0.37	0	0.0	43	7.9	544
Total	4,949	72.7	278	4.1	261	3.8	279	4.1	576	8.5	79	1.2	105	1.5	42	0.62	4	0.06	238	3.5	6,811

1 Row percent

2 Includes occupational exposure

Source of data: Ontario AIDS Surveillance Program, Public Health Branch, Ontario Ministry of Health and Long Term Care

Table 5.3 Number and proportion[1] of reported AIDS cases among MSM by year of diagnosis and modified health region, Ontario, 1981 to 1999

	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
<1984	0	0.0	3	13.6	0	0.0	12	54.5	0	0.0	4	18.2	3	13.6	22
1984	0	0.0	1	2.1	1	2.1	40	83.3	2	4.2	1	2.1	3	6.3	48
1985	1	0.72	9	6.5	2	1.4	97	70.3	8	5.8	8	5.8	13	9.4	138
1986	6	2.5	14	5.9	4	1.7	156	65.8	18	7.6	19	8.0	20	8.4	237
1987	7	2.0	33	9.2	6	1.7	232	65.0	30	8.4	26	7.3	23	6.4	357
1988	9	2.4	25	6.5	11	2.9	250	65.4	28	7.3	29	7.6	30	7.9	382
1989	6	1.4	45	10.3	9	2.1	286	65.4	28	6.4	26	5.9	37	8.5	437
1990	8	1.6	41	8.4	9	1.8	323	65.8	31	6.3	45	9.2	34	6.9	491
1991	12	2.6	54	11.5	7	1.5	294	62.8	27	5.8	35	7.5	39	8.3	468
1992	10	1.9	37	7.1	10	1.9	358	68.8	25	4.8	47	9.0	33	6.3	520
1993	13	2.5	26	5.1	3	0.58	363	70.6	42	8.2	36	7.0	31	6.0	514
1994	11	2.5	31	6.9	10	2.2	302	67.4	32	7.1	26	5.8	36	8.0	448
1995	10	2.6	10	2.6	11	2.9	280	72.9	20	5.2	31	8.1	22	5.7	384
1996	1	0.43	12	5.2	2	0.86	169	72.5	9	3.9	21	9.0	19	8.2	233
1997	4	3.1	9	7.0	3	2.3	87	67.4	8	6.2	13	10.1	5	3.9	129
1998	1	1.1	11	12.0	1	1.1	58	63.0	5	5.4	9	9.8	7	7.6	92
1999	1	2.0	5	10.2	1	2.0	30	61.2	5	10.2	2	4.1	5	10.2	49
Total	100	2.0	366	7.4	90	1.8	3,337	67.4	318	6.4	378	7.6	360	7.3	4,949

1 Row percent

Source of data: Ontario AIDS Surveillance Program, Public Health Branch, Ontario Ministry of Health and Long Term Care

Table 5.4 Number and proportion[1] of reported AIDS cases among MSM-IDU by year of diagnosis and modified health region, Ontario, 1981 to 1999

	Northern		Ottawa-Carleton		Eastern, other		Metro Toronto		Central East, other		Central West		Southwest		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
<1984	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2
1984	0	0.0	0	0.0	0	0.0	2	66.7	0	0.0	0	0.0	1	33.3	3
1985	0	0.0	0	0.0	0	0.0	1	20.0	3	60.0	0	0.0	1	20.0	5
1986	1	11.10	0	0.0	1	11.1	4	44.4	3	33.3	0	0.0	0	0.0	9
1987	1	5.6	1	5.6	1	5.6	14	77.8	0	0.0	1	5.6	0	0.0	18
1988	0	0.0	0	0.0	0	0.0	16	84.2	2	10.5	1	5.3	0	0.0	19
1989	0	0.0	3	13.0	1	4.3	16	69.6	0	0.0	1	4.3	2	8.7	23
1990	1	4.8	0	0.0	0	0.0	15	71.4	1	4.8	1	4.8	3	14.3	21
1991	1	5.0	1	5.0	0	0.0	12	60.0	3	15.0	1	5.0	2	10.0	20
1992	5	15.2	1	3.0	3	9.1	17	51.5	1	3.0	2	6.1	4	12.1	33
1993	1	3.0	1	3.0	0	0.0	24	72.7	0	0.0	3	9.1	4	12.1	33
1994	1	3.3	3	10.0	0	0.0	16	53.3	3	10.0	2	6.7	5	16.7	30
1995	0	0.0	1	3.3	3	10.0	18	60.0	1	3.3	4	13.3	3	10.0	30
1996	1	5.9	1	5.9	1	5.9	8	47.1	0	0.0	5	29.4	1	5.9	17
1997	1	11.1	2	22.2	1	11.1	3	33.3	1	11.1	0	0.0	1	11.1	9
1998	0	0.0	0	0.0	0	0.0	3	75.0	1	25.0	0	0.0	0	0.0	4
1999	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2
Total	13	4.7	14	5.0	11	4.0	173	62.2	19	6.8	21	7.6	27	9.7	278

1 Row percent

Source of data: Ontario AIDS Surveillance Program, Public Health Branch, Ontario Ministry of Health and Long Term Care

Table 5.5 Number and proportion[1] of reported AIDS cases among MSM-endemic by year of diagnosis and modified health region[2], Ontario, 1981 to 1999

	Ottawa-Carleton		Metro Toronto		Central East, other		Central West		Southwest		Total
Year	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**
<1984	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
1984	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0	3
1985	1	20.0	3	60.0	0	0.0	0	0.0	1	20.0	5
1986	0	0.0	6	75.0	1	12.5	0	0.0	1	12.5	8
1987	0	0.0	4	57.1	1	14.3	2	28.6	0	0.0	7
1988	0	0.0	12	80.0	3	20.0	0	0.0	0	0.0	15
1989	0	0.0	11	91.7	0	0.0	1	8.3	0	0.0	12
1990	0	0.0	24	96.0	1	4.0	0	0.0	0	0.0	25
1991	0	0.0	13	76.5	3	17.6	1	5.9	0	0.0	17
1992	0	0.0	16	100.0	0	0.0	0	0.0	0	0.0	16
1993	0	0.0	15	88.2	1	5.9	1	5.9	0	0.0	17
1994	0	0.0	21	100.0	0	0.0	0	0.0	0	0.0	21
1995	0	0.0	14	87.5	1	6.3	1	6.3	0	0.0	16
1996	0	0.0	4	100.0	0	0.0	0	0.0	0	0.0	4
1997	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2
1998	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0	3
1999	0	0.0	7	100.0	0	0.0	0	0.0	0	0.0	7
Total	1	0.56	158	88.8	11	6.2	6	3.4	2	1.1	178

1 Row percent

2 Northern and Eastern, other regions did not report any cases in this category

Source of data: Ontario AIDS Surveillance Program, Public Health Branch, Ontario Ministry of Health and Long Term Care

Table 6.1 Number and rate per 100,000 person-years of syphilis cases by stage and year of diagnosis, Ontario[1], 1993 to June 2000

	1993		1994		1995		1996		1997		1998		1999		2000[2]		Total
Stage	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**
Primary	29	0.27	33	0.31	33	0.30	25	0.23	15	0.13	18	0.16	14	0.12	2	0.03	169
Secondary	38	0.36	28	0.26	33	0.30	28	0.25	18	0.16	11	0.10	17	0.15	4	0.07	177
Early latent	53	0.50	35	0.32	27	0.25	29	0.26	17	0.15	14	0.12	21	0.18	10	0.17	206
Late latent	423	4.0	318	2.9	281	2.6	216	1.9	191	1.7	189	1.7	198	1.7	57	0.97	1,873
Tertiary	9	0.08	5	0.05	8	0.07	9	0.08	9	0.08	6	0.05	4	0.04	1	0.02	51
Congenital	2	0.02	1	0.01	0	0.0	1	0.01	1	0.01	3	0.03	1	0.01	0	0.0	9
Unknown	51	0.48	25	0.23	25	0.23	11	0.10	13	0.12	9	0.08	10	0.09	3	0.05	147
Total	605	5.7	445	4.1	407	3.7	319	2.9	264	2.3	250	2.2	265	2.3	77	1.3	2,632

1 Hamilton-Wentworth data unavailable for this analysis
2 Population estimate based on proportion population growth, 1993 to 1999

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

Table 6.2 Number and rate per 100,000 person-years of infectious (primary & secondary) syphilis cases among men aged 15 years and older by age group and year of diagnosis, Ontario[1], 1993 to June 2000

Age group	1993		1994		1995		1996		1997		1998		1999		2000[2]		Total
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
15-24	8	1.1	7	0.93	4	0.53	2	0.27	1	0.13	1	0.13	5	0.65	0	0.0	28
25-34	15	1.6	8	0.85	15	1.6	10	1.1	8	0.89	7	0.79	11	1.3	1	0.23	75
35-44	8	0.95	9	1.1	12	1.4	12	1.3	3	0.32	7	0.72	4	0.40	3	0.59	58
45-54	3	0.48	11	1.7	7	1.1	5	0.72	6	0.84	3	0.40	2	0.26	0	0.0	37
55+	2	0.20	4	0.40	3	0.29	1	0.10	2	0.19	3	0.27	2	0.18	1	0.18	18
Total	36	0.87	39	0.93	41	0.96	30	0.70	20	0.46	21	0.47	24	0.53	5	0.22	216

1 Hamilton-Wentworth data unavailable for this analysis

2 Population estimate based on proportion population growth, 1993 to 1999

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

Table 6.3 Number and rate per 100,000 person-years of infectious (primary & secondary) syphilis cases among men aged 15 years and older, by modified health region and year of diagnosis, Ontario, 1993 to June 2000

Modified health region	1993		1994		1995		1996		1997		1998		1999		2000[1]		Total
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
Northern	4	1.1	1	0.28	1	0.28	1	0.28	0	0.0	0	0.0	0	0.0	0	0.0	7
Ottawa-Carleton	0	0.0	0	0.0	1	0.35	0	0.0	1	0.34	2	0.67	2	0.66	0	0.0	6
Eastern, other	0	0.0	0	0.0	1	0.33	0	0.0	0	0.0	2	0.64	1	0.31	1	0.6	5
Metro Toronto	26	2.8	21	2.2	23	2.4	21	2.2	14	1.4	7	0.71	14	1.4	3	0.60	129
Central East, other	5	0.54	8	0.85	9	0.93	4	0.40	5	0.49	7	0.66	3	0.28	0	0.0	41
Central West[2]	1	0.13	3	0.37	2	0.25	2	0.24	0	0.0	1	0.12	1	0.12	0	0.0	10
Southwest	0	0.0	6	1.1	4	0.70	2	0.35	0	0.0	2	0.34	3	0.51	1	0.33	18
Total	36	0.87	39	0.93	41	0.96	30	0.70	20	0.46	21	0.47	24	0.53	5	0.22	216

1 Population estimate based on proportion population growth, 1993 to 1999
2 Hamilton-Wentworth data unavailable for this analysis

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

Table 6.4 Number and rate per 100,000 person-years of gonorrhea cases by site[1] and year of diagnosis, Ontario[2], 1993 to June 2000

	1993		1994		1995		1996		1997		1998		1999		2000[3]		Total
Site	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**	**Rate**	**No.**
Rectal	29	0.27	42	0.39	22	0.20	29	0.26	40	0.36	45	0.39	38	0.33	25	0.43	270
Pharyngeal	10	0.09	8	0.07	11	0.10	12	0.11	13	0.12	15	0.13	11	0.10	13	0.22	93
Genito-urinary	2,897	27.1	2,990	27.6	2,868	26.2	2,211	19.9	1,794	15.9	2,130	18.7	2,140	18.5	1,144	19.6	18,174
Disseminated	5	0.05	8	0.07	9	0.08	8	0.07	4	0.04	5	0.04	6	0.05	3	0.05	48
Other	2	0.02	1	0.01	0	0.0	0	0.0	1	0.01	0	0.0	2	0.02	0	0.0	6
Unknown	123	1.2	98	0.91	96	0.88	69	0.62	58	0.52	57	0.50	35	0.30	31	0.53	567
Total	3,066	28.7	3147	29.1	3,006	27.4	2,329	21.0	1,910	17.0	2,252	19.7	2,232	19.3	1,216	20.8	19,158

1 Based on a hierarchy which accounts for multiple sites (see text)
2 Hamilton-Wentworth data unavailable for this analysis
3 Population estimate based on proportion population growth, 1993 to 1999

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

Table 6.5 Number and rate per 100,000 person-years of rectal gonorrhea cases among men aged 15 years and older by modified health region and year of diagnosis, Ontario, 1993 to June 2000

Modified health region	1993		1994		1995		1996		1997		1998		1999		2000[1]		Total
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
Northern	0	0.0	0	0.0	0	0.0	1	0.28	0	0.0	0	0.0	1	0.28	0	0.0	2
Ottawa-Carleton	1	0.35	4	1.4	1	0.35	2	0.69	3	1.0	7	2.4	3	1.0	1	0.66	22
Eastern, other	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Metro Toronto	20	2.1	28	2.9	20	2.1	22	2.3	35	3.6	32	3.2	32	3.2	20	4.0	209
Central East, other	1	0.11	1	0.11	0	0.0	1	0.10	1	0.10	2	0.19	0	0.0	2	0.36	8
Central West[2]	1	0.13	4	0.50	0	0.0	2	0.24	0	0.0	1	0.12	1	0.12	1	0.23	10
Southwest	0	0.0	0	0.0	0	0.0	0	0.0	1	0.17	1	0.17	0	0.0	0	0.0	2
Total	23	0.55	37	0.88	21	0.49	28	0.65	40	0.91	43	0.97	37	0.97	24	1.0	253

1 Population estimate based on proportion population growth, 1993 to 1999
2 Hamilton-Wentworth data unavailable for this analysis

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

Table 6.6 Number and rate per 100,000 person-years of pharyngeal gonorrhea cases among men aged 15 years and older by modified health region and year of diagnosis, Ontario, 1993 to June 2000

Health region	1993		1994		1995		1996		1997		1998		1999		2000[1]		Total
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
Northern	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Ottawa-Carleton	1	0.35	0	0.0	0	0.0	1	0.35	0	0.0	4	1.3	0	0.0	0	0.0	6
Eastern, other	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Metro Toronto	4	0.42	6	0.63	9	0.93	9	0.93	13	1.3	8	0.81	7	0.70	9	1.80	65
Central East, other	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.09	0	0.0	1
Central West[2]	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.12	3	0.69	4
Southwest	1	0.18	0	0.0	1	0.18	0	0.0	0	0.0	2	0.34	0	0.0	0	0.0	4
Total	6	0.14	6	0.14	10	0.24	10	0.23	13	0.30	14	0.32	9	0.20	12	0.52	80

1 Population estimate based on proportion population growth, 1993 to 1999
2 Hamilton-Wentworth data unavailable for this analysis

Source of data: Public Health Branch, Ontario Ministry of Health and Long Term Care; Statistics Canada

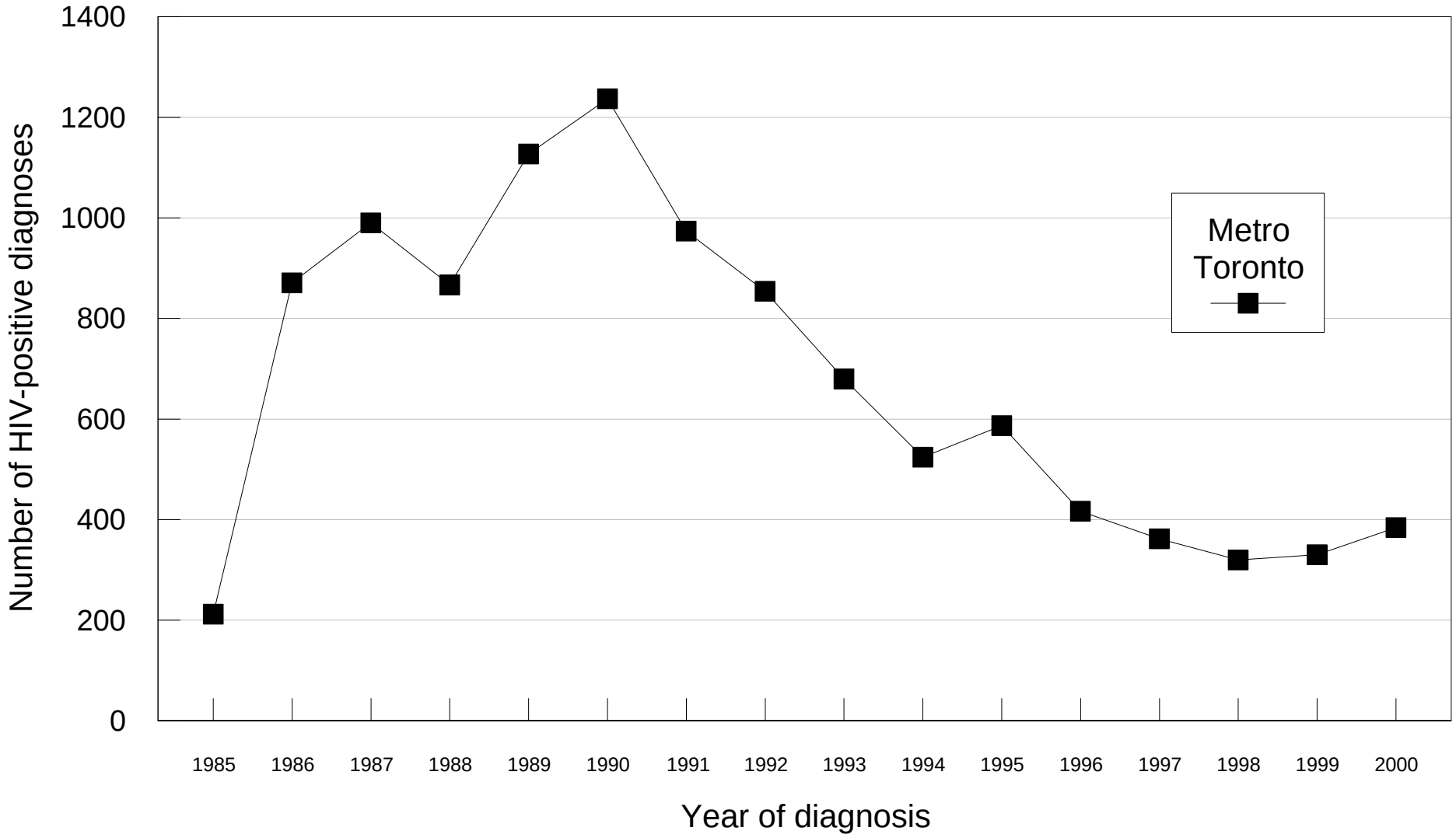
Table 7.1 Modeled incidence and prevalence of HIV infection, HIV diagnoses, AIDS and AIDS-associated mortality among MSM, Ontario, 1977-1999

	Population		HIV infection					HIV diagnoses					AIDS				
Year	Ontario	MSM	Incid. rate (%)	Incid. (#)	Cumul. incid.	Preval. (#)	Preval. rate (%)	Number	Cumul. diagnoses	Preval. (#)	Proportion	Infected, undiagnosed	Incid.	Cumul. incid.	Preval	Annual mortality	Cumul. mortality
1977	8,526,000	81,466	0.03%	24	24	24	0.0%	0	0	0	0.0%	24	0	0	0	0	0
1978	8,613,000	82,297	0.10%	82	107	107	0.1%	0	0	0	0.0%	107	0	0	0	0	0
1979	8,686,000	82,995	0.30%	248	355	355	0.4%	0	0	0	0.0%	355	0	0	0	0	0
1980	8,770,000	83,797	0.60%	498	852	852	1.0%	0	0	0	0.0%	852	0	0	0	0	0
1981	8,838,000	84,447	0.80%	663	1,516	1,515	1.8%	0	0	0	0.0%	1,516	1	1	0	1	1
1982	8,951,000	85,527	1.20%	996	2,512	2,509	2.9%	0	0	0	0.0%	2,512	6	8	1	2	3
1983	9,073,000	86,693	1.50%	1,244	3,756	3,746	4.3%	0	0	0	0.0%	3,756	19	26	5	8	10
1984	9,206,000	87,963	2.00%	1,652	5,408	5,372	6.1%	0	0	0	0.0%	5,408	61	88	16	26	36
1985	9,334,000	89,186	1.50%	1,240	6,648	6,542	7.3%	286	286	286	4.4%	6,362	168	255	51	70	106
1986	9,477,000	90,553	1.20%	998	7,645	7,399	8.2%	1,118	1,404	1,264	17.1%	6,241	274	529	149	140	246
1987	9,685,000	92,540	1.00%	845	8,490	8,044	8.7%	1,236	2,640	2,300	28.6%	5,850	410	939	283	200	446
1988	9,884,000	94,442	0.90%	773	9,263	8,574	9.1%	1,060	3,700	3,117	36.4%	5,563	468	1,406	493	243	689
1989	10,151,000	96,993	0.90%	791	10,055	9,061	9.3%	1,281	4,981	4,093	45.2%	5,074	526	1,933	717	304	993
1990	10,341,000	98,808	0.85%	759	10,814	9,486	9.6%	1,474	6,455	5,233	55.2%	4,359	598	2,530	939	334	1,328
1991	10,472,000	100,060	0.85%	767	11,581	9,818	9.8%	1,257	7,712	6,055	61.7%	3,869	585	3,115	1,202	435	1,763
1992	10,646,000	101,723	0.85%	779	12,360	10,111	9.9%	1,144	8,856	6,713	66.4%	3,504	640	3,755	1,352	486	2,249
1993	10,800,000	103,194	0.80%	733	13,092	10,314	10.0%	857	9,713	7,040	68.3%	3,380	623	4,378	1,506	529	2,778
1994	10,900,000	104,150	0.70%	650	13,743	10,446	10.0%	714	10,427	7,237	69.3%	3,315	558	4,935	1,599	518	3,297
1995	10,964,000	104,761	0.60%	562	14,305	10,466	10.0%	718	11,145	7,412	70.8%	3,159	468	5,403	1,638	543	3,839
1996	11,101,000	106,070	0.57%	537	14,842	10,656	10.0%	536	11,681	7,601	71.3%	3,161	253	5,655	1,563	347	4,186
1997	11,250,000	107,494	0.75%	716	15,558	11,186	10.4%	475	12,156	7,890	70.5%	3,402	125	5,780	1,469	186	4,372
1998	11,384,000	108,774	0.80%	770	16,328	11,812	10.9%	458	12,614	8,204	69.5%	3,714	63	5,843	1,408	144	4,516
1999	11,546,000	110,322	1.00%	970	17,298	12,638	11.5%	409	13,024	8,469	67.0%	4,274	63	5,905	1,326	144	4,660

Table 7.2 Modeled MSM population at risk, HIV prevalence and incidence by health region (aggregated), Ontario, December 1999

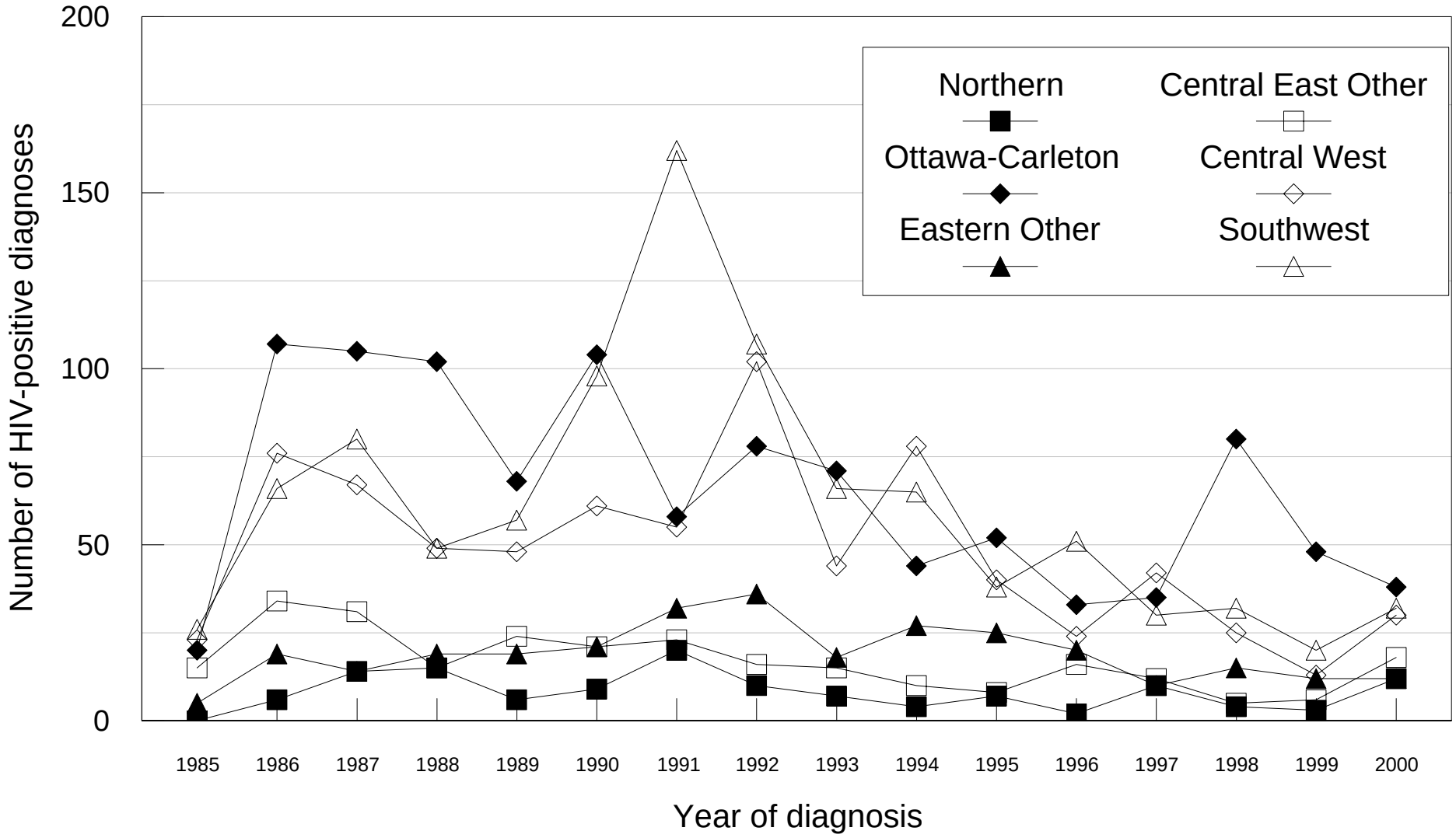
Health region (aggregated)	Population	Adult male population	Prevalence MSM	Number MSM	Prevalence HIV	Number HIV	Annual HIV incidence (%)	Annual HIV incidence (No.)
Metro Toronto	2,552,000	969,760	6.0%	58,014	14.7%	8,511	1.5%	718
Ottawa-Carleton	764,000	290,320	3.0%	8,681	10.6%	921	0.5%	35
Rest of Ontario	8,230,000	3,127,400	1.4%	43,627	7.3%	3,206	0.5%	217
Ontario, total	11,546,000	4,387,480	2.5%	110,322	11.2%	12,638	1.0%	970

Figure 1a Number of HIV-positive diagnoses (adjusted) among MSM by year of diagnosis, Metro Toronto, 1985 to 2000*



* figures for 2000 projected

Figure 1b Number of HIV-positive diagnoses (adjusted) among MSM by year of diagnosis and health region, Ontario, 1985 to 2000*



* figures for 2000 projected

Figure 2. First-time HIV positivity rates (%, adjusted) among MSM by year of diagnosis and health region, Ontario, 1992 to June 2000

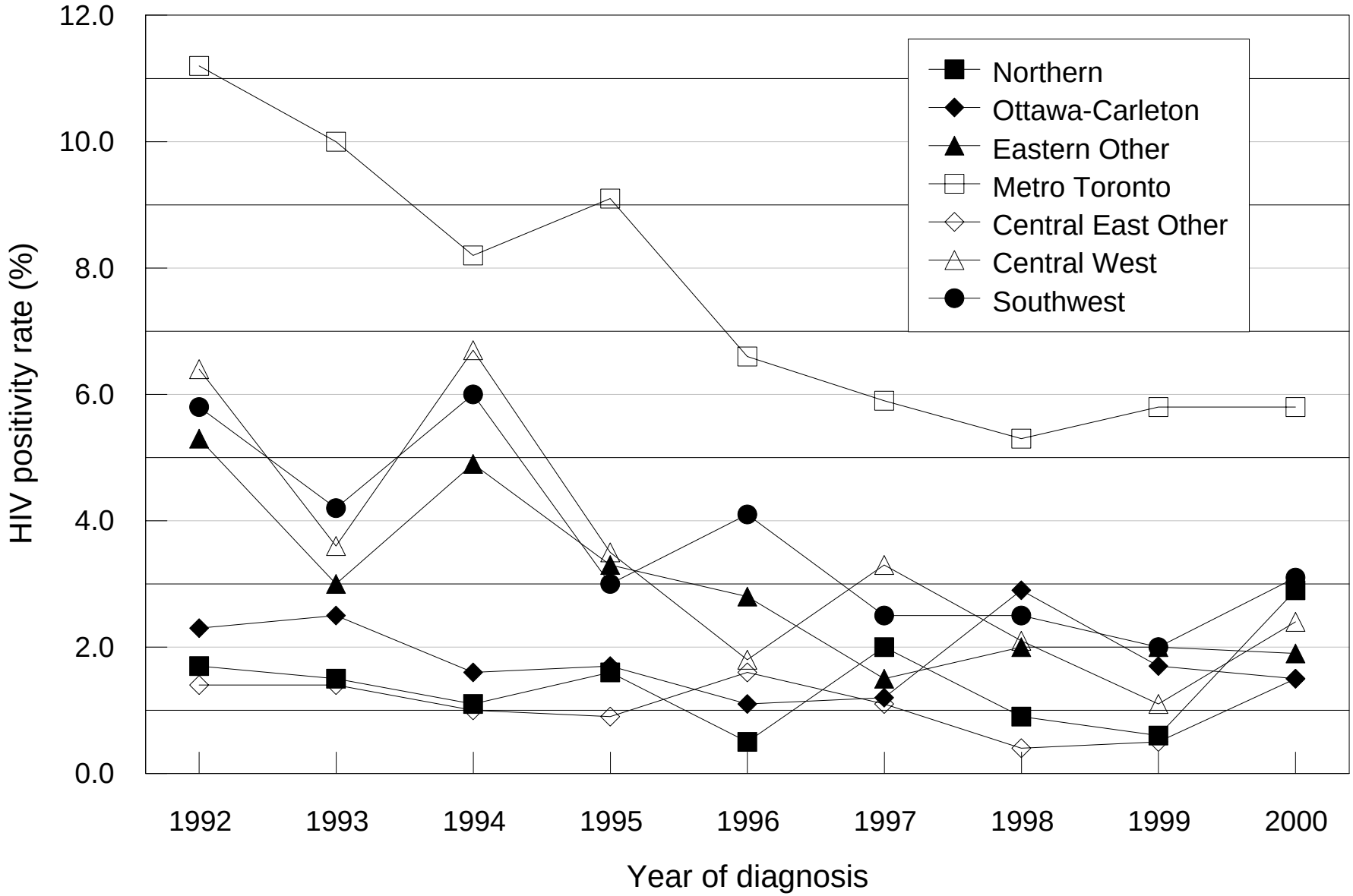
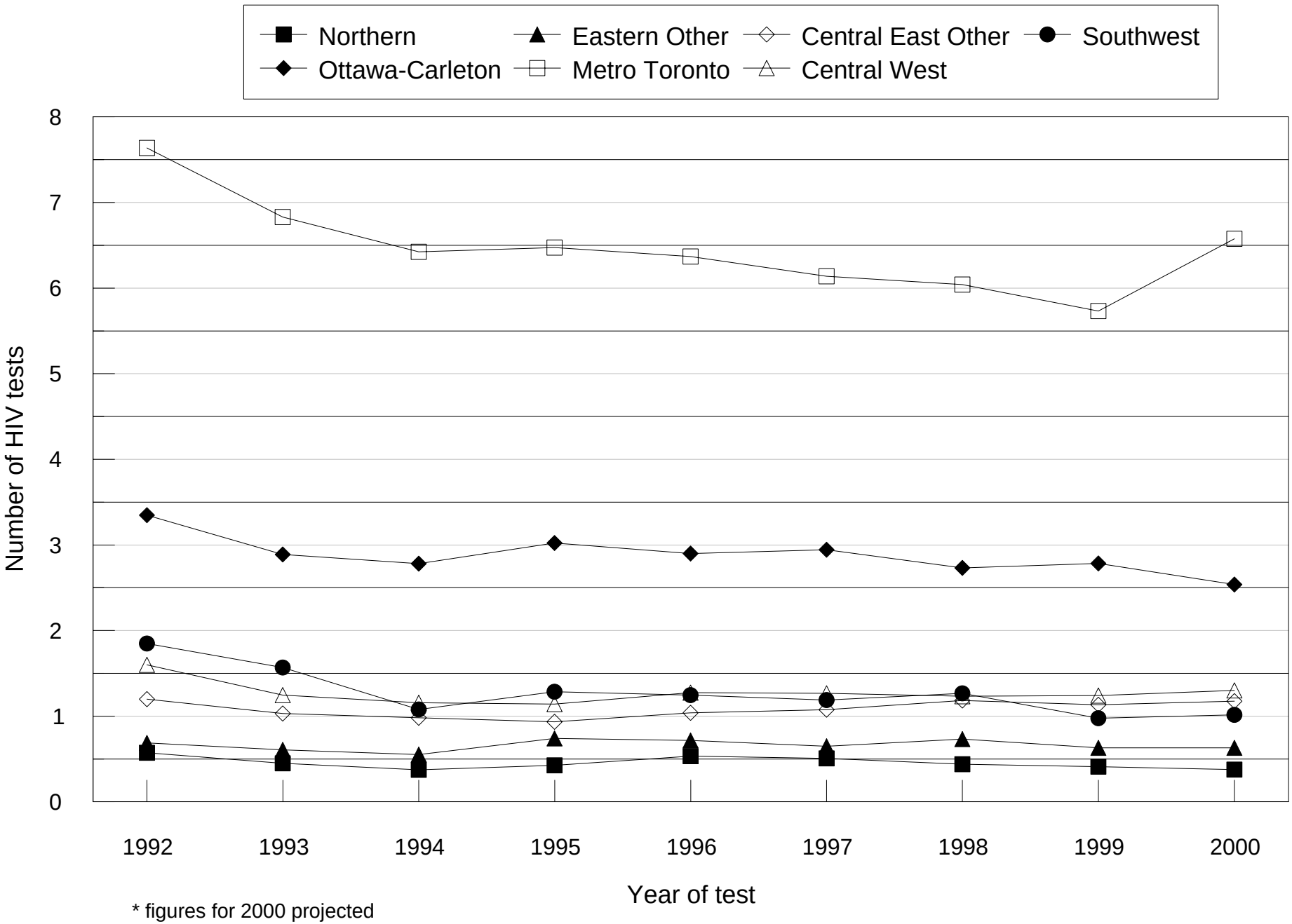


Figure 3. Number of HIV tests (adjusted) among MSM by year of test and health region, Ontario, 1992 to 2000*



* figures for 2000 projected

Figure 4. Incidence density among MSM repeat testers with 95% confidence intervals, 1992-1999 (n = 28 103 PY)

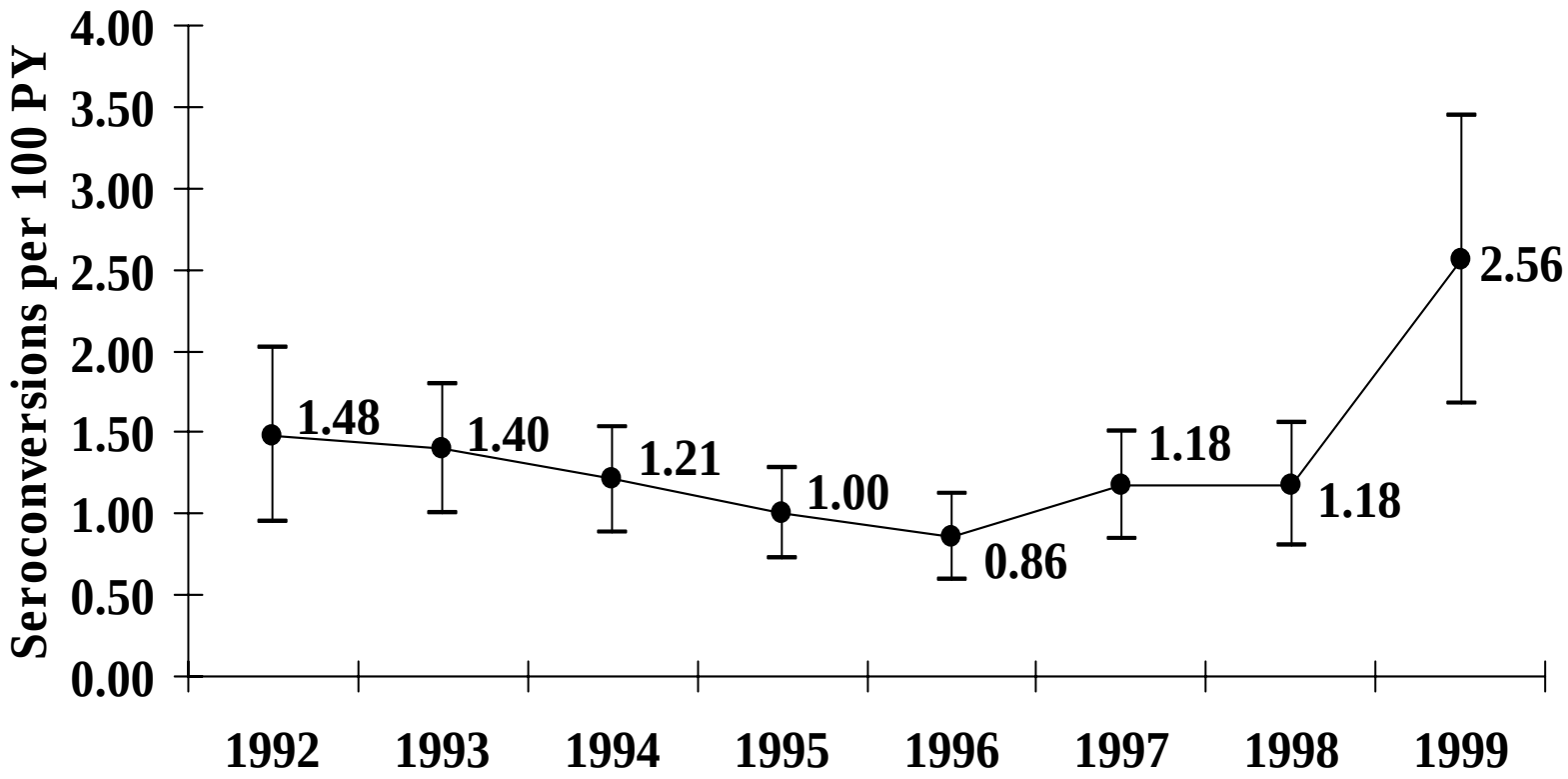


Figure 5. Incidence density among MSM repeat testers by age group, 1992-1999.

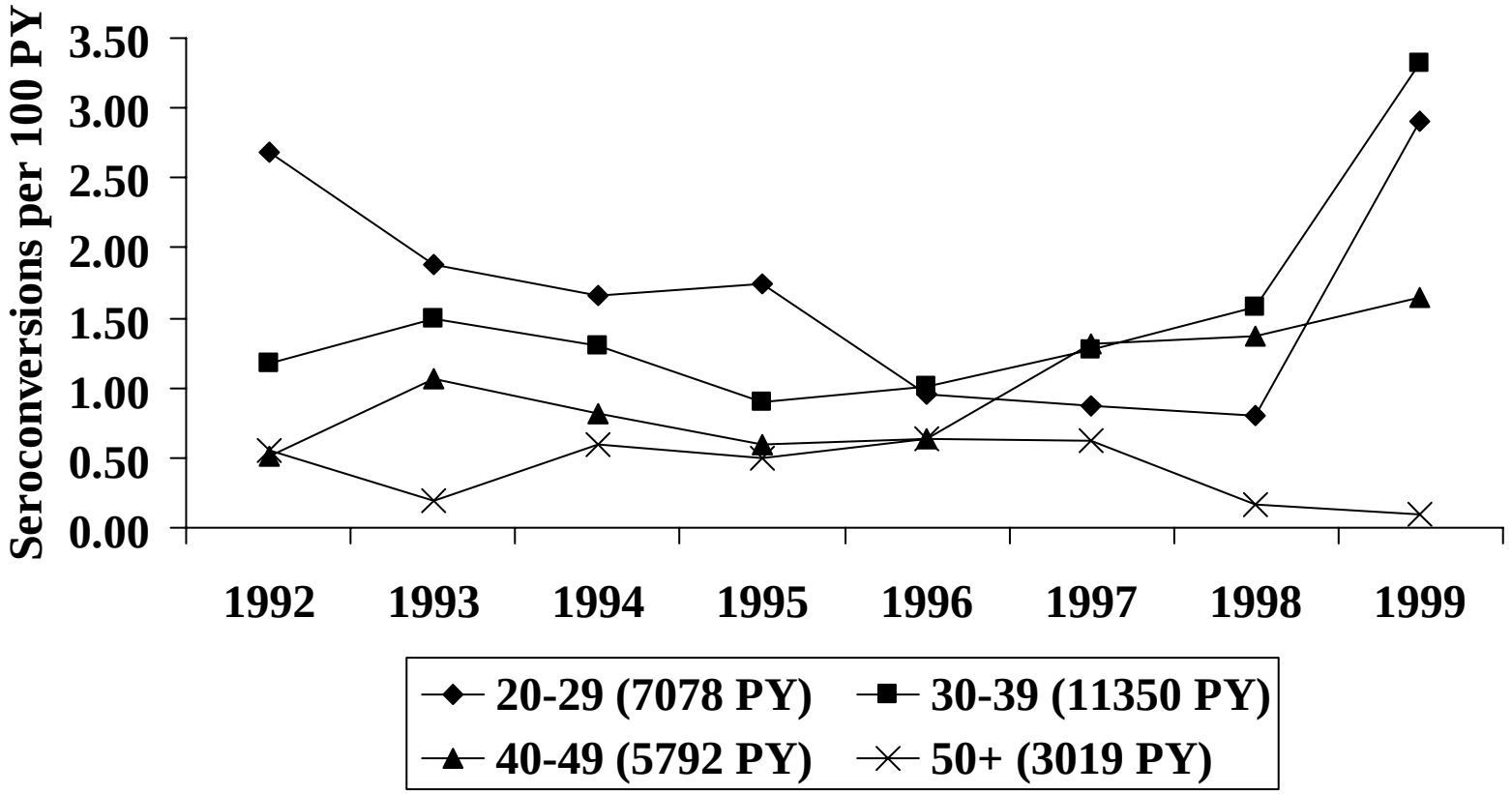


Figure 6. Incidence density among MSM repeat testers by geographic region, 1992-1999

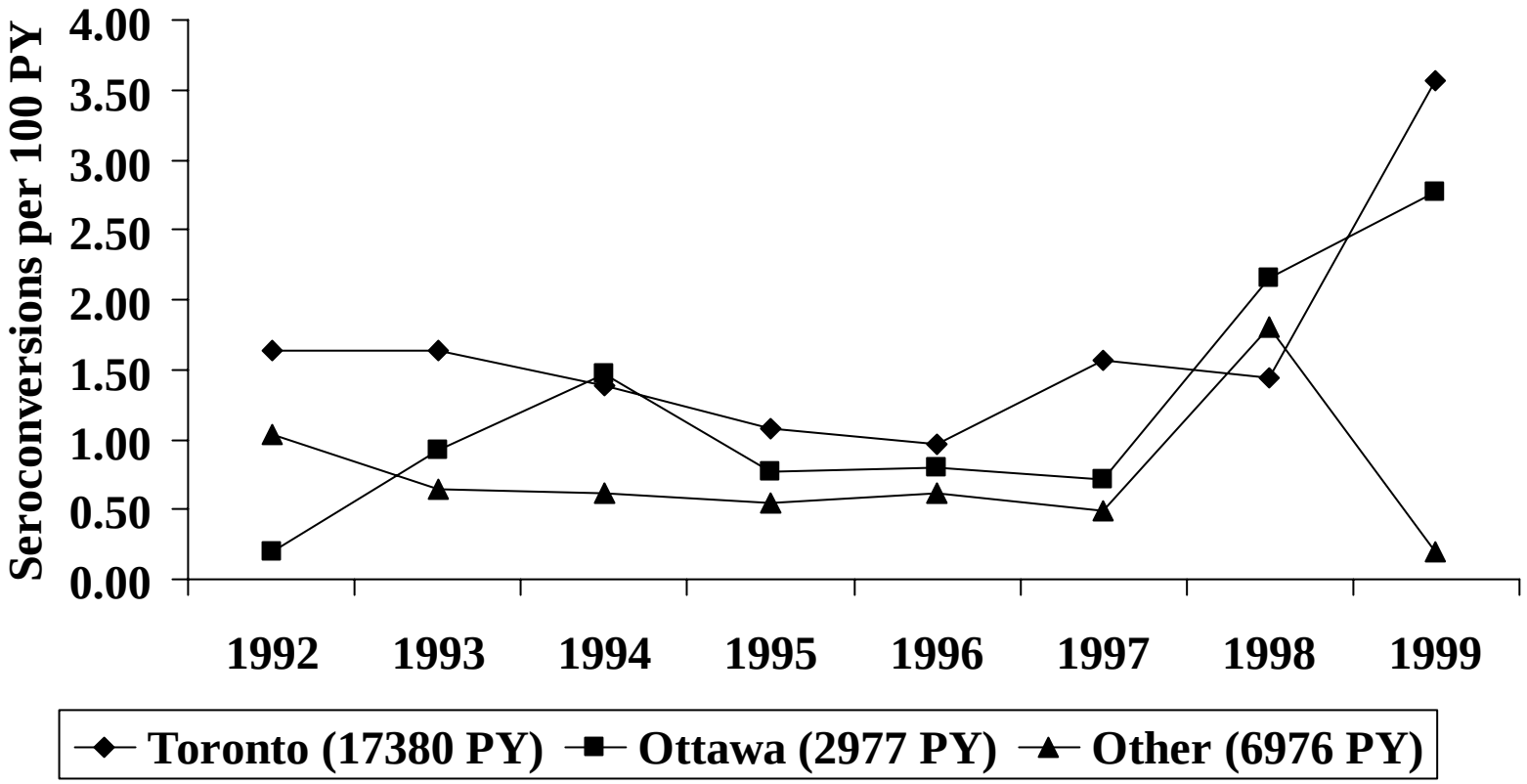


Figure 7. HIV incidence density among MSM by age group from detuned assay, Ontario HIV Laboratory, October 1999-June 2000

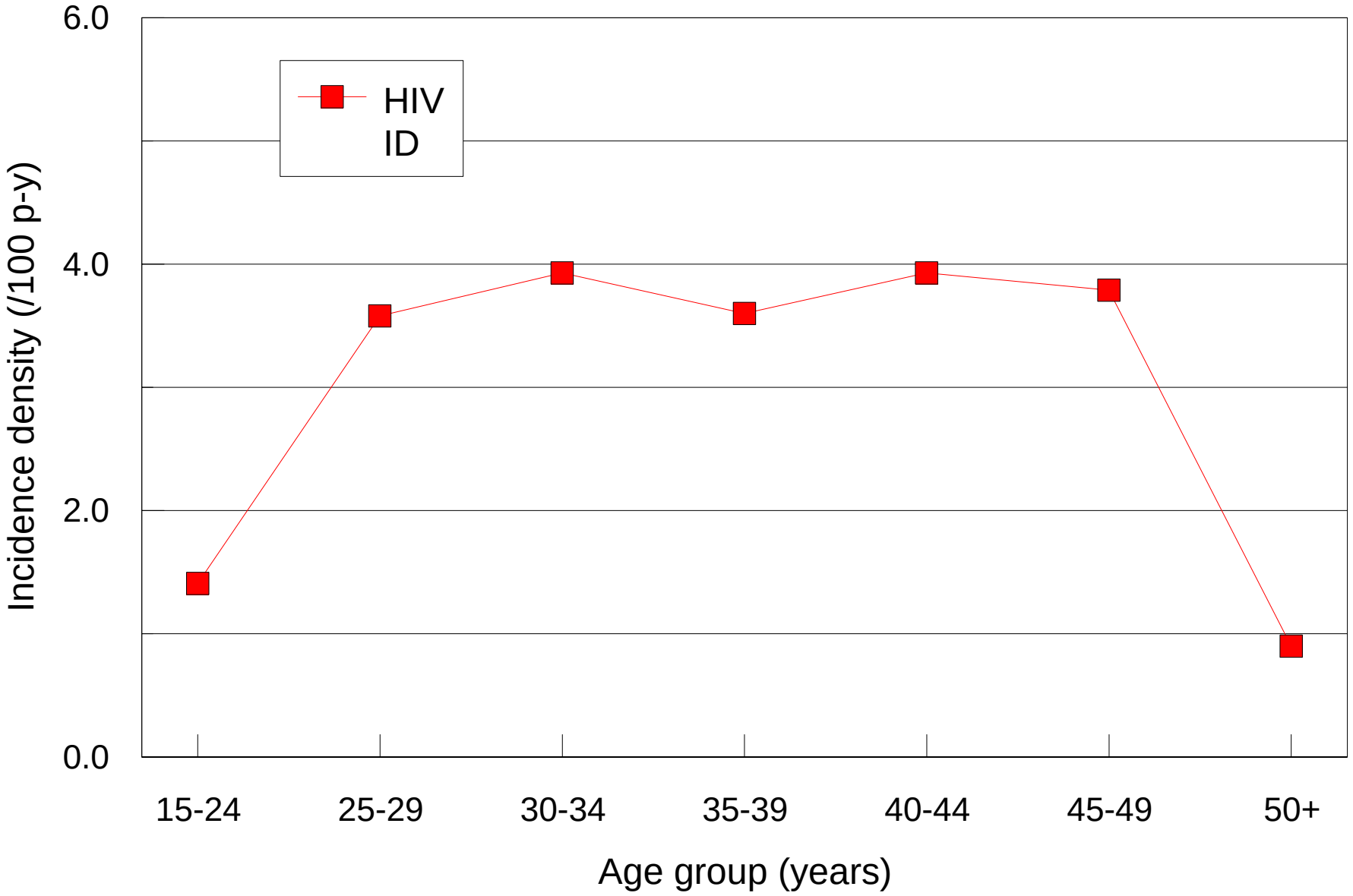


Figure 8. Incidence (per 100,000 person-years) of reported rectal and pharyngeal gonorrhea among adult males, Metro Toronto, 1993-2000