



**Injection Drug Use, HIV and HCV Infection in Ontario:
The Evidence 1992 to 2004**



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GLOSSARY OF TERMS

CONFIDENCE INTERVAL (CI): Statistical analysis of research study data will not produce a result that is 100% accurate for the true value in a population being sampled. The result reported for a study is the most likely result. A confidence interval is an estimate of the spread between the lowest likely result and the highest likely result of a study. The true result for the population probably lies somewhere within this confidence interval (e.g. polls are reported as accurate within 4 percentage points, 19 times out of 20).¹

INCIDENCE RATE: The incidence rate is the rate at which new events, or new cases, occur in a specified time in a defined population that is 'at risk' of experiencing the condition or event.

MODELING: Modeling involves estimating something which cannot readily be directly measured (e.g. the number of current HIV infections among Ontario injection drug users, including those who are not seeking testing) by mathematically combining a number of contributing variables, with the variables either coming from directly measured data (e.g. number of positive HIV tests reported annually which identify IDU as a risk factor for HIV) or from estimations based on the best scientific evidence currently available (e.g. an estimate of the proportion of IDU who are tested for HIV annually).

MULTIVARIATE REGRESSION: A set of techniques used when the variation in several variables has to be studied simultaneously. In statistics, any analytic method that allows the simultaneous study of two or more dependent variables.²

PREVALENCE RATE: The prevalence rate is the total number of existing cases of a disease at a specified time divided by a defined population that is 'at risk' of experiencing the condition.¹

SEROCONVERSION: The development of detectable antibodies to HIV in the body fluids as a result of HIV infection. A person who goes from being HIV negative to HIV positive is said to have seroconverted or is a seroconverter.¹

SEROSTATUS: The result of an antibody blood test. The serostatus or blood test result of an individual tested for HIV can be HIV negative or HIV positive.¹

UNIVARIATE: A statistical analysis that considers only one factor or variable at a time.

¹ Canadian AIDS Society and Health Canada, 2002. A Guide to HIV/AIDS Epidemiological and Surveillance Terms.

² J.M. Last, 1995. A Dictionary of Epidemiology. Oxford University Press.

SUMMARY OF KEY MESSAGES

- Ontario is estimated to have approximately 41,000 injection drug users, or about 0.2-0.6% of the population depending on the region. This is about 35-40% of the Canadian total.
- Injection drug use is associated with many health and social needs that require immediate investments in order to avoid large future costs. This report focuses on HIV and Hepatitis C (HCV), in particular on effective prevention and care strategies for these diseases that can substantially reduce future expenditures.
- Models estimate that overall 4.7% of active injection drug users (IDUs) in Ontario are living with HIV. Only a few Ontario cities have recent (2003) research measures of HIV among their IDUs: Toronto 5.1%, Sudbury 10.1%, Ottawa 11.1% (POINT Project).
- Incidence rate for new HIV cases from HIV laboratory testing data for IDU in the province as a whole is relatively low at 0.23 per 100 person years. Transmission rates appear to be higher in the North and in Ottawa.
- Only Ottawa has measured incidence of HIV in research cohorts. Incidence measures from these studies are much higher than the estimate for all of Ontario obtained from laboratory testing data - 5.8 per 100 person years (SurvIDU, 1996-2003) and 2.3 per 100 person years (POINT Project, 2003).
- Research studies have measured HCV prevalence among current IDUs at 54.2% in Toronto, 61.5% in Sudbury, and 75.8% in Ottawa. Only Ottawa has measures of incidence rates, which are 25 per 100 person years overall. Although high, the prevalence rates do indicate that many IDUS remain uninfected with HCV and can still, through effective harm reduction, be prevented from becoming infected.
- Almost all IDUS living with HIV are co-infected with HCV; the total number of co-infected IDUS in Ontario is estimated at about 1800. Co-infection accelerates the progression of both diseases but one-third to one-half of persons with HCV can be cured. This points to the need to develop and evaluate specialized HCV treatment for IDUs.
- Higher prevalence and incidence rates of HIV and HCV infection are linked to higher rates of cocaine use, use of previously used needles or other injection equipment, more frequent injections, and longer duration of injection career.
- In Ottawa, there is evidence of higher prevalence of HIV among Aboriginal IDUs. Consultation with Aboriginal groups in Ontario is needed to identify potential Aboriginal-specific program needs.
- There is research evidence of significant declines in sharing of both needles and other injection equipment in Toronto since the early 1990's. Toronto has also experienced a stable prevalence of HIV infection, indicating that although new HIV infections occurred, they have not outpaced the numbers of deaths and dropouts from injecting. Toronto has not seen the dramatic rise in infections that occurred in Vancouver and Montreal.
- Ottawa appears to have much higher prevalence of HIV infection along with very high rates of cocaine use, and there is not as yet evidence of statistically significant overall declines in sharing of needles or other equipment.
- Comparison of needle exchange policies between Toronto and Ottawa suggests that the lower HIV and HCV prevalence in Toronto may be linked to early initiation of services, including outreach and peer workers, relatively decentralized services, and especially with relatively liberal exchange policies (not requiring 1:1 exchange, no limits on numbers of

- needles exchanged) and distribution of other injection materials (sterile water, filters, cookers).
- Despite strict limitations on needle exchange in Ottawa, extended use of needle exchange services is associated with reduced risk of HIV infection.
 - To maximize the effectiveness of needle exchange programs in Ontario, these programs require the development and implementation of standards and best practices.
 - To prevent HIV and HCV, all Ontario needle exchanges need to implement liberal needle distribution policies and distribute other injection materials (sterile water, filters, cookers).
 - Although not based on full formal evaluation, there is evidence that the IDU Outreach Program has extended availability of outreach to IDUs in Ontario. Outreach work with involvement of peers as paid and volunteer service providers is a promising strategy that requires expanded resources for peer training and support.
 - Overall access to methadone maintenance has improved dramatically in Ontario but there is significant inequity in access by region. As well as increasing accessibility, there is also need to increase number of low threshold harm reduction methadone treatment programs which tend to serve very marginalized IDUs.
 - Access to detoxification programs needs to be expanded and linked to case management services.
 - Treatment programs for injectors of non-opiate drugs need to be expanded in numbers and geographic distribution.
 - Ontario needs development and careful evaluation of more extensive drug treatment options, including buprenorphine and medical heroin as alternatives to methadone.
 - Pharmacies are an important point of access for sterile needles for many IDUs when they cannot or will not access needle exchanges; there is scope to increase their role by providing more educational materials and service referral information.
 - Ontario communities should be supported to undertake needs assessments for the development of safer injection facilities. This could be accomplished quickly using the research design developed for Ottawa.
 - Surveillance research such as that undertaken by SurvIDU and the I-Track study funded by Health Canada can provide valuable data to track both HIV and HCV in Ontario IDUs and should be extended to other Ontario cities. There is also a need to supplement these studies with a network of ethnographic data collection which can provide information about emerging drug use patterns.
 - Research suggests that a majority of active IDUs have been incarcerated at least once, and there is evidence that this puts them at risk for acquiring HIV and/or HCV and for transmitting these infections in the wider community upon release. Prison-based harm reduction programs are necessary and long overdue.
 - Women IDUs are more likely than men to have a partner who is also an IDU, and effective harm reduction requires attention to gender issues, relationship issues, and couple counseling and treatment.
 - The high level of mental health problems among IDUs requires development of harm reduction oriented mental health treatment services.
 - It is essential that a mechanism such as a Secretariat within the Ontario Ministry of Health and Long-term Care be developed, working with a community advisory committee, to better co-ordinate services for the range of needs of IDUs in Ontario and break down the barriers created by the separation of programming and policy responsibilities for HIV, HCV, mental health, substance use, and prison health.



1. INTRODUCTION

1.1 HIV AMONG INJECTION DRUG USERS (IDUs)

Since the 1980's, HIV transmission among injection drug users (IDUs) has been an international public health concern. For IDUs the re-use of HIV-contaminated needles and other injection equipment can lead to HIV infection, and has fueled explosive epidemics of HIV in diverse locales where prevention efforts have been absent or insufficient [1-3]. As well, there have been concerns about IDUs transmitting HIV to their sexual partners and from women who inject drugs to their infants, thus contributing to the epidemic among heterosexuals.

Until the late 1980's, the HIV epidemic in Canada was almost entirely among men who have sex with men (MSM). However, by the early to mid 1990s, there was a shift to increasing HIV infections among IDUs. Prior to 1995, the proportion of adult positive HIV tests attributed to drug injection was 10.7% [4]. This increased substantially in 1995 to 29.5% and rose to a peak of just over 33% in 1996 and 1997 [4]. Since then, there has been a gradual decline: from 28.8% in 1999 to 24.0% in 2002 [5]. Nevertheless, the proportion of positive HIV tests attributable to drug injection remains double the pre-1995 proportion.

HIV incidence is evidence of recent HIV infection, whereas AIDS data provide information on HIV infections that occurred from 2 to 10 or more years in the past. In Canada, the proportion of adult AIDS cases attributed to IDU rose steadily from 1991 and peaked at 21.5% in 1998 [5]. While the proportion attributed to IDU decreased to 14.8% in 2001, the proportion rose to 19.1% in 2002 [5].

National data mask the uneven pattern of HIV infection among IDUs in Ontario and the rest of Canada. Vancouver and Montreal were the first Canadian cities to observe high incidence rates among IDUs. In 1997, Vancouver's HIV incidence rate was 10.3 per 100 person-years (py) and Montreal's was 8.1 per 100 py [6, 7]. While explosive outbreaks have been reported in several large urban centres across Canada, it should be noted that smaller urban centres have also observed high prevalence rates of HIV. Other cities in Ontario and across Canada have maintained relatively low prevalence. Table 1 presents data on the variability of HIV prevalence in Ontario and the rest of Canada [7-12].

TABLE 1.
HIV PREVALENCE RATES IN SELECTED CITIES IN CANADA AND IN THE PROVINCE OF ONTARIO

City	Year	Prevalence rate (%)
Vancouver	2001	29.1
Victoria	2003	16.0
Calgary	1998	3.3
Edmonton	1997	7.0
Regina	2003	1.2
Winnipeg	1998	12.6
Montreal	2003	17.2
Ontario	1997	4.7
Toronto	2003	5.1
Sudbury	2003	10.1
Ottawa	2003	20.6

Note: These rates are based on modeling, cross-sectional and multiple year cohort studies

1.2 HEPATITIS C VIRUS (HCV) INFECTION AMONG IDUS

There is also growing concern about HCV infection among IDUs in Canada. Just as with HIV, the sharing of HCV-contaminated needles and injection equipment can lead to the transmission of HCV. However, compared to HIV, HCV is 10 to 15 times more infectious through blood contact [13]. Remis (2004) estimated that in Canada IDU accounts for 56% of prevalent HCV infections and that approximately 55% of active IDUs are infected with HCV and 49% of past IDUs [14]. Regional variability in HCV prevalence rates has been observed in several studies carried out among IDUs in Canada. In 1997 a Vancouver study observed that 88% of IDUs were infected with HCV [3] compared to 47% in a semi-rural region of Nova Scotia [15].

1.3 PREVENTION PROGRAMS AND SERVICES FOR IDUS

In Ontario, public expenditures on services for IDUs are concentrated in the health care system (e.g., medical services, detoxification and rehabilitation services), the social welfare system, and the criminal justice system (i.e., detection of criminal activity and incarceration). As well, schools, other governmental and non-governmental agencies provide drug use prevention programs and services. Currently in Canada the vast majority of expenditures directly related to injection drug use are focused on the criminal justice system.

In Ontario, drug treatment services are offered through a specialty drug treatment system, a separate methadone treatment system, and also general and psychiatric hospitals. In 2001, 150 agencies comprised the specialty drug treatment system funded primarily by the Addiction Program, Mental Health and Addiction Branch of the Ministry of Health and Long-Term Care. The specialty system is funded almost universally through the public sector, United Way, or other non-profit sources (e.g., Salvation Army). Many of these agencies fulfill a single role on the treatment continuum e.g., detoxification, assessment and referral, out-patient counselling, short-term residential care, and longer-term recovery homes. Others provide a comprehensive mix of treatment services. Physicians provide methadone services on a fee-for-service basis and are based in private offices. However, there is one physician-run methadone clinic integrated within the Centre for Addiction and Mental Health.

Non-governmental and public health organizations have established needle exchange programs (NEPs) to prevent transmission of HIV and other bloodborne pathogens. In Ontario, the first NEPs opened in Toronto and Ottawa during the late 1980s and early 1990's. The development and delivery of NEPs are governed by the Mandatory Health Programs and Services Guidelines, Ontario Ministry of Health and Long-Term Care (December 1997). The Mandatory Programs represent the minimum programs that a jurisdiction must deliver, but each jurisdiction can develop additional programs and supplement mandatory programs as they deem necessary. Under the program standards for STDs and HIV, the Mandatory Programs and Services Guidelines direct that:

'(t)he Board of Health shall ensure that injection drug users can have access to sterile injection equipment by the provision of needle and syringe exchange programs as a harm reduction strategy to prevent transmission of HIV, hepatitis B, hepatitis C, and other blood-borne infections and associated diseases where drug use is recognized as a problem in the community. The strategy shall also include counselling and education and referral to primary health services and addiction/treatment services. The Board of Health shall produce an annual report of program activities and forward a copy to the Minister of Health' [16].

In 1997/98, using HIV testing data, nine Ontario communities that were experiencing relatively high HIV incidence among IDUs were identified (See table 24). The AIDS Bureau of the Ontario Ministry of Health and Long-Term Care funded environmental scans to assess the situation in each of these communities and subsequently invited proposals for injection drug user outreach projects. The AIDS Bureau sought proposals for projects using community-based approaches to reduce HIV transmission, establish contact with marginalized IDUs and encourage service utilization, reduce the social isolation of IDUs and complement existing services in these communities. All proposed projects were to be based on harm reduction principles and to include: outreach, counselling, support, education, community development and a peer component. A total of 15 workers were hired across the 9 communities, with a mandate to spend 80% of their time doing frontline outreach work and 20% on community development and community advisory activities.

1.4 MANDATE OF THE PRESENT SITUATION REPORT

The mandate for the report came from the AIDS Bureau, Ontario Ministry of Health and Long-Term Care. In this report available data were examined to determine the extent of injection drug use and the levels of HIV and HCV infection among IDUs in Ontario. There are five main objectives:

1. To characterize the epidemiology of injection drug use in Ontario;
2. To describe the epidemiology of HIV infection among injection drug users in Ontario;
3. To describe the epidemiology of HCV infection among injection drug users in Ontario;
4. To examine the trends in HIV and HCV-related risk behaviours and practices among Ontario's injection drug users; and
5. To assess the evidence for successes and challenges of HIV prevention programs and services for IDUs in Ontario.

2. DATA SOURCES

We collected data on IDUs and HIV and HCV infection from many sources and carried out an integrated analysis to obtain an overview of the HIV and HCV epidemics among IDUs in Ontario. Detailed information on the data sources and methods utilized can be found in Appendix A (alphabetical) and is summarized in Table 2.

TABLE 2.
DATA SOURCES

Prevalence of injection drug use	<ul style="list-style-type: none">• The Capture-recapture Study, Toronto, 1998• IDU Estimates based on Holmberg et al. (1996) methodology Ontario, 2004
Characteristics of IDUs	<ul style="list-style-type: none">• I-Track, Toronto, Sudbury, 2003• NEP Study, Ontario, 1998• POINT Project, Ottawa, 2002-2004• SurvIDU Study, Ottawa, 1996-2003• WHO Study, Toronto, 1991-1994
HIV Prevalence	<ul style="list-style-type: none">• I-Track• NEP Study• POINT Project• SurvIDU Study• WHO Study
HIV Incidence	<ul style="list-style-type: none">• Laboratory Enhancement Study, Ontario, 2004• POINT Project• Repeat HIV Tester Study, Ontario, 1992-2000• SurvIDU Study
Laboratory HIV diagnoses	<ul style="list-style-type: none">• First time HIV diagnoses, Laboratories Branch, Ontario Ministry of Health and Long-Term Care, Ontario, 2004
Reported AIDS cases	<ul style="list-style-type: none">• Reported AIDS cases, Public Health Division, Ontario Ministry of Health and Long-Term Care, Ontario, 2004
Modeling of HIV incidence and prevalence	<ul style="list-style-type: none">• Modeled HIV infection– First time HIV diagnoses, Laboratories Branch, Ontario Ministry of Health and Long-Term Care, Ontario, 2004– Laboratory Enhancement Study, incidence data, Ontario, 2004– Repeat HIV tester study– Reported AIDS cases, Public Health Division, Ontario Ministry of Health and Long-Term Care– Vital Statistics, Registrar General of Ontario, Ontario, 2004

HIV among inmates	<ul style="list-style-type: none"> • Scientific literature
HCV prevalence	<ul style="list-style-type: none"> • I-Track • POINT Project • Surv-IDU Study
HCV incidence	<ul style="list-style-type: none"> • New hepatitis C cases, RDIS database, Ontario Ministry of Health and Long-Term Care, Ontario, 2004 • POINT Project • SurvIDU Study
HIV and HCV coinfection	<ul style="list-style-type: none"> • I-Track • POINT Project • Modeled HIV-HCV co-infections
HIV risk behaviours	<ul style="list-style-type: none"> • I-Track • NEP Study • SurvIDU Study • WHO Study
HIV prevention programs	<ul style="list-style-type: none"> • COUNTERfit Harm Reduction Program Evaluation, Toronto, 2002 • Drug and Alcohol Treatment Information System, Ontario, 2001 • The Impact of Organizational Responses to Environmental Pressures on Outreach Programs for IDUs, Ontario, 1998-2000 • IDU Outreach Program, AIDS Bureau, Ontario Ministry of Health and Long-Term Care, Ontario, 2004 • Needle and Syringe Exchange programs in Ontario, Public Health Branch, Ontario Ministry of Health and Long-Term Care, Ontario, 2002 • Profile of Ontario Methadone Recipients and Providers, Ontario, 1996-2001 • Understanding Injection Drug Use Study, Toronto, 2000-2001

3. FINDINGS

Data from the studies listed in Table 2 are presented in this section. First, the number of IDUs in Ontario are estimated and characterized. Then the prevalence of HIV among IDUs in Ontario, the incidence of HIV among IDUs in Ontario, the number of HIV diagnoses and the reported cases of AIDS are examined followed by a modeling of the HIV epidemic among IDUs. After the review of HIV epidemiology, HCV prevalence, incidence and HIV-HCV co-infection are reviewed followed by an exploration of trends in HIV-HCV-related risk behaviours. The results section finishes with a summary of programmes and services available for IDUs in the province. Section four then provides interpretation and discussion of the findings.

3.1 EPIDEMIOLOGY OF IDUS IN ONTARIO

Few studies have been carried out in Ontario to determine either the proportion of the population or the number of individuals who have injected drugs. A capture-recapture study conducted as part of the Consortium to Characterize Injection Drug Users in Canada was undertaken in 1996 and completed in 1998. This study concluded that, in Toronto, there were approximately 13,700 injection drug users with a range of 11,600 to 16,500 [17].

A second type of capture-recapture analysis for Toronto and Ottawa was undertaken using the HIV laboratory database. An analysis carried out in 1999 yielded an estimate of 9,700 injection drug users in Toronto (Remis, personal communication, 2004). A 2003 analysis for Ottawa showed a range of 3,000 to 5,000 injection drug users (Remis, personal communication, 2004).

Table 3 presents the most recent modeled estimates of the number of injection drug users by health region. Based on these estimates, there are approximately 41,000 active IDUs in the province of Ontario.

TABLE 3.
MODELED NUMBER OF ACTIVE IDUS BY HEALTH REGION, ONTARIO, 2002

Region	Population	Number of IDUs
Northern	908,108	3,100
Ottawa	742,969	3,300
Eastern, other than Ottawa	781,206	2,100
Toronto	2,462,510	16,300
Central East, other than Toronto	2,602,222	5,700
Central West	2,118,152	5,700
Southwest	1,485,709	5,000
Total	11,100,876	41,100

Source: Estimates based on modeling

Northern Region comprises Algoma, Muskoka, North Bay, Northwestern, Porcupine, Sudbury, Thunder Bay and Timiskaming public health units. Eastern, other than Ottawa comprises Eastern Ontario, Hastings-Prince Edward, Kingston-Frontenac, Leeds-Greenville and Renfrew public health units. Central East, other than Toronto comprises Durham, Haliburton, Peel, Peterborough, Simcoe and York Region public health units. Central West comprises Brant, Haldimand, Halton, Hamilton-Wentworth, Niagara, Waterloo, and Wellington –Dufferin public health units. Southwest comprises Bruce Grey-Owen Sound, Elgin-St. Thomas, Huron, Kent-Chatham, Lambton, Middlesex-London, Oxford, Perth, and Windsor-Essex public health units.

3.2 CHARACTERISTICS OF IDUS IN ONTARIO

In Ontario, the majority of IDUs are men. IDUs typically have relatively low educational attainment, high rates of incarceration, low income and experience a high prevalence of homelessness [18-21]. Age at first injection has been reported as relatively young (about 20 years of age on average), with use of illicit drugs by non-injection routes generally beginning a few years earlier. Most commonly used drugs seem to vary by city and region, with Ottawa and Northern Ontario generally having experienced higher rates of use of cocaine as a primary drug, while Toronto has reported more heroin use. Toronto has also reported injection of crack cocaine and of both heroin and cocaine by the same users, (mixed or individually) more frequently than other Ontario centres.

Most IDUs in recent studies from Toronto and Ottawa report at least one previous test for each of HIV and HCV (HIV: Toronto, 2003, 94% had ever tested; Ottawa, 2003, 91% had ever tested; HCV: Toronto, 2003, 85% had ever tested; Ottawa, 2003, 84%) [20, 22, 23]. However, the most recent test dates reported in these studies also indicate that some IDUs' testing may not be up to date.

3.3 HIV PREVALENCE AMONG IDUS IN ONTARIO

In 1998, the NEP Study reported an overall HIV prevalence rate of 6.7% in Ontario among 537 IDUs [18]. Among 125 women the prevalence rate was 9.6% and among 403 men it was 6.0% (difference not statistically significant, p=0.28). Regional prevalence ranged from 1.4% to 14.7% (Table 4).

TABLE 4.
HIV PREVALENCE AMONG IDUS, ONTARIO, 1998

	N	HIV prevalence (%)	95% confidence interval
Men	403	6.0	3.9, 8.7
Women	125	9.6	5.1, 16.2
Overall	537	6.7	4.7, 9.2
Southwest	72	4.2	0.9, 11.7
Central West	115	2.6	0.5, 7.4
Central East	184	8.2	4.6, 13.1
Eastern	71	1.4	0.03, 7.6
Northern	95	14.7	7.6, 21.8

3.4 HIV PREVALENCE AMONG IDUS IN TORONTO

Between 1991 and 1994, the WHO Study observed an overall HIV prevalence rate of 5.5% among 1,276 IDUs in Toronto [24]. The rate was significantly higher among 1,018 men at 6.1% than among the 255 women at 2.4% ($p=0.02$; Table 5). Among men IDUs, heterosexuals had a significantly lower rate of HIV at 3.3% compared to 44.7% among MSM and 24.2% among bisexual men ($p<0.01$).

In 1998, the NEP Study observed an HIV prevalence rate of 8.6% among 174 IDUs in Toronto, 8.3% among 145 men and 13.6% among 22 women ($p=0.23$; Table 5) [18].

In 2003, I-Track reported an HIV prevalence rate of 5.1% among 214 IDUs in Toronto, 5.7% among 158 men and 3.6% among 56 women ($p=0.54$; Table 5) [20].

Comparison of the data across the studies suggests that the overall HIV prevalence rate among Toronto IDUs has not changed significantly since 1991 ($p>0.05$).

TABLE 5.
HIV PREVALENCE AMONG IDUS, TORONTO, 1991-2003

	N	HIV prevalence %	95% confidence interval
WHO study, 1991-1994			
Men	1018	6.1	4.7, 7.8
Women	255	2.4	0.9, 5.1
Overall	1276	5.5	4.3, 6.9
NEP study, 1998			
Men	145	8.3	4.3, 14.0
Women	22	13.6	2.9, 34.9
Overall	174	8.6	4.9, 13.8
I-Track, 2003			
Men	158	5.7	2.6, 10.5
Women	56	3.6	0.4, 12.3
Overall	214	5.1	2.6, 9.0

Source: WHO Study, NEP Study, I-Track

In the WHO Study (1991-1994), univariate analysis found five factors significantly associated with HIV infection among Toronto IDUs (Table 6). These factors included socio-demographic characteristics, drug use, injection practices and sexual behaviours.

TABLE 6.
FACTORS SIGNIFICANTLY ASSOCIATED WITH HIV PREVALENCE AMONG
TORONTO IDUS IN THE WHO STUDY: UNIVARIATE ANALYSIS

Risk Factor	Odds Ratio	P
Injected cocaine in the last 6 months		
Yes	4.8	<0.01
No	1.0 (Referent)	
Gender		
Men	2.7	0.02
Women	1.0 (Referent)	
Protected sex only in the last 6 months		
Yes	2.4	<0.01
No	1.0 (Referent)	
Shared injection equipment in the last 6 months		
Yes	2.0	<0.01
No	1.0 (Referent)	
Injected heroin in the last six months		
Yes	0.59	<0.01
No	1.0 (Referent)	

In the NEP Study (1998), univariate analysis found five factors significantly associated with HIV infection among Toronto IDUs (Table 7). Factors included injection practices, drug use, sexual behaviours and NEP use.

TABLE 7.
FACTORS SIGNIFICANTLY ASSOCIATED WITH HIV PREVALENCE AMONG
TORONTO IDUS IN THE NEP STUDY: UNIVARIATE ANALYSIS

Risk Factor	Odds Ratio	P
Duration of IDU		
5 years or greater	11.3	<0.01
Less than 5 years	1.0 (Referent)	
Used the services of a NEP in the past		
Yes	4.2	<0.01
No	1.0 (Referent)	
Cocaine use or cocaine use in combination with heroin in the last 6 months		
Yes	4.1	0.02
No	1.0 (Referent)	
Protected sex only		
Yes	3.7	<0.01
No	1.0 (Referent)	
Binge injection past 6 months		
Yes	3.1	<0.01
No	1.0 (Referent)	

In the I-Track Study (2003), univariate analysis found three factors significantly associated with HIV infection among Toronto IDUs (Table 8). Factors included drug use and injection practices. No sexual behaviours were found to be significantly associated with HIV infection.

TABLE 8.
FACTORS SIGNIFICANTLY ASSOCIATED WITH HIV PREVALENCE AMONG TORONTO IDUS IN THE I-TRACK STUDY: UNIVARIATE ANALYSIS

Risk Factor	Odds Ratio	P
Injected opiates in the last 6 months		
Yes	9.2	<0.01
No	1.0 (Referent)	
Injected daily in the past 6 months		
Yes	3.5	0.04
No	1.0 (Referent)	
Smoked Crack		
Yes	0.23	0.01
No	1.0 (Referent)	

3.5 HIV PREVALENCE AMONG IDUS IN SUDBURY

In 1998, the prevalence of HIV among 74 IDUs in Sudbury was observed to be 12.2%. In 2002, this decreased to 10.1% among 169 IDUs (Table 9). This decrease was not statistically significant ($p>0.05$).

TABLE 9.
HIV PREVALENCE AMONG IDUS, SUDBURY, 1998 AND 2003

	N	HIV prevalence %	95% confidence interval
NEP study, 1998			
Men	54	5.6	1.2, 15.4
Women	20	30.0	9.9, 50.1
Overall	74	12.2	4.7, 19.7
I-Track, 2003			
Overall	169	10.1	5.6, 14.6

3.6 HIV PREVALENCE AMONG IDUS IN OTTAWA

Leonard et. al. documented an overall HIV prevalence rate of 20.6% among 1,061 participants recruited into the SurviDU Study from 1996 to 2003 [22]. Among 254 women, the HIV prevalence rate was 18.1%, compared with 21.3% among 806 men (Table 10).

In 2004, Leonard et. al. reported an overall HIV prevalence rate of 11.9% among 486 participants in Ottawa's POINT project [19]. Among 83 women, the HIV prevalence was 9.6% and among 400 men it was 12.0% (Table 10).

TABLE 10.
HIV PREVALENCE AMONG IDUS, OTTAWA, 1996-2004

	N	HIV prevalence %	95% confidence interval
SurvIDU Study 1996-2003			
Men	806	21.3	18.5, 24.3
Women	254	18.1	13.6, 23.4
Overall*	1061	20.6	18.2, 23.1
POINT Project 2004			
Men	400	12.0	9.0, 15.6
Women	83	9.6	4.3, 18.1
Overall*	486	11.9	9.2, 15.2

Source: SurvIDU Study, POINT project

*Includes transgendered IDUs

The four significant independent predictors of baseline HIV infection among women in the SurvIDU Study are shown in Table 11. Factors included drug use, injection practices, NEP use and sexual behaviours.

TABLE 11.
SOCIO-DEMOGRAPHIC AND BEHAVIOURAL DETERMINANTS OF BASELINE HIV PREVALENCE AMONG OTTAWA WOMEN IDUS IN THE SURVIDU STUDY: MULTIVARIATE ANALYSIS (N=254)

Risk Factor	Adjusted Odds Ratio* (95% CI)	P
Only same-sex partner(s) in 6 months preceding baseline interview		
Yes	10.4 (1.7, 61.8)	0.01
No	1.0 (Referent)	
Use of Ottawa needle exchange programme ≥ 7 months		
Yes	3.5 (1.3, 10.0)	0.02
No	1.0 (Referent)	
Ever injected with someone else's needle		
Yes	3.0 (1.3, 7.1)	0.01
No	1.0 (Referent)	
Injected heroin in 6 months preceding baseline interview		
Yes	0.3 (0.1, 0.9)	0.03
No	1.0 (Referent)	

*Adjusted for all other variables in the equation.

The five significant independent predictors of baseline HIV infection among Ottawa men IDUs in the SurviDU Study are shown in Table 12. Factors included socio-demographic characteristics, injection practices, sexual behaviours and needle exchange program (NEP) use.

TABLE 12.
SOCIO-DEMOGRAPHIC AND BEHAVIOURAL DETERMINANTS OF BASELINE HIV PREVALENCE AMONG OTTAWA MEN IDUS IN THE SURVIDU STUDY: MULTIVARIATE ANALYSIS (N=807)

Risk Factor	Adjusted Odds Ratio* (95% CI)	P
Regular or occasional employment in six months preceding baseline interview		
Yes	1.0 (Referent)	<0.001
No	4.0 (2.2, 7.5)	
Unprotected sex with any opposite sex partner in 6 months preceding baseline interview		
Yes	1.0 (Referent)	<0.001
No	2.5 (1.5, 4.1)	
No opposite sex partner in the past six months	3.1 (2.0, 5.0)	
Ever injected with someone else's used needle		
Yes	2.5 (1.6, 3.7)	<0.001
No	1.0 (Referent)	
Use of Ottawa needle exchange programme ≥ 7 months		
Yes	2.3 (1.5, 3.6)	0.02
No	1.0 (Referent)	

*Adjusted for all other variables in the equation.

The seven significant independent predictors of baseline HIV infection among Ottawa IDUs in the POINT project are shown in Table 13. Factors included socio-demographic characteristics, sexual behaviours, injection practices and NEP use.

TABLE 13.
SOCIO-DEMOGRAPHIC AND BEHAVIOURAL DETERMINANTS OF BASELINE HIV PREVALENCE AMONG OTTAWA IDUS IN THE POINT PROJECT: MULTIVARIATE ANALYSIS

Risk Factor	Adjusted Odds Ratio* (95% CI)	P
High number of same-sex sexual partners in the six months preceding baseline interview		
Six or more	5.3 (1.4, 20.2)	0.016
Five or fewer	1.0 (Referent)	
Older age (years)		
31 and older	4.9 (1.7, 13.7)	0.003
30 and under	1.0 (Referent)	
Ever used services of the needle exchange programme in Ottawa		
Yes	4.8 (1.6, 14.4)	0.005
No	1.0 (Referent)	
Always inject alone in the six months preceding baseline interview		
Yes	3.6 (1.7, 7.5)	0.001
No	1.0 (Referent)	
Ethnic group		
Aboriginal	2.9 (1.2, 7.2)	0.018
Other	1.0 (Referent)	
Ever injected with used needles		
Yes	2.8 (1.3, 6.1)	0.010
No	1.0 (Referent)	
High frequency of daily injections		
Six or more	2.0 (1.1, 3.7)	0.036
Five or fewer	1.0 (Referent)	

3.7 HIV INCIDENCE AMONG IDUS IN ONTARIO

Data from the Laboratory Enhancement Study (LES) were used to determine HIV incidence among Ontario IDUs. Cumulatively, incidence among IDUs based on the LES was 0.23 per 100 person-years, with 0.22 per 100 person-years for men and 0.26 per 100 person-years for women (Table 14). HIV incidence among IDUs varied by region (rates per 100 person-years in decreasing order): Ottawa 0.71, Northern 0.57, other Eastern 0.25, Toronto 0.19, Central West 0.13, Southwest 0.11 and other Central East 0.04. Rates were clearly highest in Ottawa and in the Northern region (Table 14).

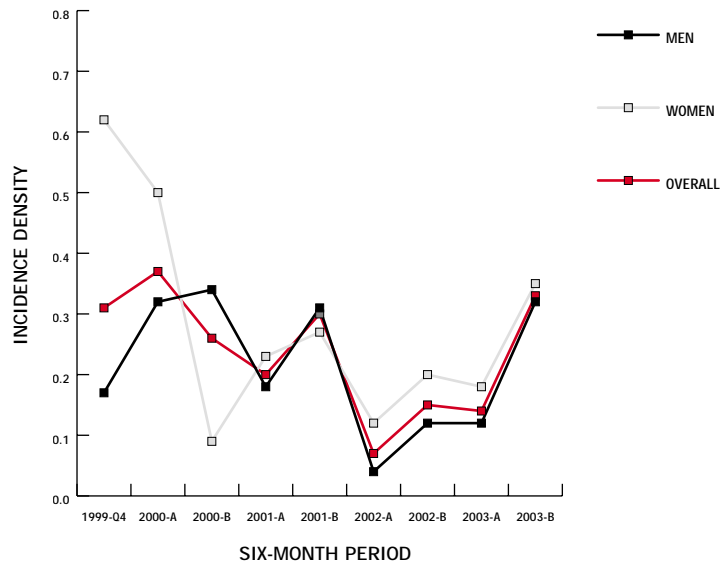
TABLE 14.
HIV INCIDENCE AMONG IDUS BY SEX AND HEALTH REGION, ONTARIO, OCTOBER 1999 TO DECEMBER 2003

	Men	Women	Overall
Northern	0.81	0.33	0.57
Ottawa	0.87	0.53	0.71
Eastern, other than Ottawa	0.26	0.22	0.25
Toronto	0.12	0.30	0.19
Central East, other than Toronto	0.01	0.13	0.04
Central West	0.10	0.18	0.13
Southwest	0.16	0.01	0.11
Ontario	0.22	0.26	0.23

Source: Laboratory Enhancement Study

Overall, there was a general decline in incidence from 1999 until 2002, from about 0.30 per 100 person-years in the early period to around 0.10 per 100 person-years in the more recent period. However, incidence increased to 0.33 per 100 person-years in the latter half of 2003. The rates by sex displayed parallel trends in HIV incidence since the beginning of 2001 (Figure 1).

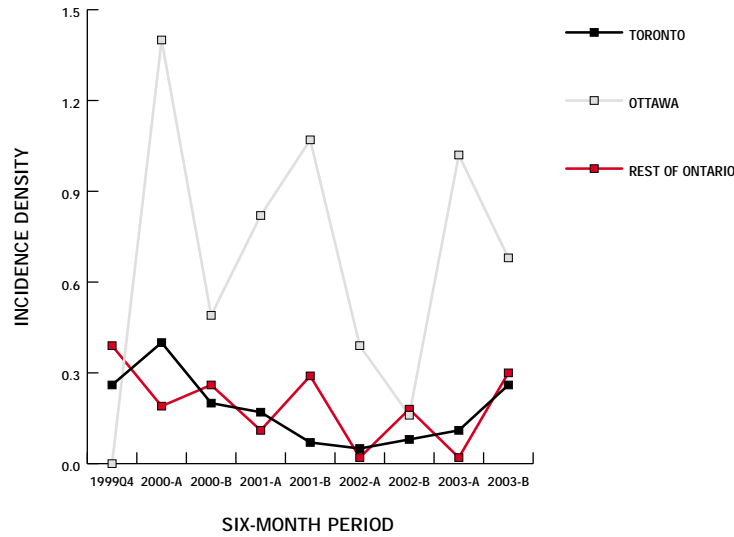
FIGURE 1.
INCIDENCE DENSITY (/100) AMONG IDUS BY SEX BY SIX-MONTH PERIOD,
ONTARIO, 1999-2003



Source: Laboratory Enhancement Study

We examined HIV incidence over time for Toronto, Ottawa and the rest of Ontario (Figure 2). For Toronto, rates were highest in the last quarter of 1999 and the first half of 2000. Since this time, the rate has remained in the 0.10 to 0.20 per 100 person-years range with the sole exception of the last half of 2003 when it increased to 0.26. However, in Ottawa, the incidence density has varied over time from a high of 1.40 to a low of 0.0.

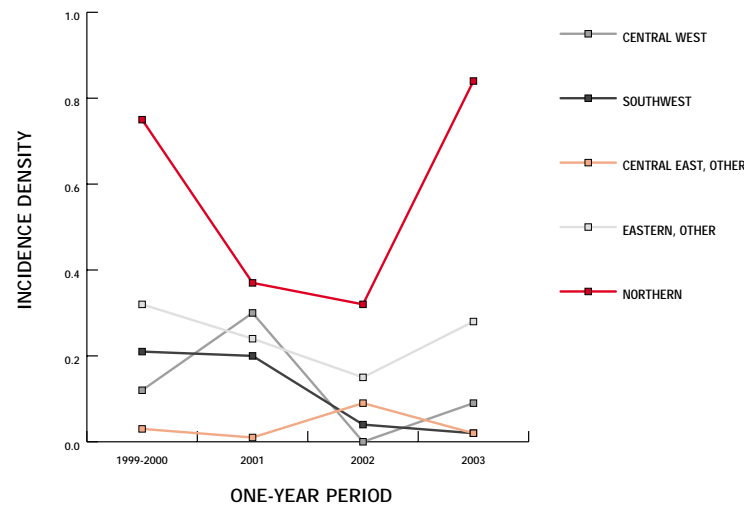
FIGURE 2.
INCIDENCE DENSITY (/100py) AMONG IDUS BY BY HEALTH REGION AND SIX-MONTH PERIOD, ONTARIO 1999-2003



Source: Laboratory Enhancement Study

The trends in HIV incidence for the five other regions are shown by year in Figure 3. In all regions except the Northern, incidence has either been stable or decreasing. In the Northern region, incidence more than doubled in 2003 compared to 2001 and 2002.

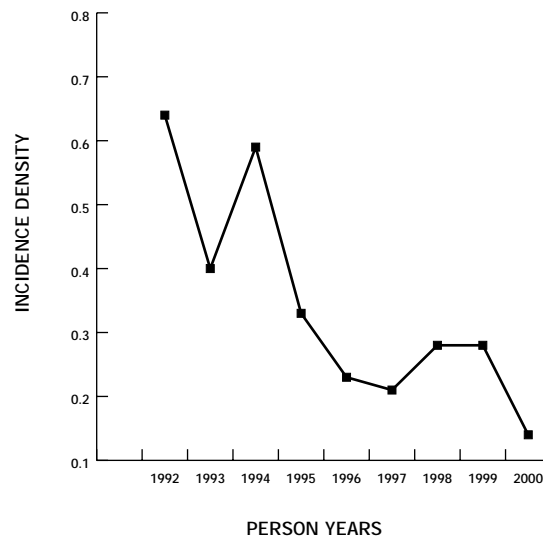
FIGURE 3.
INCIDENCE DENSITY (/100py) BY ONE-YEAR PERIOD FOR SELECTED HEALTH REGIONS, ONTARIO, 1999-2003



Source: Laboratory Enhancement Study

The Repeat HIV Tester Study also reported HIV incidence density for Ontario IDUs. Calzavara et al., (2002) documented 119 seroconversions among IDUs from 1992 to 2000 in the 38,167 person years of follow-up for IDUs [26]. As seen in Figure 4, the incidence density among IDUs showed a declining trend.

FIGURE 4.
INCIDENCE DENSITY (/100py) AMONG REPEAT IDU HIV TESTERS, ONTARIO, 1992-2000



Source: Repeat HIV Tester Study

Incidence density observed among IDUs declined significantly over the 1992-2000 period. Gender and age were not statistically significant factors. The risk of infection was nine-fold greater in Ottawa and two-fold greater in northern Ontario compared to Toronto (Table 15).

TABLE 15.
RELATIVE RATES AMONG IDU REPEAT TESTERS, ONTARIO, 1992-2000

Variable	Adjusted RR	95% confidence interval
Calendar Year		
one-year change	0.87	0.80, 0.94
Sex		
Men	0.90	0.62, 1.3
Women	1.0 (Referent)	
Age		
20-29	1.0 (Referent)	
30-39	1.5	0.94, 2.3
40-49	0.90	0.50, 1.6
50+	0.79	0.19, 3.3
Geographic Region		
Ottawa	9.3	5.1, 17.0
Northern Ontario	2.3	1.1, 4.7
Other Ontario	1.1	0.6, 1.9
Toronto	1.0 (Referent)	

Source: Repeat HIV Tester Study

3.8 HIV INCIDENCE AMONG IDUS IN OTTAWA

Among the 1,061 Ottawa IDUs who completed baseline interviews in the SurviDU Study, 341 participants completed at least one follow-up interview. Among this group, 278 tested HIV-negative at baseline and had complete HIV test result data. Among this cohort of 278 HIV-negative IDUs, 33 HIV seroconversions were observed during the follow-up period. The mean follow-up time was 2.0 years, with a range of six months to 6.5 years. The overall HIV incidence density was 5.8 per 100 person-years (py; 95% confidence interval [CI]: 3.8, 7.9).

Twenty-seven seroconversions occurred among men IDUs resulting in an incidence density of 7.6 per 100 py (95% CI: 4.6, 10.6). Six seroconversions occurred among women IDUs resulting in an incidence density of 2.9 per 100 py (95% CI: 0.9, 4.9).

Among the 506 Ottawa IDUs who completed interviews at baseline in the POINT project, 272 participants completed at least one follow-up interview in two waves of semi-annual follow-up. Among these 272 IDUs who completed follow-up interviews, 225 tested HIV-negative at baseline and had complete HIV test result data. Among this HIV-negative cohort of 225 IDUs, four seroconversions were detected during the first year of follow-up. The overall incidence density was 2.3 per 100 py (95% CI: 0.1, 4.5).

Three seroconversions occurred among men IDUs for an incidence density of 2.1 per 100 py (95% CI: 0.0, 4.5). One seroconversion occurred among women IDUs for an incidence density of 2.9 per 100 py (95% CI: 0.0, 8.6).

Based on the SurVIDU data, four significant independent predictors of HIV seroconversion among Ottawa men and women IDUs were identified (Table 16). Factors included socio-demographic characteristics, injection practices and NEP use. No sexual behaviours were found to be predictive of HIV seroconversion.

TABLE 16.
RISK FACTORS FOR HIV SEROCONVERSION AMONG OTTAWA MEN AND
WOMEN IDUS IN THE SURVIDU STUDY: MULTIVARIATE ANALYSIS (N=278)

Risk factor	Adjusted relative risk * (95% Confidence Interval)	P
Gender		
Men	2.8, (1.1, 6.9)	0.028
Women	1.0 (Referent)	
Inject with used needles in six months preceding last interview		
Yes	2.7 (1.3, 5.4)	0.007
No	1.0 (Referent)	
Unstable housing		
Yes	2.1 (1.0, 4.4)	0.045
No	1.0 (Referent)	
NEP use ≥ 7 months		
Yes	0.06 (0.01, 0.46)	0.008
No	1.0 (Referent)	

*Adjusted for all other variables in the equation.

3.9 FIRST-TIME HIV DIAGNOSES AMONG ONTARIO IDUS

Since HIV testing began in 1985, 2,010 injection drug users have been diagnosed with HIV. Additionally, there have been 973 persons diagnosed with HIV who indicated risk from sex with other men and injection drug use (MSM-IDU; Table 17). With respect to IDU, the number of new diagnoses peaked in 1994 at 195 cases and decreased to approximately 40% of that level by 2003. With respect to MSM-IDU, the peak was slightly earlier in 1992 with 86 HIV diagnoses with a somewhat more dramatic decrease to 23 new diagnoses in 2003, or about 25% of the peak level. The pattern of first time HIV diagnoses among MSM-IDU falls between that of MSM and IDU (data not shown).

TABLE 17.
NUMBER OF FIRST-TIME HIV DIAGNOSES (ADJUSTED) BY YEAR OF HIV
DIAGNOSIS AND EXPOSURE CATEGORY, ONTARIO, 1985 TO 2003

Year	IDU	MSM-IDU	Total	Year	IDU	MSM-IDU	Total
1985	2	14	16	1995	150	67	217
1986	26	57	83	1996	138	44	182
1987	29	57	86	1997	122	35	157
1988	62	57	119	1998	138	46	184
1989	96	69	165	1999	141	31	172
1990	137	79	216	2000	95	37	132
1991	128	69	197	2001	90	28	118
1992	184	86	270	2002	81	20	101
1993	120	80	200	2003	77	23	100
1994	195	74	269	Total	2,011	973	2,984

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

With regard to gender, 1,410 or 70% of first-time HIV diagnoses among IDUs were men. This corresponds to the male:female ratio generally found among IDUs.

The distribution of first-time HIV diagnoses among IDUs by region from 1985 to 2003 is shown in Table 18. The largest number of HIV diagnoses among IDUs was in Toronto with 697 constituting 34.7% of HIV diagnoses in Ontario, followed by Ottawa with 527 or 26.2%. The rate per 100,000 population was highest in Ottawa at 66.6; rates observed in Toronto and in the Eastern region other than Ottawa were similar to each other at 26.8. An intermediate rate was observed in the Northern region at 18.7 per 100,000, substantially higher than the remaining four regions where rates varied from 3.2 to 9.7. Interestingly, the difference between Ottawa and Toronto was greatest among men IDUs where the rate in Ottawa were almost three-fold higher than in Toronto compared to among women where the rate was approximately two-fold greater (data not shown).

TABLE 18.
NUMBER OF FIRST-TIME HIV DIAGNOSES (ADJUSTED) BY YEAR OF HIV
DIAGNOSIS AND HEALTH REGION AMONG IDUS, ONTARIO, 1985-2003

Year	Northern	Ottawa	Eastern, other than Ottawa	Toronto	Central East, other than Toronto	Central West	Southwest	Ontario
1985-1989	12	28	19	111	11	27	8	215
1990-1994	28	186	82	321	37	81	28	764
1995-1999	92	223	59	181	30	72	32	689
2000	8	27	12	26	4	14	6	95
2001	7	26	15	17	2	17	4	90
2002	8	16	16	23	10	4	3	81
2003	11	22	15	18	4	4	2	77
Total	167	527	218	697	98	220	83	2010
Ontario Proportion	8.3%	26.2%	10.8%	34.7%	4.9%	10.9%	4.1%	100.0%
Rate per 100,000	18.7	66.6	26.8	26.8	3.2	9.7	5.4	16.8

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

Among MSM-IDUs, 530 or 54.4% of diagnoses in Ontario were in Toronto and 16.8% in Ottawa (see Table 19). Rates per 100,000 population were substantially higher in Toronto and Ottawa than other regions with rates of 20.4 and 20.6, respectively. The rates in the other regions varied from 1.3 to 7.6 per 100,000.

TABLE 19.
NUMBER OF FIRST-TIME HIV DIAGNOSES (ADJUSTED) BY YEAR OF HIV
DIAGNOSIS AND HEALTH REGION AMONG MSM-IDU, ONTARIO, 1985 TO 2003

Year	Northern	Ottawa	Eastern, other than Ottawa	Toronto	Central East, other than Toronto	Central West	Southwest	Ontario
1985-1989	0	21	12	169	9	30	14	254
1990-1994	7	82	27	200	21	33	22	388
1995-1999	0	40	19	98	14	34	13	223
2000	2	7	1	20	2	1	3	37
2001	2	2	1	17	2	2	2	28
2002	0	2	1	15	1	1	0	20
2003	0	5	2	11	3	2	0	23
Total	12	163	61	530	51	101	55	973
Ontario Proportion	1.2%	16.8%	6.3%	54.4%	5.2%	10.4%	5.7%	100.0%
Rate per 100,000	1.3	20.6	7.6	20.4	1.7	4.5	3.6	8.1

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

3.10 REPORTED AIDS CASES AMONG ONTARIO IDUS

Since 1981, 336 cases of AIDS attributed to injection drug use have been reported in Ontario. Of those, 258 were among men and 78 among women (Figure 5); thus male cases accounted for 77% of IDU AIDS cases. The relative proportion of female IDU AIDS cases has not changed significantly since the beginning of the HIV epidemic.

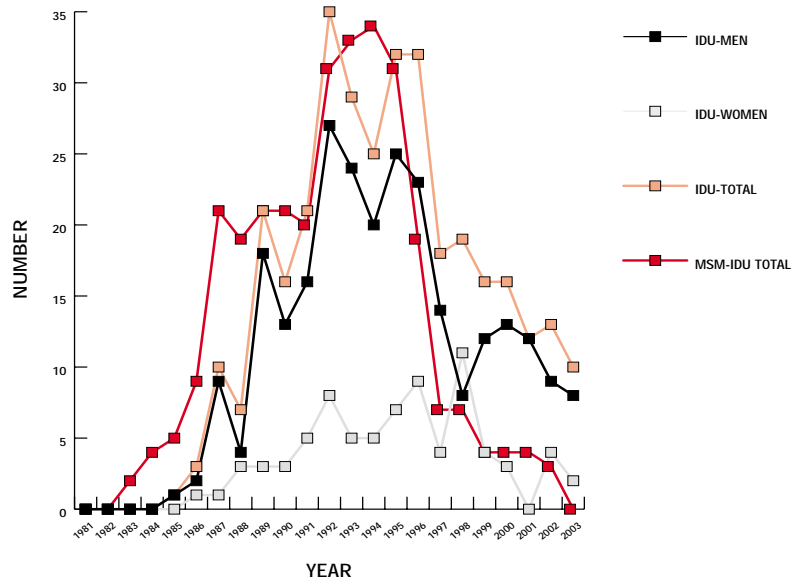
AIDS incidence reached a peak in 1995 and 1996 when 32 cases in each of these years were reported among IDUs (Figure 5). Since this peak, AIDS cases have decreased by approximately 75%; the decrease was less marked among MSM-IDU where the decrease was 19%.

The incidence of reported AIDS cases among IDUs varied by public health unit. The incidence was highest in Kingston with a cumulative incidence rate of 10.5 per 100,000. In five public health units, incidence was greater than 4.0 per 100,000 as follows: Kingston 10.5, Ottawa 7.8, Thunder Bay 4.9, Toronto 4.7 and Sudbury 4.4 per 100,000.

Since 1981, an additional 299 AIDS cases were attributed to MSM-IDU exposure (Figure 5). It is difficult to know whether these persons were infected sexually or through drug injection. Nevertheless, the marked decrease in incidence since the peak in 1992-1995, as well as the relative incidence by region (see below), suggest a pattern more similar to MSM.

Overall, the AIDS incidence rate for MSM-IDU was 2.7 per 100,000 for Ontario as a whole. The cumulative incidence rate was highest in Toronto with 7.2 and North Bay with 5.7 per 100,000. Three other public health units observed rates greater than 3.0, namely London 3.5, Sudbury 3.4 and Ottawa 3.2 per 100,000. The relative rates and rank order also appeared more similar to those of MSM compared to IDU. In Ottawa, the rate among IDUs was 66% higher than in Toronto, whereas for MSM-IDU the rate was only 44% that of Toronto.

FIGURE 5.
NUMBER OF IDU (BY SEX) AND MSM-IDU AIDS CASES BY YEAR
OF DIAGNOSIS, ONTARIO, 1981 TO 2003



Source: Ontario Ministry of Health and Long-Term Care

3.11 MODELING OF THE HIV EPIDEMIC AMONG ONTARIO IDUS

As noted above, we estimated, to the extent possible, the annual, cumulative and prevalent number of HIV infections, first-time HIV diagnoses, reported AIDS cases and HIV-related deaths for IDUs in Ontario from 1978 until 2002. This modeling incorporates an iterative spreadsheet approach using data from the HIV Laboratory, AIDS surveillance programs and data provided by Vital Statistics kept by the Registrar General.

Table 20 shows the modeled estimates of HIV prevalence and incidence among IDUs in Ontario by health region as of December 2002.

Overall, we estimate that 1,950 of the estimated 41,140 active IDUs in Ontario are infected with HIV. The greatest number of infections was in Toronto (32% of HIV-infected IDUs in Ontario) but the highest infection rates were in Ottawa (17.7% compared to 1.6% to 10.4% in the other regions). Interestingly, the second highest prevalence rate was in the rest of the Eastern region, contiguous with Ottawa. The third highest prevalence rate was observed in the Northern region.

Overall, the modeled HIV incidence was 0.29 per 100 person-years, with incidence considerably higher in Ottawa than in the other regions. Given the limitations of the data and the small numbers, incidence was not calculated separately for each of the health regions outside of Toronto and Ottawa.

TABLE 20.
MODELED ESTIMATES OF PREVALENCE AND INCIDENCE OF HIV INFECTION
AMONG IDUS BY HEALTH REGION, ONTARIO, DECEMBER 2002

	Number of IDUs	HIV prevalence, number	HIV prevalence proportion	HIV incidence number	HIV incidence rate
Toronto	16,250	620	3.8%	50	0.31
Ottawa	3,270	580	17.7%	30	0.92
Other regions					
Northern	3,100	160	5.2%		
Eastern, other than Ottawa	2,120	220	10.4%		
Central East, other than Toronto	5,730	170	3.0%		
Central West	5,720	170	3.0%		
Southwest	4,950	80	1.6%		
Total other regions	21,620	800	6.7%	40	0.19
Total	41,140	1,950	4.7%	120	0.29

3.12 HEPATITIS C PREVALENCE AMONG IDUS IN ONTARIO

In 2003, the HCV prevalence rate in Toronto among 210 I-Track participants was 54.3% compared with 61.5% found among 169 participants in Sudbury [20]. In 2003, the overall cumulative baseline HCV prevalence rate in Ottawa among 252 SurVIDU Study participants was 75.8%. In 2004, the HCV prevalence rate in Ottawa among 485 POINT Project participants was 58.3% [21] (Table 21). Among 399 men in the POINT Project, the prevalence rate was 59.9% compared with 66.3% among 83 women.

TABLE 21.
HCV PREVALENCE RATES AMONG IDUS, ONTARIO, 2003

	N	HCV prevalence %	95% C.I.
Toronto –I-Track (2003)	210	54.3	47.6, 61.0
Sudbury –I-Track (2003)	169	61.5	54.2, 68.8
Ottawa			
SurVIDU Study (1996-2003)	252	75.8	70.5, 81.1
POINT project (2004)	485	58.3	53.9, 62.6

Source: I-Track, SurVIDU, POINT project

The six significant independent predictors of baseline HCV infection among Ottawa men IDUs in the POINT project are shown in Table 22. Factors included sociodemographic variables, drug use, injection practices and NEP use.

TABLE 22.
SOCIO-DEMOGRAPHIC AND BEHAVIOURAL DETERMINANTS OF BASELINE
HCV PREVALENCE AMONG OTTAWA MEN IDUS IN THE POINT PROJECT;
MULTIVARIATE ANALYSIS (N=399)

Risk factor	Adjusted odds ratio (95% CI)	P
Duration of drug use		0.002
3 years or more	8.5 (2.3, 32.0)	
2 years and less	1.0 (Referent)	
Older age		<0.001
31 years and older	4.9 (2.9, 8.3)	
30 years and under	1.0 (Referent)	
History of injection with a used needle		<0.001
Yes	3.0 (1.8, 4.8)	
No	1.0 (Referent)	
Inject cocaine most often in the 6 months preceding baseline interview		0.002
Yes	2.3 (1.4, 4.0)	
No	1.0 (Referent)	
Inject daily in the 6 months preceding baseline interview		0.013
Yes	2.2 (1.2, 4.0)	
No	1.0 (Referent)	
NEP use ≥ 7 months		0.005
Yes	0.50 (0.31-0.83)	
No	1.0 (Referent)	

The two significant independent predictors of baseline HCV infection among Ottawa women IDUs in the POINT project are shown in Table 23. Factors included sociodemographic and drug use variables.

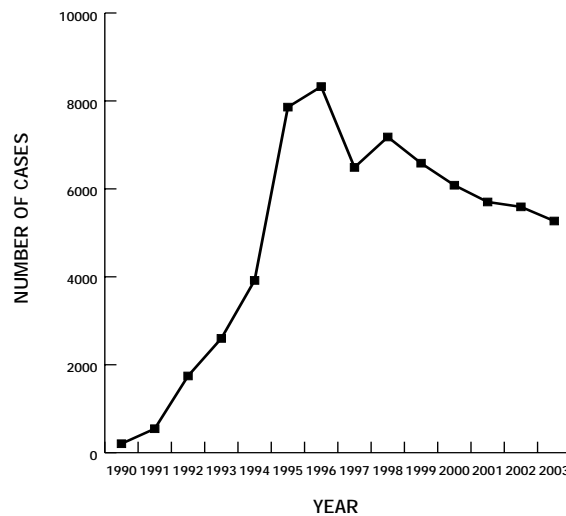
TABLE 23.
SOCIO-DEMOGRAPHIC AND BEHAVIOURAL DETERMINANTS OF BASELINE HCV
PREVALENCE AMONG OTTAWA WOMEN IDUS IN THE POINT PROJECT;
MULTIVARIATE ANALYSIS (N=83)

Risk factor	Adjusted odds ratio (95% CI)	P
Injected cocaine or morphine most often in the 6 months preceding baseline interview		
Yes	8.1 (2.7, 24.5)	<0.001
No	1.0 (Referent)	
Older age		
31 years and older	4.3 (1.4, 13.4)	0.012
30 years and under	1.0 (Referent)	

3.13 REPORTED CASES OF HEPATITIS C INFECTION AMONG IDUS IN ONTARIO

Data from the RDIS database, Public Health Division, Ontario Ministry of Health and Long-Term Care, presented in Figure 6, depict newly reported hepatitis C cases for Ontario from 1990 to 2003. Relatively few cases of HCV were reported in 1990 and 1991 but the number of cases increased to a peak of 8,326 cases in 1996 with a gradual decline thereafter (Figure 6).

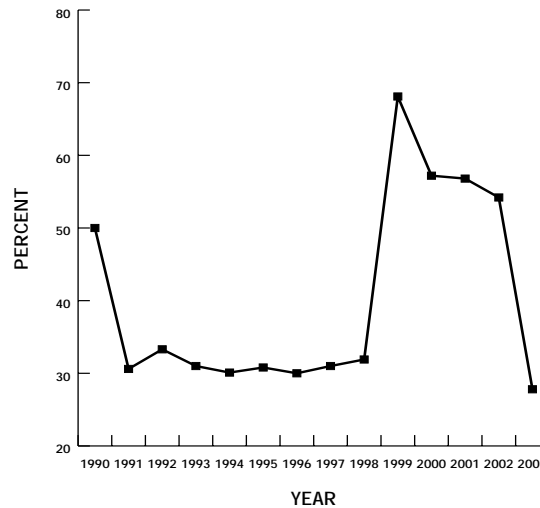
FIGURE 6.
NUMBER OF NEWLY REPORTED HEPATITIS C CASES BY YEAR, ONTARIO,
1990 TO 2003



Source: RDIS, Public Health Division, Ontario Ministry of Health and Long-Term Care

The proportion of HCV cases with a reported risk factor of IDU hovered around 30% until 1998 and increased to 68% in 1999. Since then, there has been a gradual decline in the proportion of HCV cases with the reported risk factor of IDU (Figure 7).

FIGURE 7.
PERCENT OF NEWLY REPORTED HEPATITIS C CASES WITH A REPORTED RISK FACTOR OF IDU, ONTARIO, 1990 TO 2003



Source: RDIS, Public Health Division, Ontario Ministry of Health and Long-Term Care

3.14 HEPATITIS C INCIDENCE AMONG IDUS IN OTTAWA

In the SurvIDU Study, 31 HCV seroconversions were observed among the 61 Ottawa IDUs who tested HCV negative at their baseline interview and completed at least one follow-up interview. Overall HCV incidence was 41.6 per 100 py (95% CI: 28.3, 59.1).

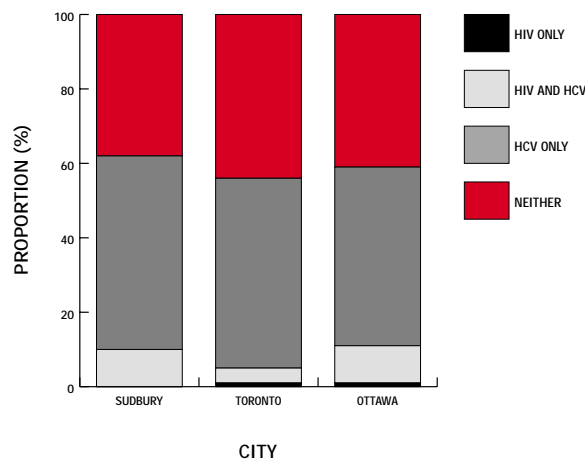
In the POINT project, there were 17 HCV seroconversions among 97 Ottawa IDUs who tested HCV negative at their baseline interview and completed at least one follow-up interview. The overall incidence density was 25.0 per 100 py (95% CI: 13.1, 36.9). Sixteen HCV seroconversions occurred among men IDUs for an incidence density of 28.6 per 100 py (95% CI: 14.6, 42.7). One HCV seroconversion occurred among women IDUs resulting in an incidence density of 8.3 per 100 py (95% CI: 0.0, 24.7).

3.15 CO-INFECTION OF HIV AND HCV AMONG IDUS IN ONTARIO

As shown in Figure 8, most IDUs infected with HIV are also found to be co-infected with HCV. Of the 11% of IDUs in Ottawa's

POINT project who were infected with HIV, 10% were co-infected with HCV, while only 1% had HIV infection alone. All 10% of IDUs in Sudbury in the I-Track Study who were infected with HIV were co-infected with HCV. Among Toronto IDUs in the same study, 4% were co-infected with HIV and HCV, while a further 1% had HIV alone. Approximately 62% of IDUs were infected with HCV in Sudbury, 58% in Ottawa, and 55% in Toronto. Finally, 44% of IDUs in Toronto were infected with neither virus compared to 41% in Ottawa and 38% in Sudbury [20, 21].

FIGURE 8. HIV AND HCV COINFECTION AMONG IDU, ONTARIO, 2003



Source: I-Track, POINT project

The extent of co-infection with HIV and HCV in Canada was modeled by Remis in 2001 [27]. He estimated that, in all, 11,200 persons in Canada had HIV-HCV coinfection as of 1999, of whom 7,900 were IDUs. The estimated number of HIV-HCV co-infected persons in Ontario was 2,800. Updating the estimates to 2002 [14] and interpolating the proportions among IDUs yields an estimated 1,800 IDUs in Ontario co-infected with HIV and HCV as of 2002 (Remis, personal communication, 2004).

3.16 HIV AND HCV INFECTION AMONG INMATES IN ONTARIO

In a provincial study, approximately 52% of prisoners reported drug use while incarcerated. [28]. The proportion of inmates in Ontario reporting a history of drug injection ranged from 15% to 37% [28-30]; 4% to 25% [28-30] injected while incarcerated. Approximately 19% to 32% of incarcerated IDUs who inject while in prison have reported needle sharing [29, 30].

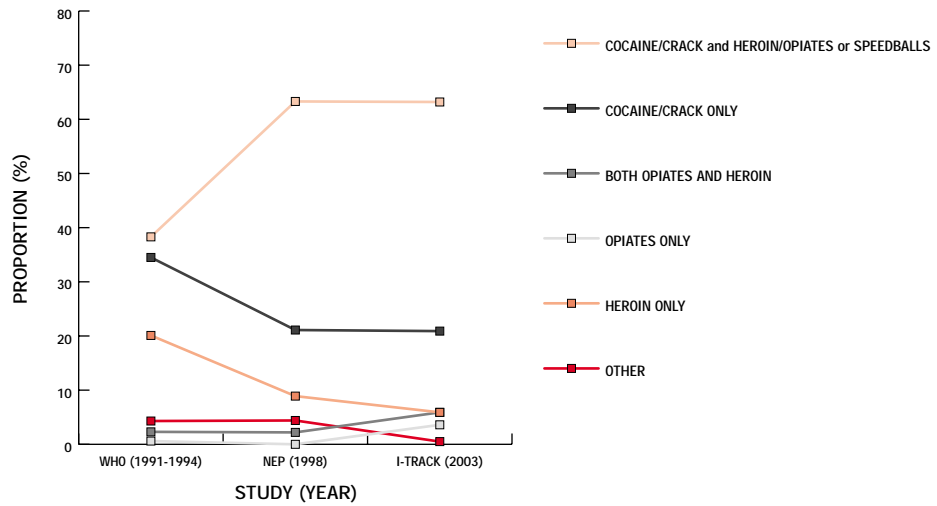
IDU is a major risk factor for HIV and HCV among inmates. Reported rates of HIV infection among those incarcerated in Ontario range from 1% to 2% [29, 31-34]. Rates of HCV infection in Ontario inmates range from 14.3% (self-reported) to 33% (blood test) [29, 33, 34].

3.17 TRENDS IN HIV AND HCV-RELATED RISK BEHAVIOURS AMONG TORONTO IDUS

Data from the WHO Study, the NEP Study and I-Track were combined to examine trends in HIV-related risk behaviours among IDUs in Toronto over 12 years. These behaviours included drug use, drug injection and sexual risk behaviours.

Drug use in the 6 months preceding interview: From 1991 to 2003, there was a significant decline in the use of heroin only and cocaine/crack only but a concomitant rise in the proportion of users reporting that they use both cocaine/crack AND heroin/opiates either individually or combined as speedballs in the 6 months preceding interview (Figure 9).

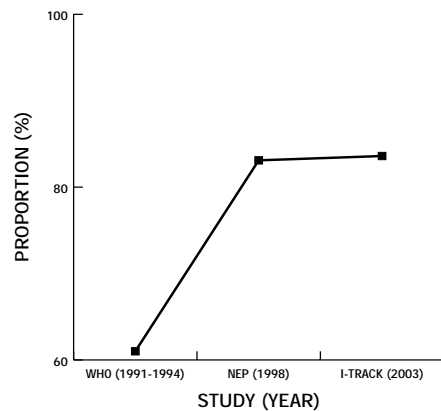
FIGURE 9.
DRUG USING BEHAVIOURS, TORONTO, 1991-2003



Source: WHO Study, NEP Study, I-Track

Crack Use in the 6 months preceding interview: Crack use in the 6 months preceding interview increased significantly in Toronto from 1991 to 2003, up 23% during this time period (Figure 10).

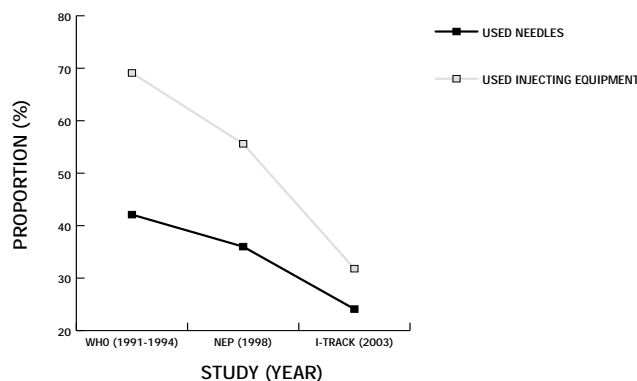
FIGURE 10.
CRACK USE, TORONTO, 1991-2003



Source: WHO Study, NEP Study, I-Track

Injecting with a used needle in the 6 months preceding interview: The proportion of IDUs in Toronto who reported re-use of needles or injection equipment in the past 6 months declined significantly over the 12-year period. Injecting with a used needle declined from 42% in 1991 to 24% in 2003. Injecting with used injecting equipment such as cookers, spoons, cotton and water, declined from 69% to 32% during the time period (Figure 11). Of the 24% of participants in I-Track who reported re-use of someone else's needles, 52.8% reported sharing with close friends/family and 41.5% with sexual partners. The remaining 5.7% mostly shared with someone they didn't know well or at all. Of the 32% of participants in I-Track who reported sharing injection equipment other than needles, 45.7% mostly shared with close friends, 48.6% with sexual partners, and 5.7% with someone they didn't know well or at all.

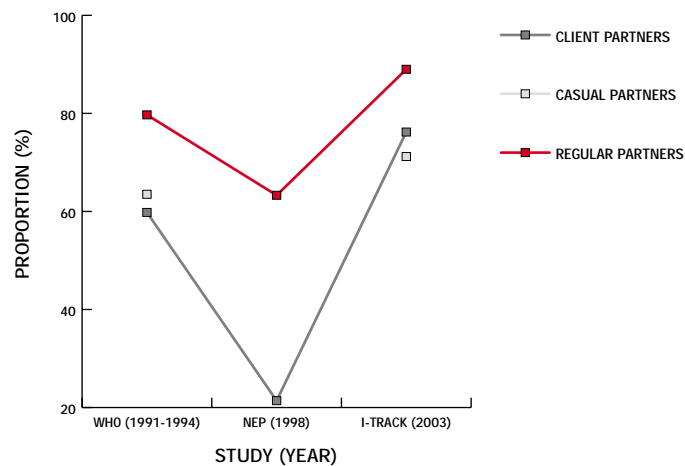
FIGURE 11.
INJECTING WITH USED NEEDLES OR INJECTING EQUIPMENT, TORONTO, 1991-2003



Source: WHO Study, NEP Study, I-Track

Unprotected sex among men by partner type in the preceding six months: The proportion of male IDUs who had unprotected sex with regular partners in the past six months significantly increased from 1991 to 2003 (63.3% to 89.0%). There was no change in the proportion of male IDUs who had unprotected sex with casual partners or clients in the past 6 months (Figure 12).

FIGURE 12.
UNPROTECTED SEX AMONG MEN BY PARTNER TYPE, TORONTO, 1991-2003



Source: WHO Study, NEP Study, I-Track

Unprotected sex among women by partner type in the preceding six months: There was no significant change in the proportion of women having unprotected sex for any type of partner in the past 6 months in Toronto (data not shown).

3.18 TRENDS IN HIV AND HCV-RELATED RISK BEHAVIOURS AMONG OTTAWA IDUS

Findings from the SurvIDU Study and the POINT Project, presented in Sections 3.6 and 3.12, have provided evidence of injection practices and sexual behaviours which are significant independent predictors of HIV prevalence (SurvIDU, POINT), HIV incidence (SurvIDU), and HCV prevalence (POINT). This section analyses trends in these risk factors using data collected over time in the SurvIDU Study.

The injection practices examined are:

- History of injection with a used needle and injecting with a used needle in the six months preceding baseline interview;
- Injecting mainly cocaine in the six months preceding baseline interview;
- Daily injections in the six months preceding baseline interview; and
- Use of previously used injection equipment (cookers, spoons, filters, cottons) in the six months preceding baseline interview.

The sexual behaviours examined are:

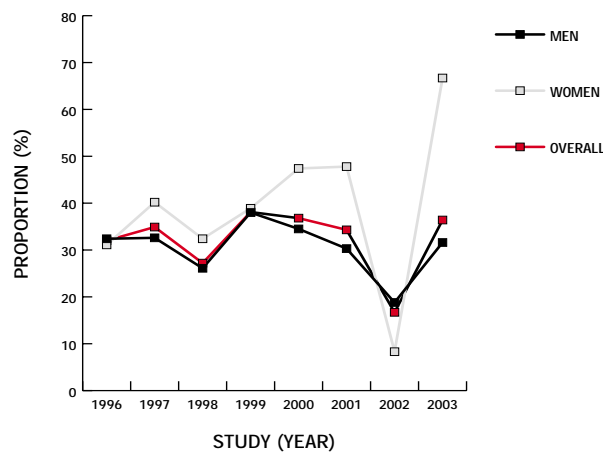
- Only same-sex sexual partners in the six months preceding baseline interview; and
- Having six or more same-sex sexual partners in the six months preceding baseline interview.

In addition, as other studies of HIV-related risk factors have reported significant associations between unprotected sexual behavior and HIV prevalence, the following sexual behaviours are also examined:

- Unprotected sexual intercourse with a regular, casual or client sexual partner of the opposite sex; and
- Unprotected sexual intercourse with a regular, casual or client sexual partner of the same sex.

Injecting with a used needle ever or in the six months preceding last interview: The proportion of Ottawa IDU reporting ever injecting with used needles fluctuated over time. However, there was no significant change through time. Figure 13 below illustrates the pattern for reported injecting with used needles in the 6 months preceding initial interview. Although there was the suggestion of a decrease in injecting with used needles in the preceding six months in 2002, the proportion of both men and women IDUs reporting this practice has shown no statistically significant change throughout the study.

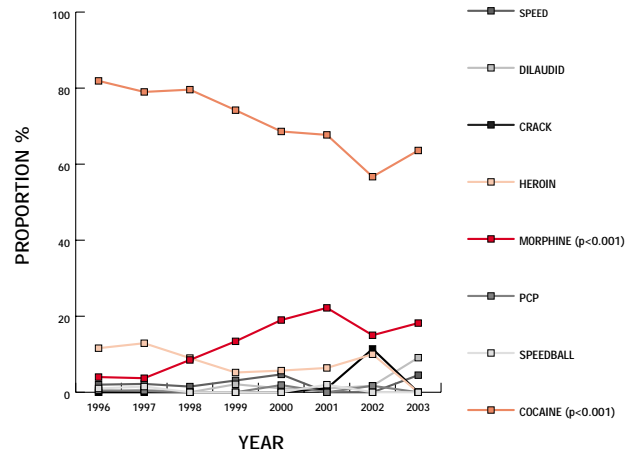
FIGURE 13.
INJECTING WITH USED NEEDLES IN SIX MONTHS PRECEDING BASELINE
INTERVIEW BY YEAR, OTTAWA, 1996-2003 (N=1,059)



Source: SurvIDU Study

Injecting mainly cocaine in the six months preceding baseline interview: As shown in figure 14, the proportion of IDUs reporting cocaine as their main drug injected declined significantly from 82% in 1996 to 64% in 2003.

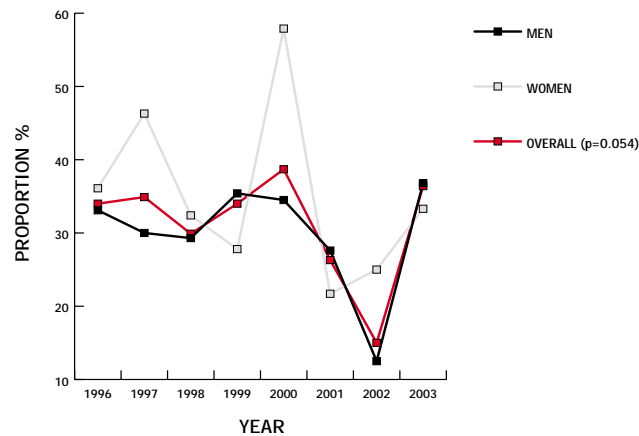
FIGURE 14.
MAIN DRUG INJECTED IN SIX MONTHS PRECEDING BASELINE INTERVIEW
BY YEAR, OTTAWA, 1996-2003 (N=1,059)



Source: SurvIDU Study

Injecting daily in the six months preceding baseline interview: Figure 15 below suggests that this injection practice fluctuated over the period 1996 to 2003, however there was no statistically significant change over the entire period.

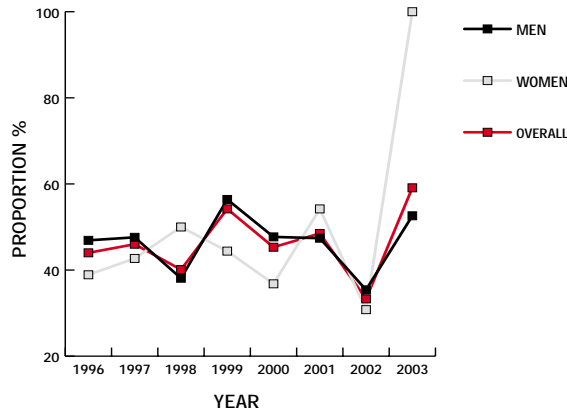
FIGURE 15.
MAIN DRUG INJECTED IN SIX MONTHS PRECEDING BASELINE INTERVIEW
BY YEAR, OTTAWA, 1996-2003 (N=1,059)



Source: SurvIDU Study

Use of previously used injection equipment (cookers, spoons, filters, cottons) in the six months preceding baseline interview: As can be seen in figure 16 below, this injection practice fluctuated over the period 1996 to 2003 with a recent sharp increase particularly among women IDUs. However, these changes were not statistically significant.

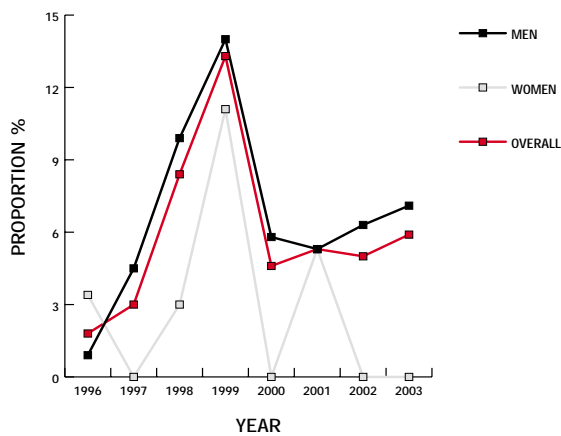
FIGURE 16.
INJECTING WITH USED EQUIPMENT (COOKERS, SPOONS, FILTERS, COTTONS)
IN SIX MONTHS PRECEDING BASELINE INTERVIEW BY YEAR, OTTAWA,
1996-2003 (N=907)



Source: SurvIDU Study

Reporting only same-sex sexual partners in the six months preceding baseline interview: This behaviour is illustrated in figure 17 below. There was no statistically significant change in this practice among Ottawa IDUs between 1996 and 2003

FIGURE 17.
ONLY SAME-SEX SEXUAL PARTNERS IN SIX MONTHS PRECEDING BASELINE
INTERVIEW BY YEAR, OTTAWA, 1996-2003 (N=851)

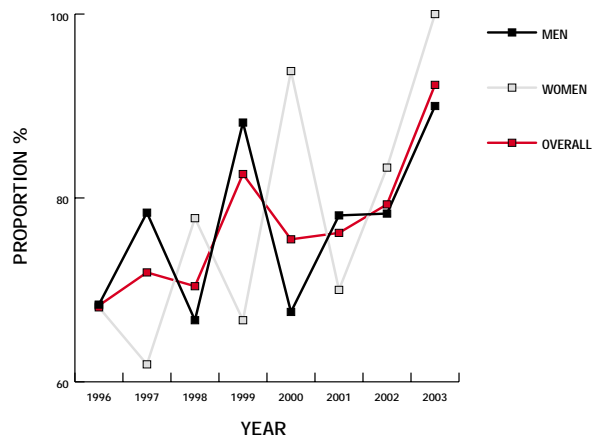


Source: SurvIDU Study

Reporting a high number (six or more) of same-sex sexual partners in the six months preceding baseline interview also fluctuated between 1996 and 2003, but again with no statistically significant change overall or by gender.

Although unprotected sexual intercourse with regular, casual or client sexual partners of the opposite sex or of the same sex was not a significant independent predictor of either HIV or HCV prevalence in either study, other HIV studies have demonstrated positive associations. As can be seen from figure 18 below, engagement in unprotected heterosexual sex with any type of sexual partner appears to be becoming more frequent among IDUs in Ottawa, although this trend is not statistically significant.

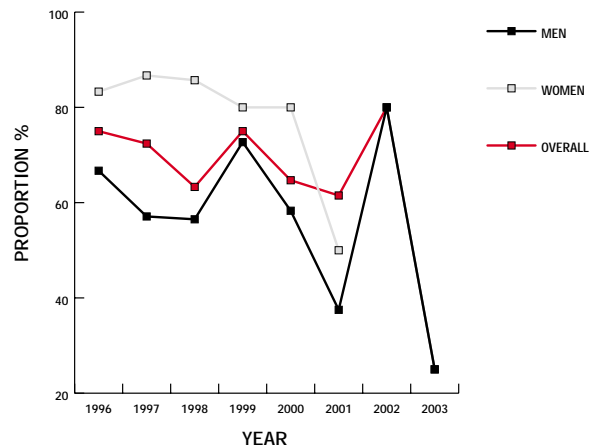
FIGURE 18.
UNPROTECTED SEX WITH ANY OPPOSITE SEX PARTNER IN SIX MONTHS
PRECEDING BASELINE INTERVIEW, OTTAWA, 1996-2003 (N=808)



Source: SurvIDU Study

In contrast, as shown in figure 19 below, the practice of unprotected sex with any same-sex sexual partner shows some decline among Ottawa IDUs, however, this trend is also not statistically significant.

FIGURE 19.
UNPROTECTED SEX WITH ANY SAME-SEX PARTNER IN SIX MONTHS
PRECEDING BASELINE INTERVIEW, OTTAWA, 1996-2003 (N=808)



Source: SurvIDU Study

3.19 HIV PREVENTION PROGRAMS AND SERVICES FOR IDUS IN ONTARIO

As of 2002, 25 NEPs operated in Ontario. In addition, 59 satellite sites provided NEP services. The modes of program delivery and service complements vary across the NEPs in relation to need or financial and human resources. Each program has at least one fixed site; eight programs also offer mobile service and five use street outreach workers to deliver services [35]. All NEPs offer needle exchange and some also offer infectious disease testing (e.g., HIV, hepatitis B and C), vaccination (e.g., hepatitis A and B) and referral services (e.g., primary care, legal aid and housing). Only three programs reported providing sterile injection-related equipment such as cookers, cottons, and tourniquets. During 1997 and 1998, four NEPs added methadone programs to their complement. Three of these programs remained operational in 2004 [35].

Most NEPs in Ontario have tried to provide their clients with choice in terms of how they will receive services [36]. Specifically, NEPs use varied service models (i.e., fixed site, mobile service, satellite sites, home visits) where possible. Mixed model approaches are used to address concerns about temporal and spatial accessibility and also concerns that only one service location may lead to new injecting networks and increased rates of HIV transmission [36, 37].

A study conducted in 1999 investigated the development and delivery of needle exchange services at 15 Ontario programs [38]. Analyses showed that the exchange policies (i.e., the number of needles distributed versus the number returned) varied across the province from strict (1-for-1 exchange and/or daily maximums) to lenient (i.e., bulk and/or no maximum exchanges) [38]. Many programs in Ontario have since implemented more lenient and client-friendly policies.

Besides NEPs, IDUs also purchase needles over-the-counter (OTC) in pharmacies and obtain needles from informal and/or unsanctioned distributors [39]. Using data from a large qualitative study conducted in 2000-2001, three patterns of needle acquisition were identified in Toronto: IDUs who stock-up by obtaining large quantities of sterile needles from NEPs which are used to meet their own needs and to provide secondary distribution to friends and drug using associates; IDUs who typically keep several days supply of needles available, primarily for their own use, having obtained these either from NEPs or from pharmacies; and IDUs who usually have no extra supply of needles and obtain equipment at the time of obtaining drugs, in some cases unsterile equipment from other injectors. The first two types of injectors are typically in stable housing, while the last group are generally homeless and may be staying in shelters or with friends or relatives who may not know of or accept the informant's drug injection.

A recent study in Ottawa compared the requirements for a sterile needle for each of the estimated number of injections by drug of choice for Ottawa's estimated 3,000 IDUs versus the number of needles distributed by the NEP [40]. The proportion of sterile needles provided by the NEP and its partner agencies in relation to the estimated number of sterile needles required was 3.3%.

A similar analysis for other cities and regions in Ontario is difficult because the number of injections by drug of choice per year is unknown. However, the number of needles provided per estimated number of IDUs can be calculated by dividing the number of needles distributed in 2002 [35] by the estimated number of IDUs in Ontario (Table 3). This results in an overall annual estimate for Ontario of 53 needles distributed per injector. There was wide variation in the number of needles distributed per estimated injector across Ontario, ranging from 1-474, with Kingston, Thunder Bay and Lambton providing the highest number of needles. Those with the lowest ratio are programs that are still under development. The estimated 53 needles per injector across all of Ontario is up from the estimated 28 needles per injector in 1998 [35]. Despite the substantial increase, this crude calculation suggests that the number of needles distributed per injector is inadequate, particularly for daily injectors.

The IDU Outreach Program funded by the AIDS Bureau, Ontario Ministry of Health and Long-Term Care began in 1997/98. The first year was an inception year with funds provided for an environmental scan in each community identified as having a concerning level of HIV infection and injection drug use. Table 24 summarizes the current structure of the program.

TABLE 24.
SUMMARY OF IDU OUTREACH PROGRAMMING FUNDED BY AIDS BUREAU,
ONTARIO MINISTRY OF HEALTH & LONG-TERM CARE

Agency	City	Year first funded	Number of staff funded (full time equivalents)
Access AIDS Network	Sudbury	1997/98	0.5
AIDS Committee of London	London	1997/98	1.13
AIDS Committee of Windsor	Windsor	1997/98	1.46
AIDS Thunder Bay	Thunder Bay	1997/98	1.0
City of Hamilton Public Health & Community Services	Hamilton	1999/2000	1.0
Kingston, Frontenac, Lennox & Addington Public Health Centre	Kingston	1998/99	1.0
Lawrence Heights Community Health Centre	Toronto	1998/99	1.0
Peel HIV/AIDS Network	Mississauga	1997/98	1.0
Queen West Community Health Centre	Toronto	1998/99	1.0
Somerset West Community Health Centre	Ottawa	1998/99	2.0
South Riverdale Community Health Centre	Toronto	1998/99	1.0
Sudbury Action Centre for Youth	Sudbury	1998/99	0.5
Syme-Wolner Neighbourhood and Family Centre	Toronto	1998/99	1.05
Toronto Public Health	Toronto	1998/99	1.0
Warden Woods Community Centre	Toronto	1998/99	1.0
Total: 15 Programs			15.6

Source: AIDS Bureau, Ontario Ministry of Health and Long-Term Care, 2004

These programs provide regular reporting of their services including counseling, practical support, education, distribution of materials, and referrals. Locations in which outreach occurs include streets/parks, bars/night clubs, parties, residential facilities, homes, and other venues. Table 25 provides a summary for 2003 of total activities reported by IDU outreach workers funded through this program.

TABLE 25.
SUMMARY OF CLIENT SERVICE ACTIVITIES OF IDU OUTREACH PROGRAM,
ONTARIO, 2003

	Males	Females	Transgendered	Overall
Outreach Contacts				
New contacts	2,274	1,795	35	
Repeat contacts	5,148	3,964	38	
Total contacts	7,422	5,759	73	
In-service Contacts	1,913	1,605	11	
New contacts	6,491	3,400	21	
Repeat contacts	8,404	5,005	32	
Outreach & Inservice Totals	15,826	10,764	105	26,695

Source: AIDS Bureau, Ontario Ministry of Health and Long-Term Care, 2004

In addition to these reported worker activities, peer activities including material distribution (7,068 contacts) and informal interactions (6,469 contacts) were reported. Community development activities by these programs included agency contacts, presentations, meetings and other activities. A total of 1,917 activities involving 13,343 participants were reported in 2003.

A recent evaluation has been carried out for COUNTERfit, a peer-run harm reduction program based at the South Riverdale Community Health Center in Toronto [40] This program is funded as one of the AIDS Bureau IDU Outreach programs, and is an example of the outreach-oriented, peer-based model which these IDU outreach programs are seeking to provide. It focuses on needle exchange and other drug-related equipment, education, referrals, counselling, accessing methadone, and community advocacy to create a more accepting and hospitable health and social service environment for drug users. COUNTERfit considers all clients to be potential service providers and clients may provide services as volunteers or paid program assistants. Program assistants are paid a stipend for the shifts that they work but also work additional hours as volunteers. In 2001 COUNTERfit distributed and exchanged the fourth largest number of needles among Ontario programs offering needle exchange. COUNTERfit has been very successful in attracting and retaining clients, developing an effective peer-based service model and assisting clients with a vast range of issues, but demand for services greatly exceeds the resources of the program.

3.20 ADDICTION AND METHADONE MAINTENANCE TREATMENT (MMT) SERVICES IN ONTARIO

During 2001, 3,234 clients reporting IDU in the previous 12 months presented at the specialty addiction treatment system for services (Drug and Alcohol Treatment Information System, unpublished data). Clients who reported past year IDU represented 21% of all clients with primary drug problems (i.e., not alcohol or gambling problems). Among the IDU clients, 38% reported cocaine as their primary problem, followed by 27% reporting alcohol, 15% heroin and 9% prescription opiates.

Most IDU clients received outpatient counselling services (45%), detoxification (31%) or residential treatment (20%).

Methadone maintenance treatment is the primary mode of treatment for opiate addiction. Following the redesign of the MMT system in 1995 [41], the number of physicians prescribing methadone increased from 60 in 1996 to 161 in 2001 [42]. In 2001, 52.8% of all methadone providers were located within the Toronto Region, 18.0% in the Central East, and 14.3% in the Central West.

The number of patients in MMT increased from 1,595 in 1996 to 7,787 in 2001. During this period, the distribution of patients by gender remained stable: approximately 70% of patients were men [42]. The number of patients increased in each region from 1996 to 2001, with the largest percentage increase occurring in the Northern region: from 22 to 343 patients [42]. The Eastern and Central East regions also experienced large increases (from 54 to 579 and 171 to 1,347 patients, respectively). These increases resulted in a redistribution of patients across Ontario. In particular, the proportion of total patients decreased for the Toronto region (58.6% to 44.8%) and increased for the Eastern (3.4% to 7.4%), Central East (10.7% to 17.3%) and Northern (1.4% to 4.4%) regions.

4. LIMITATIONS OF DATA SOURCES CITED

4.1 EPIDEMIOLOGY OF IDUS

The hidden nature of injection drug use, the mobility of some segments of the IDU population, the need to define who is a current injector versus who has ever injected, and the limitations of available methods such as capture-recapture and mathematical modeling for estimating numbers of IDUs in Ontario all result in uncertainty about the numbers of IDUs in the province and their distribution. At the same time, there is no doubt that a considerable burden of disease and many health and social needs are associated with injection drug use in Ontario, making it a serious public health problem requiring urgent and effective action.

4.2 DEMOGRAPHIC AND DRUG USE CHARACTERISTICS OF IDUS

The dynamic nature of drug use means that information on current levels of use of specific drugs and the introduction of new drugs requires constant updating. Current surveillance measures may not be sufficient to achieve this. As an example, there is very little data available about the extent of use of drugs such as oxycontin and methamphetamine although these are currently of great concern to harm reduction programs in many Ontario cities. However, demographic characteristics such as male predominance remain consistent over time and between sources.

4.3 LABORATORY TESTING DATA FOR HIV

Laboratory reporting data include persons who undergo HIV testing in Ontario and have their blood sample tested at the Provincial Public Health Laboratory. Not all persons undergo testing and it is not clear whether people do not test because they consider themselves at low risk for infection or because they are at high risk but feel unready to receive a potentially HIV-positive result. Estimation of HIV incidence from laboratory data is complicated by this uncertainty about who is being tested and how frequently. It may be that those tested are the higher risk persons, giving an impression of high levels of new infection; conversely, if persons being tested are lower risk (e.g., ex-IDUs seeking reassurance), then estimates could be low.

The analysis presented in this report is limited to persons who actually do test. Nevertheless, for injection drug users the estimates presented probably do represent the majority of IDUs. However, interpretation of this testing is complicated by the fact that some IDUs test fairly frequently, whereas others may test only once or quite infrequently; there is insufficient evidence to assess how well testing patterns relate to what would be considered necessary based on frequency and nature of ongoing risk behaviours. Positive HIV test results are classified according to the location in which the test is done since data on residence of persons tested are not available. Thus, there may be some over-estimation of the number of HIV diag-

noses in the larger urban centres to which people may travel to be tested for HIV. Test results used in this report often do not distinguish between recently acquired infection and infection which has been present for years.

Data on risk factors are missing for approximately 50% of HIV-positive test results in Ontario. The Laboratory Enhancement Study (LES) has helped to mitigate this problem through a follow-up questionnaire sent to physicians asking for further information about their patients receiving an HIV-positive test result. Thus, adjustments are made for the missing data using information from the completed questionnaires. Nevertheless, for approximately 20% of subjects, risk factor information is not available either from the laboratory form or from the LES questionnaire. Modeling is used to address this, assuming the distribution of exposure categories for this 20% is similar to those whose information was missing on the laboratory form but who returned a LES questionnaire. This assumption is reasonable but might not be entirely correct.

Provincial surveillance reports of HIV and HCV prevalence and incidence are based on results obtained from the testing of blood samples at the Provincial Public Health Laboratory. However, testing of oral fluid for the presence of HIV and HCV antibodies is frequently used in Canada and elsewhere for epidemiological surveillance among IDUs, and this was the method employed in both the SurVIDU Study and the POINT Project in Ottawa. The collection of a saliva sample is a painless, safe and less intrusive technique with a documented high compliance rate relative to finger prick blood testing and is particularly suited to community, rather than clinic, settings.

Saliva testing has documented adequate sensitivity and specificity for HIV for research purposes and as such, the use of saliva testing for the presence of HIV antibodies is well established [46]. However, concerns have surfaced concerning the adequacy of saliva testing for the presence of the hepatitis C virus. In their evaluation of collection devices and testing procedures to detect HCV in oral fluids, Judd and colleagues concluded that collecting oral fluid using the OraSure collection device and the recommended associated testing, as was employed in both Ottawa studies, is an acceptable and sufficiently accurate method for the surveillance of HCV among injection drug users with the testing assay used in both studies providing a sensitivity of 92% and specificity of 99% [47].

4.4 REPORTED AIDS CASES

AIDS surveillance data are subject to under reporting and delayed reporting. With regard to the former, the situation in Ontario has been problematic since HIV became reportable and persons who have been reported as HIV-positive may not subsequently be reported when they develop AIDS. In fact, an analysis carried out in 1997 found that in Ontario 50% of AIDS cases were identified only at the time of death (usually through the death certificate) compared to 25% in other provinces [48]. In addition, an analysis of the data shows that AIDS reports may be delayed for one or sometimes many years following diagnosis. Thus, the AIDS incidence observed in more recent years is likely an underestimate of true AIDS incidence.

4.5 ROUTINE TESTING AND REPORTING DATA FOR HCV

Like HIV, persons may remain infected with HCV over many years and may test positive at any time during this infection. It is therefore difficult to interpret trends observed in routine testing data. Although such data may help to provide some idea about HCV prevalence among IDUs, it is subject to the same uncertainties about who does and does not test, and how frequently persons with ongoing IDU-related risks are testing.

4.6 IDU BEHAVIOURAL STUDIES

There are some common limitations inherent in behavioural studies among IDUs that need to be taken into account when interpreting the study results reported here. First, it is often difficult to recruit a representative sample that shares the same characteristics as the overall population of IDUs being studied. Furthermore, it is often difficult to know what the differences between the sample and the overall population it is meant to represent actually are. Most studies of IDUs are able to recruit those who are using NEPs and other community services; most likely to be under-represented are IDUs who do not access services, either because they are severely marginalized or because they avoid services identified with drug injection. Methods of measuring behaviour and HIV incidence over time such as cohort studies or matching of individuals in repeated cross-sectional surveys can introduce further biases since these studies tend to represent relatively high risk individuals who continue to be active injectors rather than seeking treatment or spontaneously stopping injection behaviour.

Second, data on risk behaviour in many of the studies cited in this report rely on self-report. In this regard, there are several potential problems. Significant intoxication can interfere with recall of behaviour; however, most research studies exclude persons who are considered to be too intoxicated in order to avoid this problem. There is also the well-recognized problem of participants reporting behaviours they perceive to be socially desirable (i.e., providing an answer believed to be the "right answer" that conforms with preventive recommendations) [49]. However, Langendam and colleagues (1999) [50] conclude that drug users are able to give valid self-reports in a setting where social desirability does not play a role. In the behavioural studies cited in this report, it is unlikely that the responses of the IDUs were subject to social desirability bias since no illegal or embarrassing situation was involved in the context of a confidential and anonymous interview and there were no negative consequences, such as loss of services, for reporting risky behaviours. In terms of reliable reporting of drug use, previous studies have found agreement between self-reported behaviours of drug use and observed injection stigmata [51] and urine drug analysis [52]. However, even if self-reporting of risk behaviour is not always reliable, it would also have to differ over time to produce the trends seen (i.e., as long as the proportion of people being truthful remains the same over time, change can still be measured validly). Further, IDUs were recruited from similar sources (mainly community agencies providing needle exchange and other services to IDUs) in all of the studies, so the nature of the population accessed should not differ significantly over time.

4.7 DATA ON PROGRAMS AND SERVICES

In most cases, information on programs and services was limited to that routinely provided by the programs to the Ministry of Health and Long-Term Care, or available through other research undertaken by the authors. No formal evaluations are available for most of the programs and services currently provided to IDUs in Ontario.

5. DISCUSSION AND INTERPRETATION

Data compiled for the IDU Situation Report revealed variation in HIV prevalence, incidence and risk behaviours across the province. This section will attempt to interpret this variation and discuss the implications of the findings presented in Section 3. The evidence points to further policy and programming recommendations which are discussed here and summarized in Section 6.

5.1 EPIDEMIOLOGY OF DRUG INJECTING IN ONTARIO

There are no direct measures available for the numbers of current IDUs in Ontario, but this report reviews the estimates which have used mathematical modeling and available data to suggest that there were about 41,000 active injectors in Ontario in 2003, including an estimated 16,300 in Toronto, 5,700 in the rest of Central East region (including Peel, York Region and Durham Region), 5,700 in the Central West region (including Hamilton and Niagara), 5,000 in the Southwest region (including London and Windsor), 3,100 in the Northern region (including Sudbury, North Bay and Thunder Bay), 3,300 in Ottawa, and 2,100 in the rest of the Eastern region (including Kingston). This generally represents from 0.2 to 0.6% of the population. These figures remain as estimates and must be treated with caution. Since Canada is estimated to have somewhere in the range of 90,000 to 120,000 IDUs, Ontario represents about 35-40% of the national total [53].

5.2 HIV PREVALENCE AMONG IDUS IN ONTARIO

HIV prevalence data provide a measure of the total number of cases believed to exist in a population and are primarily useful for determining the extent of the HIV epidemic and planning treatment and other services. Modeling estimates based on laboratory testing data, special studies, AIDS surveillance data and vital statistics place the number of Ontario IDUs infected with HIV as of December 2003 at 1,950, or 4.7% of the active IDU population. Prevalence of HIV infection among IDUs in Ontario cities appears to vary widely: in 2003, studies measured prevalence at 5.1% in Toronto, 10.1% in Sudbury and 11.1% in Ottawa (POINT Project). Cumulative data from the SurvIDU Study in Ottawa place HIV prevalence over the period 1996 – 2003 at 20.6%. Data suggest that HIV prevalence in Toronto has remained at fairly low, steady levels since at least 1992. However, steady prevalence does not imply that there are no new cases occurring, since it is well documented that IDUs have a relatively high mortality rate, and that a less well-documented proportion stop injecting for varying periods. A steady seroprevalence suggests that new cases are not exceeding these deaths and dropouts.

An array of individual characteristics, drug use patterns, injection practices, sexual behaviours and service use histories were shown to be significantly associated with HIV infection. At the individual level, male gender, age greater than 30 years, and Aboriginal origin were associated with prevalent HIV infection.

Early data in Toronto had shown a correlation between infection among male IDUs and MSM behaviour. However, later data suggest that infection rates in men and women may be converging over time, so that this association with male gender may be reducing. The association between increasing age and HIV infection (i.e. older IDUs are more likely to be infected with HIV) is likely due to the length of time as an injector and increased chances of risk behaviour and transmission. The finding of a significant association with Aboriginal origin in Ottawa is very important since it is the first time this has been documented in Ontario, and clearly demonstrates the need for attention to provision of services that address specialized needs in this population. This is important in urban areas known to have sizable Aboriginal populations, such as Toronto and Ottawa, as well as in northern communities such as Sudbury and Thunder Bay.

Drug use behaviours found to be associated with HIV infection included heroin and cocaine injection. Injection of cocaine was consistently associated with HIV infection as well as with HCV infection in the POINT Project. This association may stem from several factors. The most important is very frequent injection with requirements for large numbers of needles if sterile equipment is to be used. This points to the necessity for more liberal policies with respect to needle distribution: no limits on the numbers of needles provided to an individual, acceptance of secondary exchange, and a budget which allows for provision of large numbers of needles with a goal of distribution as opposed to strict exchange. Cocaine use may also contribute to HIV infection through unsafe sexual activity. Crack use has been shown in US cities to be associated with sexual transmission of syphilis and HIV and sharing of crack pipes could be a means to transmit hepatitis C and other infectious agents. Rising levels of crack smoking are thus a public health concern in their own right, as is the use of crack cocaine through injection which has been seen in Toronto, although to date crack smokers have had lower levels of HIV infection than injectors of heroin and cocaine.

Heroin may have a more mixed influence: if it is being compared to cocaine, as in the POINT Project, the smaller numbers of injections and needles needed per day may appear protective; however, in situations of poor needle access, the urgency to inject when experiencing withdrawal symptoms may also contribute to unsafe behaviour. This again supports the importance of services ensuring ready access to sufficient needles.

Injection practices found to be associated with HIV infection included injection with a previously used needle or other injection equipment, five or more injections per day, binge injection, solitary injection, and duration of injection career. Five or more injections per day and binge injection are behaviours linked to the use of cocaine in particular, with implications as noted above. Association with the reuse of other injection equipment supports the importance of providing harm reduction resources such as cookers, filters, and sterile water for injection in addition to needles. The relationship between existing HIV infection and solitary injection initially seems counter-intuitive. One possible explanation for this includes preventive behaviour, with IDUs aware of their HIV-positive status injecting alone to avoid infecting others without having to reveal their HIV status. Another possibility is that solitary injection is a marker for a long-term heavy injection history, and that these persons have in fact shared needles at some time in their past. It is also possible that other injectors avoid using with persons known to be HIV-positive, leaving them to inject alone. Nevertheless, solitary injection of heroin in particular

is troublesome due to the risk of overdose. Further research is needed to fully understand all the risks of solitary injection for HIV, HCV, and overdose.

Protected sexual behaviour (use of a condom for each sexual act) was associated with HIV infection among IDUs as was exclusive same-sex sexual activity among women. The association of protected sex with HIV infection suggests adoption of safer sex practices by HIV-positive IDUs to prevent transmission to others. This suggestion is supported by an analysis from the NEP Study showing that HIV-positive IDUs who were aware of their HIV status were more likely to report protected sex than those who were unaware. The SurVIDU Study also found similar evidence of increased protective behaviour among IDUs who knew of their HIV-positive status. Thus, this does not indicate that protection is a risk for infection, but rather that HIV-positive IDUs are trying to protect their sexual partners. Further research is needed to clarify the reason for the increased HIV risk among women who inject drugs and who report only having sex with other women (WSW). One explanation put forward by community members is that, alienated from other women IDUs, WSW IDUs tend to experience their injection drug use within injecting networks that include MSM IDUs who may be at higher risk of HIV.

5.3 HIV INCIDENCE AMONG IDUS IN ONTARIO

HIV incidence measures the occurrence of new cases of HIV, and is therefore particularly relevant to assessing the need for, and effects of, prevention interventions. The incidence of HIV among IDUs in Ontario is estimated, based on laboratory testing data and modeling, to be about 0.23 per 100 person years, with Ottawa and the Northern region reporting the highest incidences in Ontario. Transmission in the North appears to have increased in 2003.

Research in Ottawa has provided two direct measures of HIV incidence among Ottawa IDUs. The first is from the SurVIDU cohort study, which measured an overall HIV incidence density of 5.8 per 100 person-years (py; 95% confidence interval [CI]: 3.8, 7.9). The second is from the POINT Project, which documented an overall incidence density of 2.3 per 100 py (95% CI: 0.1, 4.5). The differences in these findings may be explained by the longer period of observation in the SurVIDU Study. The research studies may have accessed higher-risk IDUs, while the laboratory testing database may provide somewhat lower measures due to the inclusion of persons testing who are no longer engaging in high risk behaviours.

Research in Ottawa also found that extended use of NEP services was protective against HIV seroconversion [22]. This is an important finding. It supports the international evidence that harm reduction services help active IDUs to avoid HIV infection and that the correlation found between HIV prevalence and NEP attendance stems from the ability of NEPs to attract high risk IDUs to their services and subsequently reduce their risk for infection and/or transmission to others.

Toronto seems to have been relatively spared from the explosive HIV spread observed in the other two largest Canadian cities, Montreal and Vancouver. Montreal observed a marked increase in HIV transmission among IDUs in the late 1980s and incidence has continued at a relatively high level since then [54]. A similar phenomenon was seen about five years later

but even more dramatically in Vancouver [3]. In contrast, we are reasonably confident that HIV incidence among IDUs has remained at a relatively low level in Toronto. This belief is based on the results of the HIV repeat tester analysis and more recently the Laboratory Enhancement Study, as well as repeated cross-sectional surveys [18,20,24,55]. It appears that HIV incidence in Toronto is in the range of 0.20 per 100 person years, which is quite low when compared to the situation in many large U.S. cities [43], where HIV incidence rates at least 10-fold higher are not uncommon, especially in cities on the east coast.

In contrast, in Ottawa, a phenomenon similar to Montreal and Vancouver was documented in 1997 to 1999 [56]. A high HIV incidence was observed among participants in the SurVIDU Study and is reinforced by data from the analysis of HIV repeat testers as well as more recently from the LES. It has been suggested that the proximity of Ottawa to Montreal may be a factor in this explosive spread of HIV. However, unlike Toronto, the Ottawa NEP initiated an early strict one-for-one needle exchange policy with an upper limit of three needles per visit [57]. Currently, it is the only Ontario NEP to limit the number of needles that can be distributed without exchange, although this policy is under review. Although incidence among Ottawa IDUs has recently decreased, it has not reached a level as low as that in Toronto. It is more difficult to control HIV transmission when prevalence becomes high, given the increased risk that any unsafe exposure may involve contact with an HIV-infected person.

Finally, there is evidence of a higher level of HIV incidence and prevalence in two smaller cities in northern Ontario, Thunder Bay and Sudbury. These cities have experienced HIV rates among IDUs, as reflected largely by first-time HIV diagnoses as well as data from the LES, at a higher level than in other towns and cities across Ontario. In the case of Sudbury, more recent data are available from the I-Track survey (2002) [20] indicating no significant difference in HIV prevalence from that found in the 1997-8 NEP study [18]. This suggests stable high prevalence. Limited data from the NEP study [18] suggested a high prevalence of cocaine injection as an important factor in both these cities. Both cities are also known to have a substantial Aboriginal population and the finding of higher risk for Aboriginals in Ottawa may suggest that this is also a factor in northern Ontario. In light of the often quoted hypothesis by DesJarlais, Hagan, Friedman, Friedman, Goldberg, Frischer et al. [58] that when HIV prevalence exceeds 10% the HIV prevalence will thereafter grow rapidly and be difficult to restrain, the situation in the North has been particularly worrisome. Close monitoring of the situation in these and other Northern cities is needed, as well as further research providing insight into the factors responsible for the situation.

The findings of high but somewhat stable seroprevalence in Sudbury appear to be at variance with the often quoted hypothesis by DesJarlais, Hagan, Friedman, Friedman, Goldberg, Frischer et al. (1995) that when HIV prevalence exceeds 10% the HIV prevalence will thereafter grow rapidly and be difficult to restrain. As such, it is important to understand which factors have influenced the stability of this high HIV prevalence so that other jurisdictions with a high HIV prevalence might curtail further increases [58].

5.4 HCV INCIDENCE AND PREVALENCE AMONG IDUS IN ONTARIO

Direct measures of the prevalence of HCV among IDUs varied across the province from 54.2% among Toronto I-Track participants to 75.8% reported among participants in the SurvIDU Study in Ottawa.

Ottawa is the only Ontario city with research evidence of HCV incidence rates among IDUs. The POINT Project documented an overall incidence density of 25.0 per 100 py (95% CI: 13.1, 36.9). Sixteen HCV seroconversions occurred among men IDUs for an incidence density of 28.6 per 100 py (95% CI: 14.6, 42.7). One HCV seroconversion occurred among women IDUs resulting in an incidence density of 8.3 per 100 py (95% CI: 0.0, 24.7). In the SurvIDU Study, HCV incidence was even higher at 41.6 per 100 py. These are very high incidence levels, suggesting that Ottawa IDUs are at high risk of HCV infection.

Prior to 1991, testing for HCV was not available in Ontario. The number of cases being reported peaked in 1996 at 8,326 and declined somewhat thereafter. It is quite complex to interpret actual trends in new infections from these data, since they are very affected by the availability and promotion of testing for HCV in recent years, which may identify many prevalent cases which were not newly acquired. At the same time, there may be unknown infections among IDUs who have been unaware of HCV testing or unwilling or unable to access testing. One implication is the need to identify more accessible HCV testing services for IDUs, as well as to provide effective referrals for medical care for those found to be HCV-positive; this is a large gap in care for IDUs at present.

While many IDUs are indeed accessing HCV testing, the frequency of testing may be inadequate. For example, among 506 active IDUs in Ottawa in 2004, the majority (80%) had previously been tested for HCV, reporting an average of four tests. Among this same group of IDUs, 23% of 137 IDUs who reported a negative result from an earlier HCV test, were found to be HCV-positive following testing as participants in the POINT Project. Similarly, among the 95 POINT Project participants who had not previously accessed HCV testing, 24% tested HCV-positive. Overall, among POINT Project participants, nearly one in five IDUs who tested positive during the study appear to be unaware of their positive HCV status.

Clearly there is a need to improve access to HCV testing for IDUs. Findings from the POINT Project provide direction as to how this might be achieved. Among POINT Project participants, those IDUs with a history of drug treatment (76%) and those IDUs accessing the services of Ottawa's NEP (51%) were significantly more likely to have had a blood test for HCV; however, only 4% (NEP) and 3% (drug treatment) actually had their HCV test through these services. IDUs accessed HCV testing most often through: physicians' offices (55%); jails/detention centres (12%); hospitals (11%); and Ottawa's Sexual Health Clinic (9%). These findings suggest significant scope for expanding access to HCV testing through NEPs and drug treatment programs.

A further implication of these data is the need to provide education about HCV for IDUs and service providers. There is a risk that IDUs assume that HCV infection is inevitable, given the very high HCV prevalence quoted for cities like Vancouver.

Data from Toronto, for example, suggest that a significant proportion of IDUs remain uninfected, and this provides support for the potential of harm reduction measures to at least partially control HCV infection.

It is particularly important that sharing of other injection equipment besides needles be avoided as laboratory studies have shown that blood-borne viruses can be detected in used injecting equipment. In a 1996 investigation by Shah and colleagues, HIV-1 RNA was detected in approximately 30% of used cotton filters, 50% of cookers, and two-thirds of rinse waters collected from shooting galleries in Miami [59]. More recently, Crofts et al [60] reported the detection of hepatitis C RNA from 67% of used swabs, 40% of filters, 25% of spoons, and 33% of water samples collected from 10 injecting settings in Australia.

The high proportion of contaminated injecting equipment is of significant concern because, as documented in several ethnographic and epidemiologic studies, the sharing of used injecting equipment other than needles and syringes is a common practice among men and women who inject drugs [61]. For example, among 698 men and 211 women who attended the Ottawa needle exchange program and were interviewed for the SurviDU Study between December 1996 and February 2003, 45% of respondents reported sharing used injecting equipment other than needles and syringes in the previous six months [62].

For many years Toronto NEPs have provided filters and sterile water for injection along with needles/syringes and have previously provided cookers as well, but this has been discontinued. The Ottawa NEP currently distributes a wide range of injection-associated equipment including cookers, filters, water, tourniquets, and alcohol swabs. Greater support for the strategy of consistent safe equipment provision throughout the province appears warranted particularly with respect to sterile water and cookers.

5.5 HIV AND HCV CO-INFECTION

Almost all IDUs living with HIV are co-infected with HCV. Those IDUs with HIV and not HCV may have been infected through sexual transmission of HIV. Modeled estimates place the number of co-infected IDUs in Ontario at about 1,800 [27, 63]. HCV accelerates the progression of HIV and vice versa. Co-infection may complicate options for antiretroviral treatment when it is required for HIV. Despite the challenges of providing HCV treatment to IDUs, there is reason to consider the feasibility of providing active support for the needs of IDUs willing to undertake HCV treatment, since current treatments can cure approximately 30-50% of HCV-infected persons. The very serious issues of co-infection also underline the necessity of providing both individual and community-level resources to prevent HCV and HIV among IDUs, since this is likely to be far more cost-effective than undertaking treatment. As transmission through injecting is so similar for HIV and HCV, it is a mistake to deal with HIV prevention issues without including HCV (or vice versa).

5.6 HIV AND HCV RISK BEHAVIOURS

Results from studies conducted in Ontario and elsewhere reveal that needle acquisition and usage is influenced by a complex array of individual, social, programmatic and contextual factors (see for example, Strike, Cavalieri, Bright et al., 2003 [39]; Wood, Kerr, Spittal et al., 2001 [64]; Tyndall, Bruneau, Brogly et al., 2002 [65]; Buchanon, Shaw, Tend et al., 2003 [66]; Coffin, 2000 [67]; Rockwell, Des Jarlais, Friedman et al, 1999 [68]). Research also shows that IDUs will use clean needles, distribute clean needles to fellow IDUs and avoid HIV transmission when in an environment that provides accessible NEPs without daily exchange maximums, peer-based exchange, legal pharmacy-based sale of needles, and lack of harassment by the police [39, 64, 65, 66, 69, 70, 71].

The evidence regarding change in HIV and HCV-related risk behaviours among Ontario IDUs is incomplete and somewhat mixed. For Toronto, there is evidence that in general IDUs report significantly less current sharing of both needles and other injection equipment than was the case in the early 1990's. Some factors that may have contributed to Toronto's relative success in changing behaviour include instituting harm reduction policies and programs early in the epidemic; early institution of reasonably liberal exchange policies (avoiding strict 1:1 exchange requirements, no limits on the numbers of needles exchanged); provision of injecting equipment as well as needles/syringes; having decentralized programs in which many agencies provide NEP and other services to their own clientele; having many agencies which provide street outreach as part of their services; early inclusion of vans to provide mobile NEP services to geographically dispersed clients; and having recognized early the importance of peers and undertaken to involve them through specific peer programs. The relative geographically and socially diffuse nature of Toronto's drug injection culture, with multiple areas of activity, has likely also reduced the formation of large risk behaviour networks. Although Toronto has had some advantage in that injection of cocaine has never reached extremely high prevalence as a main drug, research as far back as 1989 indicated that injection of cocaine was present and relatively popular, and NEPs responded by providing liberal exchange policies and seeking to avoid limits on numbers of needles exchanged, etc.

The other Ontario city with long term trend data for risk behaviours among IDUs is Ottawa. Here the pattern appears different, in that risk behaviours have either remained relatively constant or declined somewhat, but not to the level where we can be sure that these changes are real and statistically significant. In Ottawa, there is evidence that the baseline prevalence of HIV when NEPs were first introduced was already relatively high, and as discussed in section 5.3, harm reduction programs were seriously constrained by policy limitations.

In both Toronto and Ottawa, data suggest no significant increase in safer sex behaviour among IDUs over time. While this is somewhat discouraging, it corresponds with experience among IDUs in other places. It would appear that, generally speaking, safer sex is practiced within the sex trade among IDUs. It is particularly difficult to change behaviours with regular partners, since this is where issues of trust and relationships and their meaning become key factors limiting change. This may suggest the need for linkage of counseling and testing to prevention strategies, and the need for more couple

counseling to address safety within relationships. A heavy emphasis on drug use practices and provision of associated preventive resources may have led to an under-emphasis on sexual behaviour by harm reduction workers. It is important that NEP staff be trained and able to address sexual behaviour as well as needle use behaviours.

5.7 HIV PREVENTION PROGRAMS AND HARM REDUCTION SERVICES FOR ONTARIO IDUS

Needle exchange and provision of injection equipment

Since 1989 when the first NEPs opened in Ontario, the number of programs and volume of needles exchanged has grown substantially. According to the most recent data (2002), there were 25 NEPS with over 100 sites across Ontario where needles and other services could be obtained. The large number of exchange sites points to the concerted efforts of NEP workers and other service providers in their communities to reach their clients through partnerships, street outreach and mobile services. As well, a few have integrated peer-based programming.

Combined, the NEPs, their partner organizations and peer workers, distributed in excess of 2.1 million needles in 2002. When calculated per estimated injector, the number of needles per injector has grown substantially from an estimated 28 needles per injector in 1998 to an estimated average of 53 needles per injector in 2002 across Ontario. Despite the substantial increase, this crude calculation suggests that the number of needles distributed per injector is inadequate, particularly for daily injectors. As well, there is considerable variation in the number of needles per injector by region, ranging from 1 needle per injector per year to 474, with Kingston, Thunder Bay and Lambton providing the highest number of needles per injector.

In Ottawa, a specific estimation was carried out taking into account the type of drugs used (e.g., cocaine) and the attendant numbers of needles likely to be required. Based on this analysis, the coverage rate of the NEP (needles needed versus distributed) was estimated to be only 3.3% [25].

From the data used for this report it is difficult to determine which factors contribute to this situation. Nevertheless, insufficient funding and staffing, as well as strict policies (e.g., 1 for 1 exchange only) have been identified as factors that reduce exchange volume and increase HIV risk [38, 71]. As well, the age of program likely influences exchange rates with newer programs still developing their client base. The solution to improving access to sterile needles lies, in part, with improving funding, increasing staff, revisiting exchange policies and more actively engaging peer networks for needle exchange and education. As well, efforts are needed to ensure that IDUs have access to a comparable level of service regardless of where in Ontario they live.

Available evidence also supports the value of providing sterile injection materials (filters, water, cookers, alcohol swabs). Although most harm reduction programs in Ontario have attempted to provide such materials, this may vary between programs, and resources available do not always allow programs to provide these materials. Even a moderate degree of suc-

cess in preventing HCV will clearly make the provision of these materials highly cost-effective. However, improving HIV-HCV prevention and the quality of life among IDUs will require more than expanded distribution and exchange services. In particular, peer outreach, safer injection facilities, case management, increased access to MMT and buprenorphine and study of heroin prescription programs are essential and are explored below.

Outreach

The IDU Outreach Worker Program has expanded the number of education and service contacts with IDUs in areas with concerning rates of HIV. During 2003, the 15 funded IDU Outreach Programs reported 26,695 contacts with IDUs and provided counseling, practical support, education, distribution of materials, and referrals. Outreach was provided in streets, parks, bars, night clubs, parties, residential facilities, homes, and other venues. A total of 1,917 community development activities involving 13,343 participants were reported by the Outreach workers in 2003. This very substantial level of activity still represents the equivalent of just over 0.5 contacts per year per IDU based on the estimated number of IDUs cited above. Expansion of the outreach component of IDU services is necessary to address many of the determinants of health and HIV-HCV risk among IDUs. Previous research in Ontario has shown the vast range of unmet health and social service needs of IDUs. Workers regularly act as informal case managers for their clients [72]. However, in some cases, this work is not formally recognized and workers are not provided with training or supervision about case management, although they would greatly benefit from this type of support. Development and funding of formal harm reduction case management services for IDUs is also necessary to further prevention efforts and improve the quality of life for IDUs.

Although outcomes of the IDU Outreach Programs initially funded by the AIDS Bureau in the late 1990's have not been formally evaluated, program reporting and a detailed process evaluation of one of the programs, COUNTERfit at the South Riverdale Community Health Centre, suggest that these programs have played a valuable role in expanding access to harm reduction services in a number of communities in Ontario where such access is needed. In the case of the COUNTERfit Program, it is also clear that this funding has enabled development of a model of peer outreach and service provision in which peers are fundamental to the service and not "add-ons". There is evidence from the Understanding Injection Drug Use (UIDU) study, a large qualitative study conducted in Toronto in 2000-2001, that IDUs prefer to receive harm reduction services from programs with workers whom they perceive as having "been there" in terms of their experience and understanding of substance use as well as of poverty and marginalization [73].

The situation in South Riverdale highlights a key issue in provision of outreach services and expanding the role of peers. When these efforts are successful, they bring a requirement for greatly expanded resources which the current program is not designed to provide. This occurs because the programs create bridges to high risk, high needs IDUs who have not previously been receiving services, but whose needs cannot be adequately addressed without additional resources (e.g., greatly expanded needs for counseling, case management, referral, accompaniment to needed health and social services, etc). Resource needs also arise because the peers themselves require adequate training, supervision, and ongoing support if they are to provide services and also gain valuable work experience that can lead them to improvements in their own lives. This

type of support is particularly important for former IDUs who are trying to control their substance use and may be at risk of exposure to situations that make this difficult. Access to adequate financial compensation for their work within these programs is also important to assist peers to obtain sufficient income in order to stabilize and reintegrate into the working world.

Over the past 15 years, Ontario NEPs and IDU outreach workers have developed considerable expertise delivering services to IDUs using varied methods (e.g., fixed site, mobile, home visits and street outreach) and in varied geographical settings (e.g., large, medium and small urban, and semi-urban centres) [36]. For the future, increasing the role of peer needle exchangers across Ontario has the potential to greatly increase the reach of HIV prevention efforts. Pushing beyond the conventional needle exchange model based on paid professional staff to peer and point of sale approaches appears to be highly successful at reaching IDUs who are distrustful of formal NEP services, but who are accessible by community peers and drug dealers. The return rate of collective exchange (i.e., the number of needles dispensed versus the number returned) has been shown to be higher than that for individual exchange [69]. Providing the means (e.g., sharps containers or appropriate alternatives) and multiple disposal locations can ensure that the goal of proper disposal is achieved. As well, more extensive advocacy with police to reduce the confiscation and destruction of sterile equipment may benefit IDUs for whom stockpiling of supplies is not an option.

Implementing a distribution policy (i.e., no maximums) for needles can be contentious and lead to concerns that a distribution approach will neither encourage nor enforce proper disposal of used needles. Proper disposal of needles is a concern for communities but should not lead to imposition of a strict 1 for 1 exchange policy because this policy can result in reduced access to sterile syringes [38]. A 1992 study by Grund et al. [69] showed a high rate of return can be achieved through non-coercive and non-restrictive policies. While all clients were encouraged to return used syringes, Grund et al. observed that some return only a few but others return many more than they were given. Clients who returned more needles than they received from the NEP returned needles on behalf of other NEP clients or other IDUs. When the return rate (i.e., needles given to clients versus needles returned to the program) was calculated across all clients instead of by individuals, the NEP return rate for all clients together was much higher than that for specific individuals and demonstrated that the NEP did not contribute to a public safety problem. Providing the equipment (i.e., sharps containers), multiple locations for proper disposal and encouraging the return of used syringes can ensure that the goal of safe disposal is achieved under a distribution policy.

Safer injection facilities

The POINT Project among Ottawa IDUs has shown that public injecting is associated with increased risk of HIV [74]. Evidence from evaluations of safer injection facilities (SIFs) demonstrates the promise of these programs in reducing HIV-HCV risk and providing access to other health and social services for IDUs who are the most marginalized from services. Questions included by Millson and colleagues in the I-Track pilot study for Toronto (2003) showed that IDUs are interested in SIFs and an upcoming study by Leonard and colleagues in Ottawa will assess the need for SIFs in that city. Further work

is needed to develop and pilot these programs in Ontario.

5.8 ADDICTION AND METHADONE MAINTENANCE TREATMENT (MMT) SERVICES

The increases in the MMT patient and provider populations across Ontario show great promise for increasing the accessibility of MMT overall and also within specific geographic areas where it is needed. The number of individuals with opiate dependence receiving methadone maintenance treatment in Ontario increased substantially from 1,595 in 1996 to 7,787 in 2001 [42]. Although this has significantly increased access to methadone maintenance overall, there is wide geographic variation in availability and capacity of methadone provision. Programs also vary in the extent to which they offer harm reduction-oriented treatment as opposed to strict abstinence-only approaches. If one assumes that roughly half of the estimated numbers of injectors in Ontario use opiates, this would mean that current services are still covering only about 1/3 of those potentially eligible.

Further expansion of MMT in Ontario is necessary as are changes in treatment philosophy to principles of harm reduction. There are insufficient numbers of comprehensive publicly funded programs offering supportive services in addition to methadone alone (e.g., counseling, primary care or treatment referral, assistance with housing, job searches and other needs). A recent study by Millson and colleagues demonstrates the benefits of harm reduction-based MMT offered through NEPs [75]. Experience and anecdotal evidence shows that most MMT programs in Ontario are abstinence-based and exclude or discharge many IDUs who would benefit from MMT access.

In addition to MMT, IDUs also access detoxification programs frequently, and these programs are not always able to meet the demand for services. Furthermore, they often lack resources necessary to provide referral and follow-up services, resulting in a "revolving door" situation where IDUs are not successfully linked to further treatment services after detoxification. This is a situation in which provision of case management might improve outcomes.

Available data indicate that a sizeable proportion of IDUs have been unable to access treatment within the previous year. Twenty-four percent of men and 23% of women IDUs in the POINT Project in Ottawa had tried but been unable to get into any drug treatment program in the year prior to baseline interview. Similarly, in Sudbury 18% of I-Track participants in 2002 indicated that they had attempted to find drug treatment in the past year and been unable to do so. These figures may underestimate true demand for treatment since in areas known to have limited treatment availability IDUs may not attempt to find treatment since they consider it inaccessible.

5.9 ADDITIONAL HARM REDUCTION SERVICES

Heroin prescription

While MMT plays an important role, it is not the only treatment option available. Heroin prescription programs in Europe have been shown to be effective in reducing HIV risk and increasing overall quality of life and plans to study them in Canada are underway. As well, buprenorphine for the treatment of opiate addiction is widely available in other countries but rela-

tively inaccessible in Canada. These two programs have the potential to add to the continuum of harm reduction programming and HIV prevention in Ontario.

Pharmacies

Over the course of the HIV epidemic, pharmacy practice in Ontario has shifted from an initial stance that regarded sale of needles to injectors of illicit drugs as abetting their drug use to an understanding of the important role of access to sterile needles as a health measure to reduce the harm of bloodborne infections. Research in the mid-1990's [76] demonstrated variability in pharmacists' attitudes and practice, but suggested an overall willingness to participate in harm reduction. In Montreal, for example, pharmacists willing to offer needle access have been incorporated into harm reduction programming. Results from the I-Track study in 2003 indicate that pharmacies are an important source of needles even for IDUs recruited through NEPs, and among over 1,000 NEP attendees in Ottawa participating in the SurVIDU Study, 19% reported pharmacies as their main source of needles even though they were NEP users. Pharmacies are likely to represent an essential source for IDUs who do not want to be identified as NEP attenders. In addition, extended hours of operation and convenient geographic location combine to make pharmacies a more accessible option for some IDUs for the provision of sterile injection equipment. It is important that this access be maintained; in areas without NEPs, pharmacy services could be augmented to provide more educational materials and service referral information.

Access to HCV testing

An estimated 4,500 new HCV infections occur in Canada each year. Of those diagnosed, approximately 63% occur among injection drug users [14]. Hepatitis C virus infection is a significant public health concern due to its high rates of long-term sequelae. Furthermore, it is estimated that only about 60% of those with chronic HCV infection have been diagnosed. Co-infection with HIV and HCV is also highly problematic due to potential complications in the clinical course and treatment of both infections.

There is clear value therefore in all IDUs being afforded the opportunity to know their HCV status in order to adopt preventive behaviours and access treatment.

5.10 CONCURRENT HEALTH ISSUES FOR IDUS IN ONTARIO

Mental health

Mental health issues are a major concern for IDUs, who have been shown to suffer from a high rate of disorders such as depression, post-traumatic stress disorder, and personality disorders [77-79]. Toronto IDUs participating in the UIDU study reported their drug use as a form of self-medication to deal with mental as well as physical pain and also identified mental health problems as a barrier to harm reduction [80]. They report being unable to find harm reduction-oriented mental health care, resulting in a "catch-22" situation in which they are required to stop illicit drug use before receiving mental health services, yet feel unable to stop their drug use until their mental health improves. This lack of an adequate spec-

trum of services for mental health needs is one of the underlying determinants that must be addressed to achieve further major gains in harm reduction. There is an urgent need to identify services willing to work with IDUs in providing harm reduction-oriented treatment for mental health issues and to establish more services where the supply is inadequate. Furthermore, there is a need for bridging services through peers, outreach, harm reduction service providers and case managers to identify IDUs with mental health treatment needs and bring them into care.

Primary care

Research in Ontario (e.g., NEP study, UIDU study, I-Track) has shown that many IDUs lack a source of ongoing primary care and access emergency departments for the health services they receive. These high need individuals are typically seen as hard to serve and special services need to be developed with supports such as social workers and other professionals to improve ability to assist with health problems in this population.

5.11 PRIMARY PREVENTION OF INJECTING

There is as yet only limited evidence about modifiable factors associated with initiation of drug injection. This is an area where further research is urgently needed. It would appear that the high cost of illicit drugs is an important factor, since injecting is often a means of obtaining greater effect from a given amount of drug. Moves toward decriminalization of marijuana use might prove beneficial if they result in purchase of marijuana from dealers who do not also sell illicit drugs such as heroin and cocaine that have the potential to be injected.

5.12 PRISON

Research demonstrates that many inmates are infected with HCV and/or HIV and that IDUs engage in risk behaviours while incarcerated, putting them at risk of infection if they are not already infected. There is an urgent need to enhance harm reduction measures in prisons. This issue is explored in more detail in a recent report prepared by the Canadian HIV/AIDS Legal Network (see: <http://www.aidslaw.ca/home.htm>)

5.13 GENDER ISSUES

Available evidence suggests that there are two- to three-fold more men than women IDUs, but that HIV and HCV infection rates do not differ significantly by gender in most Ontario jurisdictions. There are important gender issues to be addressed in prevention both with respect to drug use issues and sexual risk. Across many studies, the finding is consistent that women who inject drugs are significantly more likely to have a sexual partner who injects drugs than are men who inject drugs, and are more likely to be living with another injection drug user [81-92]. Unprotected sexual intercourse within this relationship is therefore likely to carry elevated HIV-related risk for these women through their partner's possible unsafe injection and drug use practices. Addressing these situations is likely to require both counseling and testing to determine

infection status and appropriate prevention counseling for both partners. Opportunities for both partners to undertake drug treatment together can also be valuable.

5.14 CO-ORDINATION AND FUNDING ISSUES

In Ontario as in many other jurisdictions, services for IDUs are divided among several agencies and several funders, even though ultimately most services are provided through public funding. If truly effective approaches to the complex and multifaceted issue of injection drug use are to be developed, it is essential that there be improved co-ordination at both the local and provincial levels, and that the balance of expenditures between criminal approaches to drug use and provision of other services be re-examined. IDUs need services that can address their needs in a seamless manner if they are to improve their quality of life. The model of user friendly services, provided in an accessible and non-judgmental manner, has been the goal and practice of needle exchange programming in Ontario, and of the more recently added AIDS Bureau IDU Outreach Program. This approach to service delivery offers a means to engage drug users in services, but requires significantly augmented resources. It is essential that at a minimum the policy and programming roles within the Ontario Ministry of Health and Long-Term Care dealing with HIV, HCV, mental health and substance use aspects of injection drug use be brought together in order to unify efforts and address the many aspects of injection drug use which are currently falling through the cracks. Beyond this, truly innovative approaches to the currently intractable problems experienced by IDUs will require bringing together and rationalizing the expenditures and efforts currently being used within the criminal justice, social service, general health care and educational systems with the IDU-focused programs of the Ministry of Health and Long-Term Care discussed above. Providing needed services will require a significant investment of resources; however, this must be balanced against the very high longer term costs of maintaining the status quo. Failure to act will result in huge expenditures being required for health care and for social and criminal justice costs, even without considering indirect costs through loss of productivity and of potential contributions to society.

6. RECOMMENDATIONS

The recommendations which follow have been divided according to estimated timelines, beginning with those actions which could be undertaken immediately, followed by those which could be carried out in the longer term (2-5 years). In addition to these overall recommendations, further measures may need to be considered at the local level based on local context.

Immediate Actions

It is anticipated that all of these actions could be undertaken within the next year:

1. Create a Secretariat within the Ministry of Health and Long-Term Care to address the need for expertise, co-ordination and integration of the various components of the Ministry dealing with issues related to injection/illicit drug use (HIV, HCV, substance use/addictions, mental health, etc) with the goal of providing more integrated and effective policies and programs for prevention and care for IDUs in Ontario.
2. Create a Provincial IDU Advisory Committee to advise the Secretariat. The composition of this Advisory Committee would include community members, researchers and service providers spanning the fields of drugs and drug treatment, mental health, HIV, HCV, and primary care. The Provincial IDU Advisory Committee should also include representation from corrections to address the urgent need to ensure persons incarcerated in Ontario access to drug treatment and harm reduction measures, including needle exchange and education, counseling, testing, treatment, and professional and peer support related to both HIV and HCV.
3. Develop the Provincial Strategy on IDU by the Secretariat and Advisory Committee working together to build on the work being done by the Ontario Advisory Committee on HIV/AIDS (OACHA) specific to HIV and IDU.
4. Create minimum standards for NEP operation, with the province ensuring sufficient funding for these. These standards should address: distribution of materials for harm reduction (needles, cookers, filters, sterile water, tourniquets, as well as sharps containers) and provision of medical waste disposal. It should be noted that the current Mandatory Programs and Services Guidelines already mandate provision of sterile equipment, not just needles (please see: <http://www.health.gov.on.ca/english/providers/pub/pubhealth/manprog/mhp.pdf>.)
5. Immediately increase availability of needles through:
 - increased collaboration and promotion with pharmacies to enhance their role in supplying IDUs;
 - funding NEPs to increase their output, with no limits on the numbers of needles which can be accessed by those seeking NEP services;
 - support for increased partnerships with additional agencies to increase the number of sites at which needle exchange

- services are available; and
- enhanced use of paid and volunteer peers as educators and exchangers in NEP work, with increased use of existing distribution networks (eg through dealers, increased provision of secondary exchange and distribution options).

These measures should be facilitated by provincial bulk purchases to improve economies of scale for both needles and other equipment (water, filters, cookers), as well as sharps containers and disposal. Availability should also be increased through extension of hours of existing NEPs by improving staffing levels and working with additional partner agencies such as shelters.

6. NEPs must also be strengthened through increased access to inservice training for their staff. All NEP staff should have access to training in

- case management;
- HIV and HCV epidemiology
- HIV and HCV treatment;
- drug treatment options;
- interpersonal boundaries;
- scientific and service aspects of mental health problems and approaches to referral;
- pharmacology of drugs and their effects on users; and
- updates on new drugs.

Options for delivery of some of this ongoing training through technologies such as the internet should be examined in order to ensure access for NEP workers throughout the province and provide regular updating of needed information.

7. Develop programs to increase knowledge and awareness about HCV and HCV testing among IDUs and among service providers. In some communities there have already been HCV workers but there needs to be a mechanism to continue funding this work and ensure its integration with other harm reduction programs.

8. Provide programming to increase access to HIV, and especially HCV, testing for drug users (including crack smokers) through funding for onsite HCV counseling and voluntary testing in NEPs and drug treatment services where this is not already occurring. This programming should include research to examine whether nominal reporting of HCV is a barrier to testing among IDUs.

9. Improve data collection on new HCV cases, with collection of better risk factor data and validation of which are acute versus chronic infections. At a minimum, the enhanced HCV surveillance being done in Ottawa should be extended to Toronto and ideally to other cities as well. Better evidence about HCV incidence should then be used to drive future policy and programming.

10. Extend participation in the I-Track study with provincial funding as necessary to increase the number of Ontario cities where HIV and HCV prevalence and risk behaviours can be monitored regularly over time.

11. Modify laboratory testing forms for HIV and HCV to make it possible to distinguish between current and former IDUs in laboratory data by adding a question about the year when the person being tested last injected.

12. Provide provincial funding and support for communities to undertake needs assessments for the development of safer injection facilities (SIFs) as an enhancement of existing harm reduction programming. This could be accomplished quickly using the research design already developed for Ottawa. This would be followed by development of pilot SIFs where appropriate.

Medium Term Actions (Within 2-5 Years)

1. Increase the number of drug treatment programs based on a harm reduction model and targeted for injectors. Provide training and resources to allow much more extensive outreach and case management, with more equitable access across the province. Increase programming directed towards IDUs with co-occurring mental health problems. Such increased programming needs to be developed using harm reduction and low threshold principles so that continued drug use does not prevent access to much needed mental health care.

2. Prevent initiation of injection drug use through investments in educational, recreational and social and protective services for youth.

3. Ensure evaluation of pilot SIFs, and of adherence to the minimum standards for NEPs discussed above, with attention to ensuring adequacy of resources and provision of equitable services across the province.

4. Support further research to characterize IDUs in terms of population size, patterns of drugs being used and trajectories of drug using careers to assist with the development and evaluation of provincial programs.

5. Develop programs for HIV and HCV care tailored to the needs of IDUs.

6. Increase access to a range of methadone options (including low threshold, harm reduction programs) and introduce and evaluate pilot buprenorphine programs, in anticipation that these evaluations can be compared with the evaluations being undertaken of heroin prescribing when these become available, with respect to effectiveness and cost-effectiveness.

7. Carry out pilot projects to evaluate housing assistance programs for IDUs. Programs such as the Housing First project in New York City [93] and programs already existing or being developed in Ontario should be examined as potential models for new programs.

8. Support intervention research to develop and disseminate more effective treatment for cocaine and other stimulants, examining and comparing strategies for substitution treatments as well as psychosocial methods.

the 1990s, the number of people in the UK who are aged 65 and over has increased from 10.5 million to 13.5 million, and the number of people aged 75 and over has increased from 4.5 million to 6.5 million (Office for National Statistics 2000).

There is a growing awareness of the need to address the needs of older people, and the UK Government has set out a strategy for the 21st century in the White Paper on *Ageing Better: The Challenge of the 21st Century* (Department of Health 1999). This White Paper sets out a vision of a society in which older people are able to live well, and to contribute to their communities. It also sets out a number of key objectives for the government, including the need to improve the health and social care of older people, and to ensure that they are able to live independently for as long as possible.

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APPENDIX A – SOURCES OF DATA (ALPHABETICAL)

The Capture-Recapture Study: This study attempted to directly estimate the number of injection drug users in Toronto. It was carried out in 1998 by the Canadian Consortium to Characterize Injection Drug Users in Canada. This used a capture-recapture approach in Montreal, Toronto and Vancouver [45]. In Toronto, a combination of rehabilitation and detoxification data and laboratory-based HIV test data were used.

COUNTERfit Harm Reduction Program: In the fall of 2002, a process evaluation of the COUNTERfit Harm Reduction Program was completed using semi-structured interviews with program clients, volunteers, assistants and advisory committee members; the program coordinator; the Health Promotion Manager; clinical staff within the community health center; the Executive Director, a member of the Board of the health center and an external agency employee. Program documents and statistics were reviewed and site visits were also conducted.

Drug and Alcohol Treatment Information System (DATIS): Addiction programs (n=150) funded by the Ontario Ministry of Health and Long-Term Care electronically submit client demographic data, substance use information and referral sources to DATIS. This database was used to examine the number of injection drug users seeking assistance from the specialty addiction treatment system in Ontario. In particular, we used this dataset to examine the distribution of clients reporting drug problems.

First-time HIV diagnoses: All HIV serodiagnostic testing is carried out at the HIV Laboratory at the Laboratories Branch of the Ontario Ministry of Health and Long-Term Care. Information is managed using LABYRINTH, a powerful computerized data management system and data used for the analyses on HIV diagnoses were extracted from this system. Data are available for all HIV seropositive specimens from October 1985 and for seronegative specimens from January 1992.

We analyzed the data according to exposure category based on a hierarchy of risk developed first for AIDS surveillance in Ontario and in the rest of Canada. Since data on risk factors are missing for a substantial proportion of HIV positive results (over 50% in recent years), we assigned exposure categories based on the Laboratory Enhancement Study which obtains supplementary data on HIV-positive tests for which the risk factor information is missing on the laboratory requisition.

For the analyses in this report, we focused on persons in the IDU and MSM-IDU exposure categories. The analysis was limited to first time HIV diagnoses since repeat positives are, to the extent possible, eliminated through matching of serial specimens within Labyrinth. The cases are assigned to the public health unit and, in turn, to the public health region based on the location of the physician requesting the test. Data on the patient's residence are not available. The five public health regions have been modified such that the Toronto and Ottawa Public Health Units are treated separately.

The data were analyzed in SAS version 6.0 and cross-tabulations were produced by Public Health Region for IDU and MSM-IDU.

I-Track: The Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada study is a repeated cross-sectional survey funded by Health Canada. Data reported here come from the pilot survey of 794 participants from 4 cities during 2002/03: Toronto (221), Regina (254), Sudbury (169) and Victoria (150). Data for this report concentrated on sites within Ontario. Participants had to provide informed consent and have injected drugs in the prior 6 months. Demographic, drug use and risk behavior information was collected and anonymous HIV and HCV testing were conducted on finger-prick blood samples.

IDU Estimates based on Holmberg et al.: A 1996 study by Holmberg examined the actual prevalence of injection drug use in 96 US metropolitan cities [43]. Data from this study were used as a guide in determining the prevalence of IDU in various public health regions in Ontario. A preliminary exercise had been carried out in the context of a previous situation report prepared in July 1997 [12]. A similar approach was used in the present analysis.

IDU Outreach Program: Data reviewed were provided by the AIDS Bureau, Ontario Ministry of Health and Long-Term Care, including the guidelines for the programme, the programme structure and the summary data of activities reported by the programmes to the AIDS Bureau.

The Impact of Organizational Responses to Environmental Pressures on Outreach Programs for IDUs: The impact of organizational responses to environmental pressures on outreach programs for IDUs study was conducted between 1998 and 2000. The purpose of this study was to document and analyze the types of pressures on needle exchange programs, how the programs responded and the impact on service design and delivery. A total of 59 qualitative interviews were conducted with the staff, coordinators and senior managers of NEPs in Ontario. The data were analyzed using an iterative, thematic analysis process.

Laboratory Enhancement Study (LES): As noted above, a study to enhance the quality of surveillance data on HIV infection was implemented in Ontario in October 1999. This was initially funded by the Ontario HIV Treatment Network and subsequently supported through a contractual agreement with Health Canada. The LES study has three principal objectives:

1. To capture supplementary risk factor data on newly diagnosed HIV infections;
2. To obtain data on prior HIV testing history to identify repeat HIV-positive tests; and
3. To estimate HIV incidence through the use of the detuned assay which detects recent infection.

The detuned test assays are carried out specifically for the purposes of the LES.

Data from the LES were used to calculate HIV incidence among injection drug users by health region using the analytic

approach of the investigators who initially developed the test [44]. To do this, modeling was required to account for specimens without a detuned assay result and specimens from cases in which the risk factor information was missing. Although a similar approach was taken for MSM-IDU, the numbers were too sparse to be truly useful and, in addition, this group is difficult to define and is likely heterogeneous.

From October 1999 until December 2003, questionnaires asking for additional information about the individual who had been tested were mailed along with 4,465 HIV-positive test result reports and 4,315 for HIV-negative results. Overall, the return rate was 67% among the positive and 71% among the negative; the Kaplan-Meier return rate was 80% at 12 months. There were 285 results identified as IDU which were used to estimate a total of 350 IDU among the HIV positive tests.

Modeled HIV infection: Data from the HIV diagnostic program, AIDS case reporting, mortality data and incidence data from the Laboratory Enhancement Study as well as an analysis of repeat testers were used to attempt to simulate the HIV epidemic in Ontario since its beginning in the late 1970s. An iterative spread sheet model using Lotus was employed for this purpose. Only first-time HIV diagnoses were used in this analysis and were adjusted to account for duplicated testing, i.e. to remove the repeat testers. A more comprehensive description of the methods used is included in the annual HIV/AIDS Surveillance Report produced by one of the investigators [45]. In the present analysis, we present the results for MSM and MSM-IDU by year since 1978. As well, we generated for the present analysis estimates of HIV prevalence and HIV incidence by health region using interpolation.

Modeled HIV-HCV co-infections: The methodology used to estimate the number of persons in Canada coinfecting with HCV and HIV in 1999 is described in detail in the technical report cited. To estimate HCV-HIV co-infections among IDUs in Ontario in 2002, the number of HCV-HIV infections in Ontario in 1999 was adjusted by the estimated increase in HCV from 1999 to 2002 and then interpolated from the distribution by exposure category derived in the original model.

Needle Exchange Program (NEP) Study: The Study of Bloodborne Infections in Ontario was a cross-sectional survey of 551 IDUs recruited through needle exchange programs in nine Ontario cities, including Toronto and Sudbury, in 1997-98. Participants had to provide informed consent and have injected drugs in the preceding 2 months. Demographic, drug use and risk behavior information was collected and anonymous HIV testing was conducted on saliva and finger-prick blood samples.

Needle and Syringe Exchange Programs, Public Health Branch, Ontario Ministry of Health and Long Term Care: Each year, NEPs are required to report service statistics. We used these data to describe the NEP programs in Ontario and their needle distribution efforts.

New hepatitis C cases, RDIS database, Ontario Ministry of Health and Long-Term Care: Hepatitis C data from 1990 to 2003 were collected from the Ontario Ministry of Health and Long-Term Care. Physicians or laboratories report newly identified cases of HCV to the Ontario Ministry of Health and Long-Term care through local health units. Each local health unit then contacts the physician or the client (if approved by physician) to collect information including risk factors for the acquisition of HCV. Cases of HCV in Ontario are presented by risk factor from 1990 to 2003 and then the proportion of cases attributed to IDU has been tracked through time.

POINT Project: The POINT project was a closed cohort of 506 Ottawa IDUs who completed baseline interviews between October 2002 and February 2003 and 6 month follow-up interviews to January 2004. Data were collected from individuals who had given informed consent and injected drugs in the previous six months. IDUs provided saliva samples for HIV and HCV antibody testing at baseline and follow-up. The POINT project builds on the SurVIDU Study by examining a greater range of HIV-related behaviours and practices. Recruitment was also extended to IDUs who do not use NEPs.

Profile of Ontario Methadone Recipients and Providers (1996 to 2001): Methadone patient registration and physician methadone exemption data collected by the College of Physicians and Surgeons of Ontario were used to examine the distribution of methadone patients and providers across Ontario by gender, year, region and practice type.

Repeat HIV Tester Study: Data from the HIV testing database at the Central Public Health Laboratory, Ontario Ministry of Health and Long-Term Care were utilized to create a retrospective cohort in order to examine HIV incidence density. The database includes information on all voluntary diagnostic tests carried out in Ontario. Only repeat testers were utilized in these analyses: individuals with two or more linked tests, whose first test was HIV-negative. While multiple risk groups were investigated, results in this report are restricted to IDUs. Data include all repeat testers in the province of Ontario between January 1992 and October 2001.

Reported AIDS Cases: AIDS has been reportable in Ontario since 1983 but cases date back to 1981. Cases are reported by the treating physician to the public health unit where the physician practices and transferred to the public health unit of the patient's residence, as necessary. Cases are transmitted without personal identifiers to the Public Health Division, Ontario Ministry of Health and Long-Term Care on a regular basis. Data are usually collected using a standardized form developed by Health Canada and revised from time to time.

The case data are managed in RDIS, the communicable disease information system used for public health since 1990. Cases prior to 1990 were entered retrospectively when the system came into operation. Public health units first determine whether the case meets a standardized case definition developed by Health Canada. Cases are then classified according to a mutually exclusive hierarchy of risk similar to that used for HIV noted above.

In the analysis for this report, the data were analyzed in SAS to generate cross-tabulations of persons in the IDU and MSM-

IDU exposure categories by public health unit and public health region by year of AIDS diagnosis.

Since HIV became reportable in Ontario in 1989, AIDS reporting has deteriorated and a substantial proportion of cases are only reported after they have died and the death certificate includes a mention of HIV. All such death certificates are transmitted by the Registrar General to the Public Health Division for review and analysis.

SurvIDU Study: The Ottawa component of the inter-provincial SurvIDU Study is an open cohort of active IDUs recruited from the city's needle exchange programme. Participants complete interviews at baseline and prospectively every 6 months. Ottawa data utilized in this report were collected between June 1996 and February 2003 on 1,061 men and women who have given informed consent, injected drugs in the previous 6 months and attended a component of Ottawa's NEP at least once. IDUs provided saliva samples for HIV and latterly HCV antibody testing at baseline and follow-up.

Understanding Injection Drug Use Study: The Understanding Injection Drug Use in Toronto Study involved in-depth, open-ended qualitative interviews with 120 Toronto IDUs recruited through needle exchanges, posters in laundromats, field outreach, snowballing, etc., carried out between June 2000 and April 2001. Recruitment strategy aimed at maximizing diversity of age, gender, ethnicity, and area of the city in which participants live. The interviews explored IDU experiences and perceptions of aspects of drug use, HIV and HCV prevention and testing, drug overdose, violence, and service needs and experiences. Thematic analyses of the interview data were carried out focused on these issues.

World Health Organization (WHO) Study: The Drug Injecting and Risk of HIV Infection study involved repeated annual cross-sectional surveys between 1991 and 1994 among a total of 1,309 Toronto IDUs as part of a multi-city collaborative study organized by the World Health Organization and funded for Toronto by NHRDP. Recruitment was carried out at needle exchanges and a variety of other community agencies working with IDUs. Participating individuals had to have injected drugs in the prior 2 months and provide informed consent. Data were collected on a variety of demographic factors, drug use behaviours, and sexual behaviours, and anonymous HIV testing was carried out using saliva and finger prick blood samples.

the 1990s, the number of people in the world who are under 15 years of age is expected to increase from 1.1 billion to 1.5 billion.

As a result of the demographic changes, the number of people in the world who are 65 years of age and older is expected to increase from 250 million in 1990 to 500 million in 2020.

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