



Overdose and HIV and hepatitis C infection among people in Ottawa who use drugs

January 2014



Table of Contents

Main findings	2
The public health challenge of drug use.....	2
People in Ottawa use drugs illicitly.....	3
Drug overdose causes significant morbidity and mortality in Ottawa.....	3
Some people who use drugs share drug equipment	4
HIV and HCV are prevalent in people who inject drugs and many who inject are co-infected	4
Injection and inhalation drug use accounts for many of Ottawa’s HIV and HCV cases.....	7
Data notes	7
Limitations	8

Acronyms

CI: Confidence interval

HIV: Human immunodeficiency virus

HCV: Hepatitis C virus

iPHIS: integrated Public Health Information System

OHEMU: Ontario HIV Epidemiologic Monitoring Unit

OPH: Ottawa Public Health

Acknowledgements

This report was written by Dara Spatz Friedman and Jacqueline Willmore, Epidemiology Section, Ottawa Public Health. We would like to thank the following researchers for providing data: Caty Blanchette, Université Laval, Axe Santé des populations et pratiques optimales en santé and Centre de recherche du CHU de Québec; Karine Blouin, Institut nNational de santé publiqueSanté Publique du Québec; Lynne Leonard, University of Ottawa,; Pascale Leclerc, Direction de Santé Publique de l’Agence de la santé et des services sociaux de Montréal; Peggy Millson, Dalla Lana School of Public Health; Jill Tarasuk, Public Health Agency of Canada; and Michael Whelan, Public Health Ontario. We would also like to thank City of Ottawa staff who contributed to the report: Vera Etches, Andrew Hendriks, Jennifer Nickerson, Pam Oickle, Aideen Reynolds, Marie Roy, Ottawa Public Health; and Warren Bedford, Parks, Recreation and Cultural Services.

Main findings

- In Ottawa, 1,200 to 5,600 individuals were estimated to inject drugs in 2008. Approximately 55,000 people in Ottawa were estimated in 2011/12 to have used crack or cocaine in their lifetime.
- Drug overdose results in approximately 115 hospitalizations and 40 deaths in Ottawa annually.
- Among people who inject drugs in Ottawa surveyed in 2012, 14% used a previously-used needle or syringe in the past 6 months. Among people who inject drugs in Ottawa who also inhale drugs, 61% had smoked crack with a previously-used smoking device.
- HIV and HCV incidence have declined over time in the general population of Ottawa. In 2012, the rate of new diagnoses of HIV and HCV was 6.2 and 26.0/100,000, respectively.
- Among people who inject drugs in Ottawa surveyed in the fall of 2012, the prevalence of HIV and HCV was 10% and 70%, respectively.
- In 2012, 43% and 73% of diagnosed HIV and hepatitis C cases, respectively, who inject or inhale drugs, reported sharing drug equipment.

The public health challenge of drug use

People who inject illicit drugs are seen as a population that is hard to reach with conventional public health strategies.¹ A number of complex barriers such as treatment-related costs, transportation, stigma and discrimination make this population less likely to seek out healthcare.^{2,3} Historically, a limited knowledge of available services, long wait times, and limited hours of service make it difficult for these people to access health care,⁴ resulting in an over-reliance on acute and emergency care,⁵ and the tendency for this population to have unmet healthcare needs.^{6,7}

Crack (inhalation drug) use is associated with unique and serious health and social problems. Users of crack tend to be extremely marginalized within drug-using networks and the broader society. They often experience extreme poverty, homelessness, lack of access to income and other resources, and barriers to health care services.⁸

People who use drugs, particularly by injection, are at a higher risk of death than the general population. Alongside HIV-related mortality, drug overdose is the most common cause of death in this group.⁹

People who inject drugs are at risk of bloodborne infections such as HIV and hepatitis C (HCV) because of the sharing of needles and other injecting equipment.¹⁰ Transmission of bloodborne infections while smoking crack is facilitated by oral sores, cuts or burns on the lips and mouth of users and sharing of smoking implements.^{11,12,13} Impaired judgement from consuming drugs is associated with high-risk sexual behaviour, which puts one at risk for sexually-transmitted infections such as HIV.^{14,15,16}

This report provides epidemiologic information about the risk of overdose and HIV and HCV infection and among people who use drugs.

People in Ottawa use drugs illicitly

- Estimates of the number of people in Ottawa who inject drugs vary. One study found a range in 2008 of 1,200 to 5,600.^{17, a} Another study estimated the number in 2009 to be 3,870.¹⁸
- Estimates of the number of people in Ottawa who smoke crack cocaine specifically are not available; however, in 2011/12, 7.7% of the adult population in Ottawa (approximately 55,000 people) had used cocaine or crack in their lifetime.¹⁹
- In 2011/12, 8.3% of the adult population in Ottawa had used hallucinogens in their lifetime; ecstasy, 5.5%; and speed, 3.8%.²⁰
- Prescription-type opioid pain relievers are also misused. Ottawa estimates are too unreliable to report; however, 7.7% of Ontario adults used a prescription-type opioid pain reliever for non-medical purposes at least once in the past year.²¹

Drug overdose causes significant morbidity and mortality in Ottawa

Intentional and unintentional drug overdose results in approximately 115 hospitalizations²² and 40 deaths annually.²³ Two-thirds (65%) of the hospitalizations are among women, yet two-thirds (64%) of the deaths are among men. In this report, the hospitalizations counted were limited to narcotics, hallucinogens, and cocaine; however, the deaths include other types of drugs, including prescription medication. The prescription opioids fentanyl, oxycodone and methadone are involved in about 45% of deaths (Table 1).²⁴

Table 1. Drug overdose deaths involving fentanyl, oxycodone or methadone, Ottawa 2002 to 2012

Year	Fentanyl	Oxycodone	Methadone
2002 to 2006 combined	<5	<5	<5
2007	0	<5	<5
2008	<5	5	<5
2009	6	7	<5
2010	10	8	<5
2011	6	5	5
2012	6	<5	<5

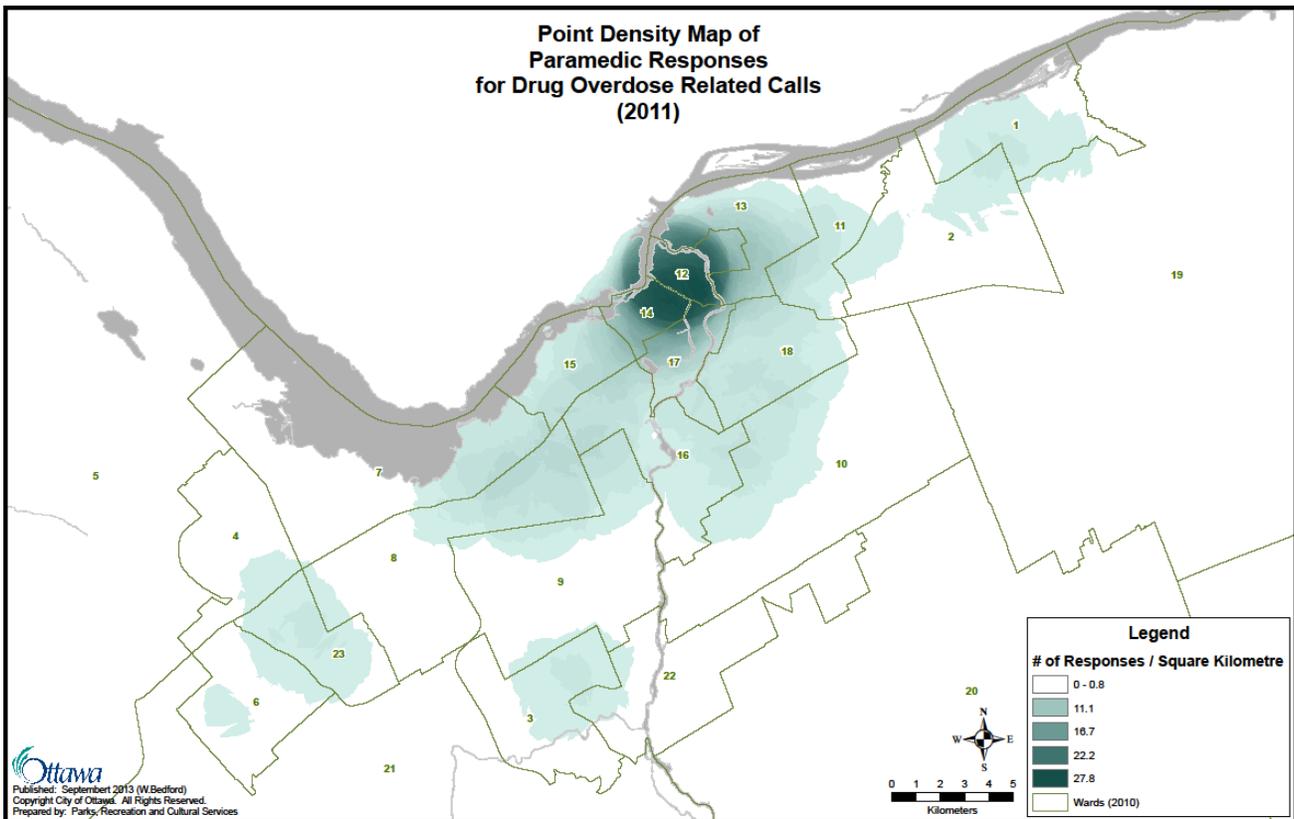
Data source: Office of the Chief Coroner for Ontario, extracted November 22, 2013.

In 2011, there were approximately 1,000 drug overdose related incidents in Ottawa to which paramedics responded. Figure 1 shows that these responses are concentrated in the downtown core of Ottawa, but with some responses in most wards. Darker shading indicates a higher number of overdose-related incidents per square kilometre. The highest density of responses over 2011 was 27.8 per square kilometre. The map does not take into account the population per square kilometre, so the higher density in the downtown core may be indicative of higher population density in that area.

^a This range was derived by the authors of the citation referenced using available estimates of HIV incidence in Ottawa (Ontario HIV Epidemiologic Monitoring Unit (OHEMU)), the number of HIV-positive individuals who inject drugs in the Champlain Local Health Integration Network (OHEMU), and the prevalence of HIV among people who use drugs in Ottawa (I-Track, 2008). The lower estimate is the population size required to yield the modeled HIV incidence, considering various factors affecting the rate of transmission. The upper estimate is derived using the modeled number of HIV-positive individuals who inject drugs and the measured prevalence of HIV among users of injection drugs.

* Interpret with caution due to high sampling variability.

Figure 1. Point density map of paramedic responses to drug overdose related* calls, Ottawa, 2011



Data source: Ottawa Paramedic Service, extracted September 25, 2012.

Data note: *Does not distinguish between type of drug involved. Excludes calls for which attempted suicide is listed in the assessment field, but may still include some intentional overdoses.

Some people who use drugs share drug equipment

Among people who inject drugs in Ottawa who were surveyed in the fall of 2012, 14.5% (10.0%, 20.0%) had injected with a previously-used needle or syringe.²⁵ Among people who inject drugs who also smoke crack, 69.1% (55.2%, 80.9%) had smoked crack with a previously-used smoking device.²⁶

HIV and HCV are prevalent in people who inject drugs and many who inject are co-infected

The rates of incidence of HIV, a sexually-transmitted and bloodborne infection, and hepatitis C (HCV), a bloodborne infection, have declined in the general population of Ottawa. In 2012, 6.2/100,000 persons in the general Ottawa population were diagnosed with HIV and 26.0/100,000 persons were diagnosed with HCV. These rates have declined over 2-fold from what they were ten years ago.²⁷ In 2012, 57 cases of HIV and 241 cases of HCV were reported in Ottawa.²⁸

However, certain groups, including people who use drugs, are at particular risk for acquiring and transmitting HIV and HCV. On average, 8 infectious disease deaths are attributed to drugs annually in Ottawa.²⁹

It is not known whether the rate of new diagnoses of HIV and HCV among people in Ottawa who use drugs has changed over the last ten years. However, among people who inject drugs in Ottawa, the

prevalence of HIV has been relatively stable during 2006 to 2012, and the prevalence of HCV has increased (Table 2a,b).^{30,31}

- In fall 2012, 9.5% (4.7%, 16.8%) of people in Ottawa who inject drugs were infected with HIV. In 2011, the latest year for which data for comparison are available, the prevalence of HIV in people who inject drugs in Ottawa was lower than that of Montreal but higher than that of Toronto.^{32,33}
- In fall 2012, 70.5% (60.8%, 79.0%) of people in Ottawa who inject drugs were infected with HCV. In 2011, the prevalence of HCV in Ottawa was the same as that in Montreal and higher than that in Toronto.
- The prevalence of co-infection with HIV and HCV has been relatively stable in Ottawa since 2004 (Table 2c). In 2011, 11.6% of people who inject drugs in Ottawa were infected with both HIV and HCV. Prevalence of co-infection with HIV and HCV in Ottawa, Montreal and Toronto is similar to the prevalence of HIV infection in each city, because most people who inject who are infected with HCV are also infected with HIV. The higher prevalence of hepatitis C may be due to its being more transmissible than HIV.³⁴

Table 2a. Measured prevalence of HIV in people who inject drugs, by geographical location, 2006 to 2012 (Prevalence (% (95% CI) of people who inject drugs) by year)

City	2006	2007	2008	2009	2010	2011	Fall, 2012
Montrealⁱ	23.4% (20.0%, 27.2%)	22.3% (18.8%, 26.1%)	21.5% (18.0%, 25.4%)	21.9% (18.2%, 26.0%)	23.3% (19.7%, 27.4%)	25.7% (21.9%, 29.9%)	-
Ottawaⁱⁱ	9.5% (5.4%, 13.9%)	-	11.9% (7.8%, 17.3%)	10.5% (6.6%, 15.6%)	9.2% (5.4%, 13.9%)	12.6% (8.3%, 17.9%)	9.5% (4.7%, 16.8%)
Torontoⁱⁱⁱ	5.0% (2.7%, 8.4%)	-	-	-	-	6.0% (3.4%, 9.7%)	-

Table 2b. Measured prevalence of HCV in people who inject drugs, by geographical location, 2006 to 2012 (Prevalence (% (95% CI) of people who inject drugs) by year)

City	2006	2007	2008	2009	2010	2011	Fall, 2012
Montrealⁱ	70.3% (66.3%, 74.0%)	73.5% (69.5%, 77.2%)	74.8% (70.7%, 78.6%)	75.9% (71.7%, 79.7%)	75.3% (71.1%, 79.0%)	70.7% (66.4%, 74.7%)	-
Ottawaⁱⁱ	60.5% (53.4%, 67.3%)	-	62.9% (55.9%, 69.7%)	64.8% (58.0%, 71.6%)	69.7% (62.6%, 75.8%)	72.6% (65.8%, 78.6%)	70.5% (60.8%, 79.0%)
Torontoⁱⁱⁱ	65.0% (59.8%, 70.0%)	-	-	-	-	61.1% (54.6%, 67.2%)	-

Table 2c. Measured prevalence of HIV/HCV co-infection in people who inject drugs, by geographical location, 2006 to 2012 (Prevalence (% (95% CI) of people who inject drugs) by year)

City	2006	2007	2008	2009	2010	2011	Fall, 2012
Montrealⁱ	20.9% (17.7%, 24.6%)	18.9% (15.7%, 22.5%)	18.7% (15.4%, 22.5%)	18.0% (14.6%, 21.8%)	20.2% (16.8%, 24.1%)	20.1% (16.7%, 24.1%)	-
Ottawaⁱⁱ	7.9% (4.6%, 12.7%)	-	11.9% (7.8%, 17.3%)	9.5% (5.8%, 14.4%)	8.4% (5.0%, 13.3%)	11.6% (7.4%, 16.8%)	-
Torontoⁱⁱⁱ	-	-	-	-	-	4.9% (2.6%, 8.4%)	-

ⁱHIV and HCV prevalence and HIV/HCV co-infection, ³⁵ Université Laval, Axe Santé des populations et pratiques optimales en santé and Centre de recherche du CHU de Québec. Note: HCV infection was assessed using antibody detection only; thus, this measurement represents either past (cured or not) or current infections.

ⁱⁱHIV & Hepatitis C Prevention Research Team, University of Ottawa. ^{36,37}

ⁱⁱⁱ2006: Public Health Agency of Canada, ³⁸ 2011: Toronto Public Health ³⁹

- = not available

Injection and inhalation drug use accounts for many of Ottawa's HIV and HCV cases

Risk factor information is available for 86.4% of HIV cases diagnosed in Ottawa during 2008 to 2012 and 64.9% of HIV cases diagnosed during 2012. (Individuals who are tested anonymously account for 21.1% of HIV cases in Ottawa in 2012. No risk factor data are available for these individuals.) Risk factor information is available for 90.0% of HCV cases diagnosed in Ottawa during 2008 to 2012 and 84.3% of HCV cases diagnosed during 2012.

Drug use among HIV cases

Among cases diagnosed during 2008 to 2012^b, 16.1% (12.2%, 20.7%) used either injection or inhalation drugs.⁴⁰ During this time period, 80.0% of cases reporting injection or inhalation drug use did not report a higher risk exposure and 20.0% were also men who had sex with men.

The specific method of drug use (injection or inhalation) was recorded only recently: in 2012, 10.8% (3.0%, 25.4%) of newly diagnosed cases reported injecting drugs, 10.8% (3.0%, 25.4%) reported inhaling drugs, and 18.9% (8.0%, 35.2%) reported either injecting or inhaling drugs. The proportion of HIV cases diagnosed in Ottawa in 2012 who reported drug use was not significantly different from what it was five years ago.

Compared with the rest of Ontario, a higher proportion of HIV cases diagnosed in Ottawa during 2008 to 2012 reported injecting or inhaling drugs. In the rest of Ontario, 9.4% (8.4%, 10.4%) of 2008 to 2012 cases injected or inhaled drugs⁴¹ compared with 16.1% in Ottawa. In 2012 alone, the proportion of newly diagnosed cases who injected or inhaled drugs in Ottawa (18.9%) was not significantly higher than in the rest of Ontario (11.1%).

Among HIV cases diagnosed in Ottawa in 2012 who injected or inhaled drugs, 42.9% (9.9%, 81.6%) reported sharing drug equipment.⁴²

Drug use among HCV cases

Based on HCV cases diagnosed in Ottawa during 2008 to 2012^b for whom risk factors are known, 60.6% (57.7%, 63.4%) used either injection or inhalation drugs.⁴³

In 2012, for whom risk factors are known, 49.0% (43.9%, 58.0%) reported injecting drugs, 42.7% (35.8%, 49.7%) reported inhaling drugs, and 59.8% (52.7%, 66.6%) reported either injecting or inhaling drugs. The proportion of HCV cases diagnosed in Ottawa in 2012 reporting drug use as a risk factor was not significantly different from what it was five years ago.

The proportion of Ottawa's 2012 HCV cases reporting drug use was higher than in the rest of Ontario. In the rest of Ontario in 2012, 48.2% of HCV cases reported drug use compared with 59.8% in Ottawa.⁴⁴

Among HCV cases diagnosed in Ottawa in 2012 who inject or inhale drugs, 73.0% (64.2%, 80.6%) reported sharing drug equipment.⁴⁵

Data notes

Hospitalization data were derived from the Discharge Abstract Database (Canadian Institute of Health Information) and the Ontario Mental Health Reporting System, from fiscal years 2008/09 to 2010/11. Mortality data (2005 to 2009) are from the Vital Statistics database (Office of the Registrar General). Additional information on deaths investigated by coroners in Ontario was obtained from the Office of the Chief Coroner of Ontario (2000 to 2011).

^b Includes all people diagnosed during this time period regardless of when infection occurred. May include recent and older infections.

Information on HIV and HCV came from two surveillance systems:

1. The Ministry of Health and Long-Term Care's integrated Public Health Information System (iPHIS) contains records of cases of HIV and HCV reported to Ottawa Public Health and includes client risk factors. These cases are assigned to health jurisdiction based on residency. There is no discrimination between recent and older infections.
2. I-Track provides HIV and HCV prevalence and risk behaviour data among people who inject drugs. I-Track is an enhanced, ongoing second generation surveillance system in urban and semi-urban centres across Canada. SurviDU, a research network including Ottawa and several cities in Quebec including Montreal, operates as a data collection site within the I-Track study. The HIV & Hepatitis C Prevention Research Team at the University of Ottawa oversees the study in Ottawa. SurviDU recruits survey participants twice a year (in spring and fall) through Ottawa-based community agencies providing harm reduction services. I-Track surveys were carried out in Toronto in 2006 and 2011 by a research team at the Dalla Lana School of Public Health at the University of Toronto.

Point estimates are provided with 95% confidence intervals (CI) in smaller font and within brackets. The 95% CI includes the true value 95 times out of 100. E.g. If the point estimate for the prevalence of HIV is 9.5% (4.7%, 16.8%), then the range from 4.7% to 16.8% will contain the true population value 95% of the time. The narrower the confidence interval is, the more precise the estimate. Statistical differences were determined using tests of proportions.

Limitations

Drug overdose deaths do not distinguish the type of drug involved (prescription, illegal or otherwise) or between intentional and unintentional overdoses.

Whereas drug overdose death due to oxycodone or methadone each has a specific involvement code that was used for their extraction by the Coroner's Office, fentanyl-related deaths did not have its own involvement code during 2002 to 2012. Because of this, fentanyl-related deaths were tabulated by the Coroner's Office through a text scan of cause of death.

The number of cases of HIV or HCV reported for a given year may be different from the number of new infections occurring in that year. Cases of HIV and HCV are reported for the year in which they are diagnosed. Because of the potential time lag between infection and testing, reports in a given year may not include all new infections occurring in that year and may include infections that occurred in previous years. In addition, some HIV cases are tested in ways that are not reportable to Public Health (e.g., point-of-care testing, viral load) and may not be captured in iPHIS.

Risk factors are obtained through case investigation and are subject to biases in reporting. Risk factor information is not collected for cases lost to follow up. Cases for whom risk factor information is available may not be representative of all cases.

I-Track draws from a convenience sample of people who inject drugs. As such, it may not be representative of the entire population of people who inject drugs in each city.

References

1. Grund J, Blanken P, Adriaans N, Kaplan C, Barendregt C, & Meeuwse M. Reaching the unreached: targeting hidden IDU populations with clean needles via known user groupos. *Journal of Psychoactive Drugs* 1992;24:41-7.
2. Drumm R, McBride D, Mesch L, Page J, Dickerson K, & Jones B. The rock always comes first; drug users' accounts about using formal health care. *Journal of Psychoactive Drugs* 2003; 35:461-9.
3. Merrill JO, Rhodes LA, Deyo RA, Marlatt GA, Bradley KA. Mutual mistrust in the medical care of drug users: the keys to the "narc" cabinet. *J Gen Intern Med* 2002 May;17(5):327-33.
4. Drumm R, McBride D, Mesch L, Page J, Dickerson K, & Jones B. The rock always comes first; drug users' accounts about using formal health care. *Journal of Psychoactive Drugs* 2003;35:461-9.
5. Neale J, Sheard L, Tompkins CN. Factors that help injecting drug users to access and benefit from services: A qualitative study. *Subst Abuse Treat Prev Policy* 2007;2:31.
6. Neale J, Sheard L, Tompkins CN. Factors that help injecting drug users to access and benefit from services: A qualitative study. *Subst Abuse Treat Prev Policy* 2007;2:31.
7. Neale J, Tompkins C, Sheard L. Barriers to accessing generic health and social care services: a qualitative study of injecting drug users. *Health Soc Care Community* 2008 Mar;16(2):147-54.
8. DeBeck K, Shannon K, Wood E, Li K, Montaner J, & Kerr T. Income generating activities of people who inject drugs. *Drug and Alcohol Dependence* 2007;91:50-6.
9. Mathers BM, Degenhardt L, Bucello C, Lemon J, Wiessing L, Hickman M. Mortality among people who inject drugs: a systematic review and meta-analysis. *Bulletin of the WHO*. 2013;91:102-123. Available online at: <http://www.who.int/bulletin/volumes/91/2/12-108282/en/>. Accessed October 24, 2013.
10. Des Jarlais D, Friedman S. HIV infection among persons who inject illegal drugs. *AIDS* 1988;1:267-73.
11. McMahon JM, Tortu S. A potential hidden source of hepatitis C infection among noninjecting drug users. *J Psychoactive Drugs* 2003 Oct;35(4):455-60.
12. Fischer B, Powis J, Firestone Cruz M, Rudxinski K, & Rehm J. Hepatitis C virus transmission among oral crack users: viral detection on crack paraphernalia. *European Journal of Gastroenterology & Hepatology*, 2008;20:29-32.
13. Tortu S, McMahon JM, Pouget ER, Hamid R. Sharing of noninjection drug-use implements as a risk factor for hepatitis C. *Subst Use Misuse* 2004 Jan;39(2):211-24.
14. Paglia-Boak A, Adlaf EM, & Mann RE. Drug use among Ontario students: 1977-2011 Detailed OSDUHS findings (CAMH Research Document Series No. 32). Toronto, Ontario: Centre for Addiction and Mental Health; 2011.
15. Hoffman J, Klein H, Eber M, & Crosby H. Frequency and intensity of crack use as predictors of women's involvement in HIV-related sexual risk behaviours. *Drug Alcohol Dependency* 2000;58:227-36.
16. Schoenbaum EE, Hartel D, Selwyn PA, Klein RS, Davenny K, Rogers M, et al. Risk factors for human immunodeficiency virus infection in intravenous drug users. 1989 Sep 28. Report No.: 321.
17. Bayoumi A, Strike C, Brandeau M, Degani N, Fischer B, Glazier R, et al. Report of the Toronto and Ottawa Supervised Consumption Assessment Study. Ontario; 2012.
18. Remis R, Swantee C, Liu J. Report On HIV/AIDS in Ontario 2009, Table 6.5. Includes men who have sex with men who use injection drugs. http://www.ohemu.utoronto.ca/doc/PHERO2009_report_final.pdf.

19. Canadian Community Health Survey 2011 to 2012. Ontario Share File. Statistics Canada.
20. Canadian Community Health Survey 2011 to 2012. Ontario Share File. Statistics Canada.
21. Shield KD, Ialomiteanu A, Fischer B, Rehm J+. Assessing the prevalence of non-medical prescription opioid use in the Canadian general adult population: evidence of large variation depending on survey questions used. *BMC psychiatry* 2013;13(1):6.
22. Ontario Hospitalization Data 2008 to 2010, IntelliHEALTH extracted May 30, 2012, Health Planning Branch, Ontario MOHLTC. Adult Mental Health 2008-2010, Ontario Mental Health Reporting System, IntelliHEALTH extracted January 4, 2013.
23. Office of the Chief Coroner for Ontario, extracted November 22, 2013.
24. Office of the Chief Coroner for Ontario, extracted November 22, 2013.
25. HIV & Hepatitis C Prevention Research Team University of Ottawa. Snapshot Issue 5: Summer 2013.
26. HIV & Hepatitis C Prevention Research Team University of Ottawa. Snapshot Issue 5: Summer 2013.
27. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health August 13, 2013.
28. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health, August 13, 2013.
29. Ontario Mortality Data 2005 to 2009, IntelliHEALTH extracted Sept 5, 2012, Ontario MOHLTC.
30. HIV & Hepatitis C Prevention Research Team, University of Ottawa. HIV, HCV, and HIV/HCV co-infection prevalence rates among IDUs in Ottawa by year (1996-2011), June 28, 2012.
31. HIV & Hepatitis C Prevention Research Team University of Ottawa. Snapshot Issue 5: Summer 2013. 2013 Aug 29.
32. Personal communication. Caty Blanchette, Université Laval, Axe Santé des populations et pratiques optimales en santé and Centre de recherche du CHU de Québec and Pascale Leclerc, Direction de Santé Publique de l'Agence de la santé et des services sociaux de Montréal.
33. Phase 3 I-Track Final Report, Toronto Public Health, 2013.
34. The C. Everett Koop Institute, Dartmouth Medical School. Transmission of Hepatitis C. <http://www.epidemic.org/theFacts/hepatitisC/transmission.html> accessed on July 8, 2013.
35. Personal communication. Caty Blanchette, Université Laval, Axe Santé des populations et pratiques optimales en santé and Centre de recherche du CHU de Québec and Pascale Leclerc, Direction de Santé Publique de l'Agence de la santé et des services sociaux de Montréal.
36. HIV & Hepatitis C Prevention Research Team, University of Ottawa. HIV, HCV, and HIV/HCV co-infection prevalence rates among IDUs in Ottawa by year (1996-2011), June 28, 2012.
37. HIV & Hepatitis C Prevention Research Team University of Ottawa. Snapshot Issue 5: Summer 2013. 2013 Aug 29.
38. Public Health Agency of Canada. HIV/AIDS Among People Who Inject Drugs in Canada, July 2010. http://www.phac-aspc.gc.ca/aids-sida/publication/epi/2010/pdf/EN_Chapter10_Web.pdf.
39. Phase 3 I-Track Final Report, Toronto Public Health, 2013.
40. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health, October 2, 2013.
41. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Public Health Ontario, May 9, 2013.
42. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health, October 2, 2013.

43. integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health, October 2, 2013.
44. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Public Health Ontario, July 23, 2013.
45. Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted by Ottawa Public Health, October 2, 2013.