Prevalence of Injecting Drug Use and Coverage of Interventions to Prevent HIV and Hepatitis C Virus Infection Among People Who Inject Drugs in Canada

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Objectives. To determine the number of people who inject drugs (PWID) in Canada and the annual coverage of opioid agonist treatment (OAT) and needle-and-syringe provision for PWID.

Methods. We estimated the number of PWID in 11 of 13 Canadian provinces and territories in 2011 by using indirect multiplier methods based on provincial and territorial methadone recipient totals and proportion of surveyed PWID receiving methadone. We modeled annual increases for 2011 to 2016 on Quebec and British Columbia longitudinal data. We calculated needle-and-syringe coverage (World Health Organization [WHO] recommendation: ≥ 200 per PWID) and OAT coverage (WHO recommendation: ≥ 40 per 100 PWID) per province and territory annually.

Results. An estimated 130 000 individuals in Canada (0.55%) injected drugs in 2011, increasing to 171 900 individuals (0.70%) in 2016. Needle-and-syringe coverage increased from 193 to 291 per PWID, and OAT coverage increased from 55 to 66 per 100 PWID over the study period.

Conclusions. While the number of PWID increased between 2011 and 2016, OAT coverage remained high, and needle-and-syringe coverage generally improved over time.

Public Health Implications. These data will inform public health surveillance, service planning, and resource allocation, and assist monitoring of treatment and harm-reduction coverage outcomes. (*Am J Public Health.* 2020;110:45–50. doi:10.2105/AJPH.2019.305379)

See also Kapadia and Landers, p. 15; and the *AJPH* Ending the HIV Epidemic section, pp. 22–68.

Illicit substance use remains a substantial contributor to global morbidity and mortality.[1] In both Canada and the United States, excessive prescription of opioid analgesics and highly potent synthetic opioids since 2001 resulted in deaths from opioid-related overdose exceeding those from motor vehicle accidents and other leading causes of death.[2] In 2017 alone, there were more than 4000 opioid-related overdose deaths in Canada and more than 47 600 in the United States.[2]

The use of drugs by injection further contributes to the burden of disease by increasing the risk of HIV and viral hepatitis infection through sharing of needles and syringes.[1] Harm-reduction interventions, such as opioid agonist treatment (OAT) and needle-and-syringe programs, are associated with reduced risk of acquiring HIV, hepatitis C virus (HCV), and other related harms among people who inject drugs (PWID)[3–5] and retention in OAT (methadone and buprenorphine/naloxone) with substantial reductions in overdose and all-cause mortality among people dependent on opioids.[6] Given the importance of harm reduction in reducing morbidity and mortality, the World Health Organization (WHO) recommends countries distribute at least 200 needles and syringes per year to PWID and provide OAT to at least 40 individuals per 100 PWID.[7] In the face of the opioid overdose crisis in North America, robust estimates of the prevalence and population size of PWID and the delivery of harm-reduction interventions are imperative.

Estimating the prevalence of injecting drug use and population size of PWID is important for public health surveillance, service planning, and resource allocation, and for monitoring treatment and harm-reduction coverage.[8] However, population surveys that directly measure prevalence are often ineffective at capturing less common forms of drug use (including injecting drug use) for varied reasons. These studies may be limited by their inability to capture certain populations in which injecting drug use is likely to be more common (e.g., people with unstable housing and people in prisons), a lower likelihood of reporting injecting drug use among participants (because of stigma and reticence to report behaviors seen as "illicit"), and low statistical power. As an alternative,

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indirect methods seek to estimate the size of "hidden" populations based on observable information indirectly related to the parameter of interest.

Though any single estimation method is unlikely to produce a true population size, multiplier methods are commonly used and favored for their ease of application in varied settings and at different scales.[9] Population size can be estimated by using data as simple as the count of clients from a service provider (e.g., number of OAT recipients) together with a single question in a population-based survey about visiting that service provider (e.g., proportion of PWID receiving OAT), providing a basis for informing and adapting harm-reduction targets.

Current estimates suggest that 15.6 million (95% uncertainty interval [UI] = 10.2, 23.7 million) people aged 15 to 64 years injected drugs worldwide in 2015, with prevalence of injecting drug use in North America (1.06%; 95% UI = 0.62%, 1.83%) exceeding the global average (0.33%; 95% UI = 0.21%, 0.49%).[10] Recent national PWID population size estimates in Canada are relatively scarce, with most estimates restricted to Montreal, Quebec; Toronto, Ontario; or Vancouver, British Columbia (Table A, available as a supplement to the online version of this article at http://www.ajph.org).[11] An estimated 112 900 (0.48%) people injected drugs in Canada in 2011,[12] while provincial-level PWID prevalence estimates range from 0.28% in Quebec in 2010[13] to 1.30% in British Columbia in 2013 to 2015.[14] Delivery of harm-reduction interventions (e.g., OAT and needle-and-syringe services) is below WHO guidelines for high coverage, with 45 million needles and syringes distributed (148 needles and syringes per PWID) and 75 000 OAT recipients (24 recipients per 100 PWID) in 2015.[15] Geographic variation is likely to occur within Canada; however, subnational estimates of coverage have not previously been made. More granular information is needed to better understand the burden of injecting drug use in Canada to assess the extent to which provinces are meeting WHO targets for implementing harm-reduction interventions (≥ 200 needles and syringes per year per PWID and ≥ 40 OAT recipients per 100 PWID).

The aim of this study was 2-fold: (1) to estimate the number of PWID and population prevalence of injecting drug use in Canada, nationally and provincially, between 2011 and 2016 by using an indirect multiplier methodology and (2) to measure the provision of harm-reduction interventions according to the WHO targets.

METHODS

We employed an indirect multiplier method to estimate the number of PWID at the provincial level and summed these figures to produce a national estimate.

Data Sources

This simple method relies on 2 key data sources to estimate population size: benchmark data provide a count of the hidden population meeting a specified criterion, while multiplier data provide a proportion of the hidden population from a second representative sample that meet the same criterion.[9] Similar to the approach taken in Australia,[16] methadone treatment statistics formed the basis of both data sources in the present study. Benchmark data count the number of PWID receiving methadone within a given calendar year, providing a known quantity for this segment of the PWID population. Multiplier data then indicate the proportion of all PWID captured within the benchmark data. The reciprocal of this proportion is termed the multiplier and is used to adjust the benchmark estimate to take into account other "hidden" segments of the population.[8]

Figure A (available as a supplement to the online version of this article at http://www.ajph.org) presents an illustrative example of this method. Here, 1350 individuals receive OAT, of whom 74% (1000 individuals) recently injected drugs. If 20% of surveyed PWID reported receiving OAT, the 1000 individuals are multiplied by 5 to obtain 5000 PWID in that population. The indirect multiplier method could be applied by using any available benchmark and multiplier indicators relevant to the population of interest, provided that (1) the population size remains the same during data collection for both components, (2) the multiplier estimate is representative of the overall population, and (3) the definitions for both components are precise and exactly matched.[8]

Benchmark data. We obtained benchmark data (numbers of unique methadone recipients) from data custodians within each province and territory (sources detailed in Table B, available as a supplement to the online version of this article at http://www.ajph.org). Methadone information was not available for Nunavut and Northwest Territories. We obtained semiannual reporting of total unique methadone recipients for 2010 to 2012 to match multiplier data collection period, where possible (see Table B for missing data).

As previously described by Larney et al.,[16] it is likely that not all methadone recipients have injected drugs in the past 12 months; therefore, we adjusted benchmark data to account for this. No data were available that systematically capture a snapshot of injecting drug use among methadone recipients in Canada. Therefore, we derived the range for this indicator from 2 low-threshold methadone clinics in Ontario: 82.5% of recipients reported injecting drug use at enrollment, decreasing to 65.6% at 6 months.[17] For this study, we applied a point estimate of 74.1% (range = 65.6%–82.5%) for this indicator. We did not include buprenorphine/naloxone in the benchmark because approval from Health Canada was only obtained in 2007, and access in 2010 to 2012 was hampered by administrative regulations, restricted provincial drug plan coverage, and a limited number of trained providers.[18]

Multiplier data. For the multiplier, we obtained the estimate of the proportion of PWID receiving methadone in the past 6 months from the I-Track enhanced surveillance of PWID report.[19] I-Track is a periodic cross-sectional enhanced surveillance system that monitors HIV and HCV prevalence and risk behaviors among PWID in sentinel sites across Canada. The most recent implementation of the I-Track survey was 2010 to 2012, with single sites in Alberta, British Columbia, Nova Scotia, Saskatchewan, and Yukon; 6 sites in Ontario; and 8 sites in Quebec through the SurvUDI network. In Quebec, the SurvUDI enhanced surveillance survey has been performed annually since 1995, and provided data for 2010 to 2016.[20] For provinces where the I-Track survey was not undertaken (Manitoba, Newfoundland and Labrador, New Brunswick, and Prince Edward Island), we applied a population-weighted average estimate of the proportion of PWID receiving

methadone (32.5%). Because multiplier data obtained through I-Track were last available for 2010 to 2012 (except Quebec), we calculated provincial PWID population sizes for 2011 and extrapolated them for the period 2012 to 2016 based on additional data available in Quebec and British Columbia.

Temporal Trends in Population Size and Prevalence Estimates

Quebec PWID estimates for 2012 to 2016 utilized the multiplier method mentioned previously (methadone recipient numbers and SurvUDI proportion of PWID receiving methadone data), and British Columbia estimates were from external administrative data linkage analysis.[14] We calculated annual fluctuations in PWID population estimates separately for the 2 provinces, and the midpoint of the fluctuations applied to all provinces to estimate provincial and territorial and national PWID population estimates for 2011 to 2016. We obtained denominators for prevalence estimates from Statistics Canada data tables for each province and territory in the years 2011 to 2016.[21] We calculated prevalence per 100 persons aged 15 to 64 years in accordance with the United Nations Office of Drugs and Crime World Drug Report 2018.[22]

Harm-Reduction Coverage

Harm reduction interventions of interest were OAT (i.e., methadone and buprenorphine/naloxone) and needle-and-syringe services. We obtained data on the number of OAT recipients and the number of needles and syringes provided from province and territory service providers or government agencies for 2011 to 2016 (Tables C, D, and E, available as supplements to the online version of this article at http://www.ajph.org). The sources of data for each province and territory are detailed in Table B. We used the PWID estimate from the multiplier method described previously as the denominator for calculating coverage of OAT (number of OAT recipients per 100 PWID) and needles and syringes (number of needles and syringes distributed per PWID) per province and territory and nationally.

Addressing Missing Data

Differing data reporting systems among provincial and territorial jurisdictions resulted in some data being unavailable for certain years. For example, the numbers of OAT recipients were either unavailable for earlier years or restricted to government beneficiaries for Quebec, Newfoundland and Labrador, and Ontario. In addition, the number of needles and syringes distributed was unavailable for 1 year in Quebec. We extrapolated missing indicator data by using existing data. All data sources and data modifications are reported in Table B.

RESULTS

With use of the multiplier method, an estimated 130 000 people aged 15 to 64 years injected drugs in Canada in 2011, giving a population prevalence of 0.55 per 100 persons (Table 1). Modeling of fluctuations in the number of PWID in Quebec and British Columbia for the years 2011 to 2016 suggested an average 5.96% annual increase (range = –0.80% to 12.9%; Table F, available as a supplement to the online version of this article at http://www.ajph.org). By 2016, the estimated number of PWID in Canada had increased to 171 900, with a population prevalence of 0.70 per 100 persons aged 15 to 64 years (Table 1). The prevalence of injecting drug use varied greatly across provinces, with the highest prevalence seen in British Columbia (1.15 in 2011 and 1.48 in 2016) and the lowest in neighboring Alberta (0.13 in 2011 and 0.16 in 2016; Table G).

TABLE 1—Population Size Estimate of People Who Inject Drugs: Canadian Provinces and Territories, 2011 and 2016

	Multiplier[a]	Benchmark Data[b] (Range)	2011 Estimated No. of PWID (Range)	2011 Population Prevalence, % (Range)	2016 Estimated No. of PWID (Range)	2016 Population Prevalence, % (Range)
Canada			130 000 (115 100–144 700)	0.55 (0.49–0.61)	17 100 (152 200–191 400)	0.70 (0.62–0.78)
Alberta	3.58	986 (872–1 097)	3 500 (3 100–3 900)	0.13 (0.12–0.15)	4 700 (4 100–5 200)	0.16 (0.14–0.18)
British Columbia	3.85	9 358 (8 284–10 419)	36 000 (31 900–40 100)	1.15 (1.02–1.28)	47 600 (42 100–53 000)	1.48 (1.31–1.65)
Manitoba	3.08[c]	2 084 (1 845–2 320)	6 400 (5 700–7 100)	0.77 (0.68–0.86)	8 500 (7 500–9 400)	0.97 (0.86–1.08)
New Brunswick	3.08[c]	1 219 (1 079–1 357)	3 800 (3 300–4 200)	0.72 (0.64–0.80)	5 000 (4 400–5 500)	0.99 (0.88–1.11)
Newfoundland and Labrador	3.08[c]	717 (634–798)	2 200 (2 000–2 500)	0.60 (0.53–0.67)	2 900 (2 600–3 200)	0.82 (0.73–0.92)
Nova Scotia	2.12	1 301 (1 152–1 448)	2 800 (2 400–3 100)	0.42 (0.37–0.47)	3 600 (3 200–4 100)	0.58 (0.51–0.64)
Ontario	2.55	22 736 (20 128–25 313)	58 000 (51 300–64 600)	0.63 (0.56–0.70)	76 700 (67 900–85 400)	0.81 (0.72–0.90)
Prince Edward Island	3.08[c]	127 (113–141)	400 (350–450)	0.40 (0.35–0.44)	500 (460–570)	0.53 (0.47–0.59)
Quebec	4.00	2 818 (2 495–3 138)	11 300 (10 000–12 500)	0.20 (0.18–0.23)	14 900 (13 200–16 600)	0.27 (0.24–0.30)
Saskatchewan	2.65	2 097 (1 857–2 335)	5 500 (4 900–6 200)	0.78 (0.69–0.87)	7 300 (6 500–8 200)	0.97 (0.86–1.08)
Yukon	4.59	29 (25–32)	100 (100–100)	0.50 (0.44–0.55)	170 (150–190)	0.63 (0.56–0.71)

Note. PWID = people who inject drugs.

[a]Multiplier: inverse of prevalence surveyed PWID receiving methadone in past 6 months.

[b]Estimated number of methadone recipients recently injected, derived from provincial treatment number.

[c]Population weighted national mean. Estimated number of PWID may not sum because of rounding.

Coverage of Opioid Agonist Treatment

On average, provision of OAT nationally exceeded WHO guidelines for high coverage (≥ 40 OAT recipients per 100 PWID) for the entire study period, increasing from 55 per 100 PWID in 2011 to 66 per 100 PWID in 2016 (Figure A and Table H, available as supplements to the online version of this article at http://www.ajph.org). Throughout the study period, Manitoba was consistently below the threshold for high OAT coverage, showing a decrease from 37 per 100 PWID in 2011 to 29 per 100 PWID in 2017. By contrast, there was a substantial increase in OAT coverage in Alberta, nearly tripling from 59 per 100 PWID in 2011 to 163 per 100 PWID in 2016. Over the period, we observed a 3.6-fold increase in the number of OAT recipients in Alberta: 2094 in 2011 and 7636 in 2016; Table I, available as a supplement to the online version of this article at http://www.ajph.org). Similarly, OAT coverage nearly tripled in Prince Edward Island over the study period, from 52 to 152 OAT recipients per 100 PWID.

Coverage of Needles and Syringes

Coverage of needles and syringes was less successful, with the country as a whole and 7 of 11 provinces and territories failing to meet WHO high-coverage guidelines (≥ 200 needles and syringes per PWID) in 2011 (Figure B and Table H, available as supplements to the online version of this article at http://www.ajph.org). Between 2011 and 2016, needle-and-syringe coverage in Canada increased from 193 to 291 per PWID per year. Of the 7 provinces below high-coverage threshold in 2011, New Brunswick, Quebec, and Yukon remained below the threshold in 2016 (Table 2 and Table H). Throughout the study period, the greatest increase was observed in Manitoba, with an increase from 78 needles and syringes per PWID in 2011 to 207 needles and syringes per PWID in 2016, a greater than 2.5 times increase. It was estimated that both Alberta and Saskatchewan distributed greater than 700 needles and syringes per PWID per year in 2016 (Table 2 and Figure B). When examined as a general population rate, Saskatchewan distributed greater than 6 needles and syringes per general population annually (7.5 needles and syringes per person in 2011) compared with a median 1 needle and syringe per general population in the remaining provinces with data (Table I).

Alberta was an important outlier, with the lowest prevalence of injecting drug use (0.16% in 2016 compared with 0.71% in all of Canada) and, therefore, greater coverage of services compared with other provinces. In the event that I-Track data overestimated methadone coverage among PWID, the prevalence of injecting drug use in Alberta could be increased nearly 4 times before OAT and needle-and-syringe coverage falls below WHO thresholds in 2017.

DISCUSSION

To our knowledge, this is the first study in Canada to estimate trends in the number of PWID in each province and to assess the coverage of harm-reduction services—specifically, OAT and needle-and-syringe provision. Overall, an estimated 130 000 people injected drugs in 2011 (0.55% prevalence), increasing to 171 900 individuals in 2016 (0.70% prevalence). Coverage of harm-reduction services varied across the country in 2016, with all but 1 province meeting the WHO guidelines for OAT and 6 of 11 provinces meeting WHO guidelines for needle-and-syringe provision. Generally, harm-reduction coverage remained stable or increased over the study period. This study advances public health surveillance, informs service planning and resource allocation, and enhances monitoring of treatment and harm-reduction coverage in the context of a national opioid crisis.

In November 2016, the Joint Statement of Action to Address the Opioid Crisis brought together more than 40 governments,

TABLE 2—Estimated Number of Opioid Agonist Treatment (OAT) Recipients per 100 People Who Inject Drugs (PWID) and Number of Needles and Syringes Distributed per PWID for PWID: Canada, 2016

	Estimated No. of PWID (Range)	No. of OAT Recipients	Estimated No. of OAT Recipients per 100 PWID (Range)	No. of Needles and Syringes Distributed	Estimated No. of Needles and Syringes per PWID (Range)
Canada	171 900 (152 200–191 400)	113 381	66 (59–75)	49 958 381	291 (261–328)
Alberta	4 700 (4 100–5 200)	7 636	163 (147–185)	4 122 866	883 (793–997)
British Columbia	47 600 (42 100–53 000)	23 506	49 (44–56)	14 991 900	315 (283–356)
Manitoba	8 500 (7 500–9 400)	2 490	29 (26–33)	1 754 597	207 (186–234)
New Brunswick	5 000 (4 400–5 500)	2 554	51 (46–58)	664 047	220 (198–249)
Newfoundland and Labrador	2 900 (2 600–3 200)	2 136	73 (66–83)	642 181	134 (120–151)
Nova Scotia	3 600 (3 200–4 100)	3 299	99 (89–112)	1 660 642	456 (409–515)
Ontario	76 700 (67 900–85 400)	58 706	77 (69–86)	18 100 000	236 (212–267)
Prince Edward Island	500 (460–570)	786	152 (136–172)	215 078	416 (373–470)
Quebec	14 900 (13 200–16 600)	6 401	43 (39–49)	2 503 574	168 (151–190)
Saskatchewan	7 300 (6 500–8 200)	5 435	74 (67–84)	5 276 496	719 (646–812)
Yukon	170 (150–190)	105	61 (54–69)	27 000	156 (140–176)

councils, and organizations to improve prevention, treatment, and harm reduction associated with opioid use in Canada.[23] Standardizing data collection through prescription drug monitoring and enhanced surveillance systems and timely reporting of a number of key indicators will be necessary for monitoring both PWID population size and implementation of harm-reduction services across the nation, such as efforts undertaken in Europe, the United Kingdom, and Australia.[24,25] While these changes in data collection and reporting are in the planning stages, there is an urgent need to assess the current situation to improve strategies and monitor changes over time.

The estimated prevalence of injecting drug use in our study exceeds previous national and provincial estimates but is within the range of global estimates. By contrast, indirect methods applied by the Public Health Agency of Canada estimated 112 900 PWID (0.40% of adults aged ≥ 15 years) in 2011.[12] Comparison against additional indirect estimates of PWID in Canada is complicated by contextual changes since time of reporting (before 2010) and geographic restriction to selected major cities (e.g., Vancouver, Montreal, and Toronto). However, the national prevalence estimate in 2016 (0.70%; range = 0.62%–0.78%) resembles that of high-income countries with similar population demographics, such as Australia (0.60%; range = 0.43%–0.76%), England (0.59%; range = 0.55%–0.63%), and the United States (1.04%; range = 0.57%–1.88%).[10]

OAT is associated with decreased injecting drug use and equipment sharing, and reduces the risk of HCV and HIV acquisition.[3,4] The current study found coverage of OAT in Canada to be greater than WHO guidelines (≥ 40 recipients per 100 PWID), meeting or exceeding that of high-income countries with similar population demographics, though it remains to be seen if this level of coverage is sufficient for prevention of HIV and HCV infections.[15] However, the differing policies and procedures in each Canadian province and territory likely contributes to the great variability of coverage seen in the current study (29–163 recipients per 100 PWID in 2016). Furthermore, I-Track illustrates the heterogeneity in drug consumption patterns in Canada, with opioids (compared with stimulants) being the most commonly injected drug in Alberta, Ontario, and Nova Scotia.[19] Low OAT coverage in provinces with higher proportions of stimulant injection is likely an underestimation of the coverage for those people with opioid use disorders who are eligible to receive OAT. While high coverage of OAT in Canada likely contributes to prevention of HIV and HCV transmission among PWID, disparities in coverage among Canadian provinces are concerning.

National needle-and-syringe coverage compared favorably with high-income countries with similar population demographics.[15] The high coverage of needles and syringes in Saskatchewan likely reflects a specific crisis in this province. The rate of new HIV diagnoses in Saskatchewan increased for the 5 years before the introduction of the Saskatchewan HIV Strategy 2010 to 2014, and new HIV infection diagnoses remained twice that of the national average in 2015.[26,27] Meanwhile, the high coverage of needles and syringes in Alberta either accurately reflects the current situation or may be a function of the low estimated prevalence of injecting drug use according to the multiplier methods. By contrast with Saskatchewan, needle-and-syringe coverage per general population in Alberta was low (0.7–1.4) throughout the study period. In a case where PWID population size was underestimated by half in Alberta, needle-and-syringe coverage in the province would still remain double that of the WHO guidelines for high coverage.

Limitations

With regard to study limitations, the multiplier method is highly dependent on the quality of the existing data. Benchmark data should only include the population whose size is being estimated, and the survey data used to generate the multiplier should be representative of the population.[28] Although methadone treatment data were restricted to individuals with opioid use disorder (and excluded methadone prescribed for pain), it was not possible to identify the proportion of recipients with recent injecting drug use in these data. For this reason, we derived the range of the proportion of recent injecting drug use among methadone recipients from the literature.[16,17] In addition, given that data from I-Track used nonrandom, convenience sampling methods, the findings may not be representative of all PWID in Canada. Within I-Track, standardized questionnaires, inclusion criteria, sampling, and recruitment strategies were implemented across the sites; however, no statistical analyses were used to compare sites, and no adjustments were made for variations in sample sizes.[19] We inferred missing needle-and-syringe and OAT indicator data by using linear, exponential, or polynomial functions (as reported in Table B) and these may not reflect actual data.

Conclusions

Albeit imperfect, the appeal of indirect multiplier methods among public health researchers is likely attributable to their ease of use, utilization of commonly available indicators (e.g., number of clients using a service), and potential to be incorporated into studies of hidden populations.[9] Multiplier methods have been applied in varying scales (single neighborhood through to whole countries), contexts (low-, middle-, and high-income settings), and population groups (e.g., PWID, female sex workers, men who have sex with men).[9,29] Population size estimation on a local geographic level is possible where benchmark and multiplier data accurately overlap, and efforts would be well placed in further standardizing local, provincial, and national data collection for ongoing monitoring and evaluation.[30] While national population sizes may be difficult to estimate, coordinated efforts to obtain granular estimates at smaller scales may provide valuable information. For example, as demonstrated in this article, the high-quality data obtained in Quebec's yearly SurvUDI survey would allow annual estimation of the number of PWID, whereas a lack of geographically representative survey data limits such efforts in other provinces.

Providing accurate and timely data on a local level will be informative in the implementation of microelimination strategies, such as in "the Fast Track City initiatives" to eliminate HIV,[31] where treatment and prevention interventions can be delivered more quickly and efficiently than in large national strategic initiatives. As in the current study, application of multiplier methods in other countries and settings would best be performed at the jurisdictional level responsible for health service planning and delivery—in this case, provincially.[32]

In Canada, expanding the scale of I-Track to be more frequent and to include additional sentinel sites in differing communities (e.g., urban, rural, and indigenous communities) in

each province and territory, similar to SurvUDI, would improve representativeness of the data collected and enable local population size estimation and coverage analysis.[20] Furthermore, supplementary surveys with diverse sampling methods should be developed to obtain more representative sampling of OAT use among PWID and injection drug use among people receiving OAT. Methods to capture personal purchases of needles and syringes from pharmacy locations will be necessary to fully capture harm-reduction coverage.

In summary, this study estimates the prevalence of injecting drug use in each Canadian province and the coverage of harm-reduction services provided. While relatively simple, the multiplier methods utilized provide the best estimate available for the number of PWID in Canada. Improved data collection at provincial levels will increase accuracy of estimates, while implementing this modest data collection (health-service indicators and PWID surveys) in international settings would enable harmonization of simple monitoring methods worldwide. Enhanced understanding of injecting drug use and harm-reduction coverage should be used to inform public health surveillance, service planning and resource allocation, and treatment and harm-reduction monitoring. AJPH

CONTRIBUTORS

B. Jacka completed the analysis and led the writing. S. Larney and N. Janjua contributed to study development, analysis, and writing. L. Degenhardt assisted with writing. S. Høj assisted with analyses and writing. M. Krajden contributed to study conceptualization. J. Grebely contributed to study design and writing. J. Bruneau conceptualized and supervised the study.

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HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary for this study because no human participants were involved.

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