

Regional Variation in HIV Prevalence and Risk Behaviours in Ontario Injection Drug Users (IDU)

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ABSTRACT

Objectives: To measure HIV prevalence, risk behaviours, and further service needs in needle exchange programs throughout Ontario, and to conduct regional comparisons.

Methods: Injection drug users (IDU) recruited through the efforts of needle exchange programme (NEP) staff in 9 Ontario cities during 1997-98 completed questionnaires about their drug use and behaviours and provided saliva and/or dried blood samples for anonymous unlinked HIV testing.

Results: Demographic and drug use characteristics of participants showed great regional variation. HIV prevalence by region ranged from 1.4% to 14.7%. In addition to region, HIV positivity was associated with injecting for more than 5 years, use of (powder) cocaine, use of crack, binge injection (10 or more times per day at least once in the previous 6 months), and being a longer-term NEP user. Sharing of injection equipment, and especially of other drug injection materials such as water and cookers, remain important issues, although much of the sharing reported is with only one other person. Unmet demand for methadone treatment was identified despite changes in regulation of methadone provision designed to make it more accessible.

Conclusions: This study suggested significant further HIV prevention needs among IDU throughout Ontario. There is also evidence of potential to provide additional services such as methadone at NEPs if the required resources are invested. NEPs that have succeeded in gaining the trust of high-risk IDU offer a means to provide access to needed services.

La traduction du résumé se trouve à la fin de l'article.

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The first Ontario needle exchange programme (NEP) opened in Toronto in 1989. The Ontario Ministry of Health and Long-Term Care has since funded NEPs in other cities throughout the province. Through these NEPs, IDU have access to such measures as education, condoms, and sterile injection equipment (needles, sterile water, alcohol swabs, cotton), aimed at prevention of bloodborne infections, especially HIV. The primary purpose of the present investigation was to determine baseline information about HIV seroprevalence and risk behaviours among IDU recruited through NEPs in Ontario. By carrying out the study throughout the province and involving a variety of NEPs in a range of settings, it was possible to conduct regional comparisons and examine the role of factors such as predominant drugs in use in different areas.

METHODS

Recruitment and data collection

The survey instrument used for this study was modeled to some extent on the one used in an Australian study of bloodborne viruses in needle exchange attenders,¹ and on input obtained from staff of Ontario needle exchanges. It was pilot tested in Toronto at "The Works" needle exchange programme in January 1997. Ethics approval of the research was obtained from the University of Toronto.

Study recruitment began in February 1997. Nine Ontario needle exchange programmes participated. For reporting, these were grouped into the health planning regions utilized by the Ontario Ministry of Health and Long-Term Care: South West (Windsor and London), Central West (Niagara [St. Catharines] and Hamilton), Central East (Toronto and Oshawa), East (Kingston) and North (Sudbury and Thunder Bay). There are a number of other sites currently operating which were not included here because they were unable to recruit participants, were not yet seeing clients at the time of the study, or in the case of Ottawa, were participating in another study.²

Participant eligibility required injecting an illicit drug within the preceding 2 months. Needle exchange staff were asked to invite all eligible users of their programme to participate. IDU who had

heard of the study would also approach needle exchange staff. All IDU identified as eligible were asked to participate, however information was not obtained about refusals. Recruitments from each site varied based on the population and staff availability. Participants were paid \$10 and the needle exchange programmes received \$25 per survey for their assistance in the study.

The survey was self-completed or completed with the assistance of NEP staff in order to include persons with literacy concerns. Participants were also requested to provide a saliva sample and a fingerprick blood sample to be tested anonymously for HIV. Samples and surveys were labeled with a site-specific unique identifier to link results for analysis purposes. Individual results were not reported to either the participants or the sites; at the time of this survey, these methods were not licensed for diagnostic purposes. Participants wanting to be tested for HIV or hepatitis were referred for this if it was not available at

TABLE I
Participant Characteristics

| Sex Distribution by Region* | | | |
|-----------------------------|-------------|-------------|-------------|
| | Females | Males | Missing |
| South West | 17 (22.7%) | 58 (77.3%) | 0 |
| Central West | 33 (27.7%) | 85 (71.4%) | 1 (0.8) |
| Central East | 24 (12.6%) | 159 (83.7%) | 7 (3.7%) |
| East | 28 (39.4%) | 42 (59.2%) | 1 (1.4%) |
| North | 26 (27.1%) | 70 (72.9%) | 0 |
| Total | 128 (23.2%) | 414 (75.1%) | 9 (1.6%) |
| Age Distribution by Region* | | | |
| | 0-19 | 20-39 | ≥40 |
| South West | 8 (10.7%) | 41 (54.7%) | 24 (32.0%) |
| Central West | 3 (2.5%) | 59 (49.6%) | 40 (33.6%) |
| Central East | 4 (2.1%) | 111 (58.4%) | 57 (30%) |
| East | 22 (31.0%) | 35 (49.3%) | 14 (19.7%) |
| North | 2 (2.1%) | 60 (62.5%) | 31 (32.3%) |
| Total | 39 (7.1%) | 306 (55.5%) | 166 (30.1%) |

* Percentages are calculated within each region.

the NEP. Data management and analysis were centralized at the University of Toronto, with findings for their site provided back to each participating NEP.

All testing was done at the HIV Laboratory, Ontario Ministry of Health and Long-Term Care. Dried blood spots were screened using the Organon Teknika

Vironostika HIV1 EIA kit. All reactive tests were duplicated. Repeatedly reactive specimens were confirmed using an in-house Western Blot procedure that has been modified for dried blood spots.

Saliva specimens were collected using the Omnisal device and extracted using a serum separator. Specimens with less than

TABLE II
Drug Use Behaviours Compared by Region

| Drug Use Behaviour (previous 6 months) | Regions (n, %*) | | | | | P-value | Overall | |
|---|-----------------|--------------|--------------|---------|---------|----------------|----------|---------|
| | SouthWest | Central West | Central East | East | North | | Total | Missing |
| Duration | | | | | | | | |
| ≤ 5 yrs | 20 (27) | 20 (17) | 19 (10) | 34 (48) | 19 (20) | <0.000 | 112 (20) | 50 (9) |
| > 5 yrs | 50 (67) | 82 (69) | 151 (80) | 37 (52) | 69 (72) | | 389 (71) | |
| Freq. injection | | | | | | | | |
| ≥ daily | 43 (58) | 61 (55) | 111 (59) | 49 (70) | 56 (60) | 0.41 | 320 (60) | 17 |
| < daily | 31 (42) | 49 (45) | 76 (41) | 21 (30) | 37 (40) | | 214 (40) | |
| Binge injection† | | | | | | | | |
| Yes | 31 (42) | 37 (33) | 82 (44) | 38 (54) | 58 (60) | 0.001 | 246 | 12 |
| No | 42 (58) | 74 (67) | 106 (56) | 33 (46) | 38 (40) | | 293 | |
| Crack smoking‡ | | | | | | | | |
| Yes | 39 (53) | 75 (66) | 151 (81) | 23 (32) | 49 (53) | <0.000 | 337 | 14 |
| No | 34 (47) | 39 (34) | 35 (19) | 48 (68) | 44 (47) | | 200 | |
| Drugs injected | | | | | | | | |
| Cocaine only | 18 (24) | 36 (30) | 49 (26) | 11 (15) | 42 (44) | (coc vs. not): | 156 | 0 |
| Heroin only | 12 (16) | 14 (12) | 34 (18) | 15 (21) | 3 (3) | | <0.000 | 78 |
| Both heroin & cocaine | 19 (25) | 49 (41) | 85 (45) | 38 (54) | 44 (46) | | 235 | |
| Neither heroin nor cocaine | 26 (35) | 20 (17) | 22 (12) | 7 (10) | 7 (7) | | 82 | |
| Needle/syringe (N/S) sharing | | | | | | | | |
| Yes | 35 (47) | 56 (49) | 68 (37) | 37 (49) | 37 (41) | 0.155 | 227 | 12 |
| No | 39 (53) | 58 (51) | 117 (63) | 38 (51) | 54 (59) | | 306 | |
| Number of people shared with§ | | | | | | | | |
| 1 | 14 (42) | 35 (62) | 35 (56) | 25 (68) | 19 (58) | 0.267 | 128 (58) | 23 |
| >1 | 19 (58) | 21 (38) | 27 (44) | 12 (32) | 14 (42) | | 93 (42) | |
| Sharing paraphernalia (cooker/cotton/water) | 56 (75) | 68 (57) | 105 (55) | 57 (80) | 53 (55) | 0.0002 | 339 (62) | 0 |
| Drug Use Behaviour (Ever) | | | | | | | | |
| Drug overdose | 52 (72) | 72 (65) | 112 (63) | 43 (64) | 50 (54) | 0.181 | 329 (63) | 29 |
| Drug treatment | 46 (62) | 89 (79) | 130 (70) | 52 (73) | 61 (66) | 0.094 | 378 (71) | 15 |
| Methadone treatment | 14 (19) | 33 (30) | 32 (17) | 20 (28) | 8 (9) | 0.001 | 107 (20) | 21 |
| Current Methadone Needs | | | | | | | | |
| Want methadone program¶ | 41 (59) | 37 (46) | 76 (48) | 24 (46) | 45 (58) | 0.237 | 223 (51) | 111 |
| Want methadone to stop illicit drugs | 32 (46) | 22 (27) | 45 (28) | 15 (29) | 33 (42) | 0.873 | 147 (33) | |

* Percentages are calculated based on the relevant denominator of those who answered that question.

† Binge injection was defined as having injected at least 10 times in one day within the preceding 6 months.

‡ Findings for all crack use (including injecting) were similar.

§ The denominator for these numbers is only those who said that they did share needles/syringes in the preceding 6 months.

¶ This question was only asked of persons not currently receiving methadone.

|| This is a subset of all respondents who indicated that they would enter a methadone program tomorrow if they could; this group indicated that they would enter such a program so that they could quit using other drugs; the p-value compares the proportion of persons wanting methadone in order to stop illicit drugs to the overall numbers wanting methadone, by region.

TABLE III
Condom Use in the Preceding Six Months by Gender and by Region

| | Always | < Always | Missing* | P-value |
|---------------------|-----------|-----------|----------|---------|
| Males | 106 (26%) | 244 (59%) | 64 (15%) | 0.89 |
| Females | 31 (24%) | 76 (59%) | 21 (16%) | |
| South West | 9 (12%) | 51 (68%) | 15 (20%) | 0.009 |
| Central West | 28 (23%) | 78 (66%) | 13 (11%) | |
| Central East | 61 (32%) | 94 (49%) | 35 (18%) | |
| East | 18 (25%) | 42 (59%) | 11 (26%) | |
| North | 24 (25%) | 60 (63%) | 12 (12%) | |
| Total (all regions) | 140 (25%) | 325 (59%) | 86 (16%) | |

* Most missing data relate to persons who did not report any sex partners in the previous 6 months.

TABLE IV
HIV and Hepatitis Information by Gender and by Region

| | HIV Lab Result | P-value | HIV+ (self-report) | Hep C+ (self-report) |
|--------------|----------------|---------|--------------------|----------------------|
| Males | 24/403 (6.0%) | 0.227 | 22 (5.3%) | 134 (32.4%) |
| Females | 12/125 (9.6%) | | 10 (7.8%) | 46 (35.9%) |
| South West | 3/72 (4.2%) | 0.002 | 10 (5.6%) | 71 (39.4%) |
| Central West | 3/115 (2.6%) | | 2 (1.7%) | 45 (37.8%) |
| Central East | 15/184 (8.2%) | | 7 (9.7%) | 15 (20.0%) |
| East | 1/71 (1.4%) | | 2 (2.8%) | 21 (29.6%) |
| North | 14/95 (14.7%) | | 10 (10.5%) | 27 (28.1%) |
| Total | 36/537 (6.7%) | | 33 (6.0%) | 182 (33.0%) |
| Missing* | 14 | | 156 | 366 |

* Missing category for laboratory results includes those who did not provide a specimen for testing and those whose specimen was considered inadequate for testing; for self-report, it includes those who had never been tested, those who had been tested but did not know their result, and those who did not answer the question.

1 ml were considered inadequate for testing. HIV antibody screening was done in duplicate using a Biochem Detect HIV kit version 1 modified for use with saliva samples. Reactive specimens were confirmed using an in-house Western Blot procedure which has been optimized for saliva testing.

Analyses were conducted using SPSS. For bivariate analyses, the chi square statistic was used. These analyses examined variables correlated with HIV status, needle sharing, and condom use, for the entire dataset, and for the dataset stratified by gender and stratified by region. Logistic regression analysis was undertaken to examine predictors of HIV status if sample size for the relevant variables was determined to be sufficient.

RESULTS

Description of programs and respondents

Participating programmes varied in staffing levels, programme services and delivery methods (e.g., van, fixed site, street outreach) and numbers and characteristics of clients served (more details available from authors). Table I presents the demographic characteristics of study participants by region, demonstrating wide variability among IDU recruited.

Risk Behaviours & Drug Use

There was striking regional variation in patterns of drug use (Table II). Seventy-eight percent of respondents had injected for more than five years, 60% indicated that they injected at least daily and 46% indicated that they had binge injected in the past six months (defined as injecting more than 10 times in 24 hours). There was significant regional variation in duration of drug use ($p < 0.0001$) and in proportion of the sample reporting binge injection ($p = 0.001$), but not in injection frequency ($p = 0.4$). A high proportion (63%) of injectors reported a history of drug overdose (no significant regional variation). Crack smoking in the previous six months was indicated by 63% of the study population. Here too there was significant regional variation, ranging from 81% smoking crack in Central East region to 32% in East region ($p < 0.001$).

More than half (57%) of respondents indicated that they had not shared needles or syringes in the past six months. However, 61.5% had shared cookers, cotton or water during the same period. Of those 227 who indicated that they had shared needles with anyone in the previous six months, 221 answered an additional question about how many people they had shared with. Fifty-eight percent had only shared with one other person. There were

no significant regional variations in needle sharing. Sharing of paraphernalia other than needles/syringes (e.g., cotton, cookers, or water) ranged by region from 55-80% ($p = 0.0002$).

More than two thirds of the population (69%) had at some time received treatment for drug abuse. This did not differ by region ($p = 0.09$). Fifty-one percent of respondents who answered the question indicated that they would enter methadone treatment if it were immediately available to them, with no statistically significant regional differences; two thirds of those interested in methadone would seek to stop other drugs completely, and the remaining third indicated that they would probably continue to use other drugs to some extent. Nineteen percent of the entire sample had at some time been on methadone. This varied significantly by region ($p = 0.001$), the North having only 9% of their sample ever having been in methadone treatment, while the Central West region, with similar proportions of participants reporting heroin injection in the past six months, had 30% of participants having been in methadone treatment.

Table III provides information about condom use. Of the participants who indicated that they had at least one sexual partner in the preceding six months ($n = 465$), only 30% indicated that they always used condoms. There were no statistically significant differences for males and females in reported condom use, but reporting of always using condoms vs. less than always varied significantly by region, ranging from 31-50% ($p = 0.009$).

HIV Results

Table IV provides results of HIV tests and self-report on HIV and hepatitis C status. For those who provided a sample for testing (97.3% of participants), the HIV prevalence in the population was 6.7% (36/537). The prevalence of HIV among women was 9.6% (12/125) and 6.0% (24/403) for men; this difference was not statistically significant ($p = 0.227$). Nine individuals either did not provide information on gender or identified themselves as transgendered; all of these were HIV negative. The regional prevalence ranged widely, from 1.4-14.7% ($p = 0.002$).

Table V identifies variables correlated with HIV prevalence for the overall sam-

ple. HIV prevalence was higher among NEP users (9.1%) than among persons using NEP for the first time (2.3%) (OR 4.2, $p=0.008$). Binge injection, use of crack, and longer history of injection were all associated with higher HIV prevalence, as were cocaine and combined cocaine/heroin use (OR=4.14, $p=0.021$).

Participants also self-reported their HIV and hepatitis C status (Table IV). Of 417 participants who indicated a previous HIV test, 33 self-reported as positive, with 21 of these confirmed by laboratory testing. HIV positive participants who reported knowing that they were HIV positive were significantly more likely to report always using condoms (10/12) when compared to HIV positives who did not know their true HIV status (1/9). Only 194 participants indicated ever having a blood test for hepatitis C to their knowledge; of these, 182 self-reported having been diagnosed with hepatitis C. The question did not distinguish between chronic carrier status and antibody positivity.

DISCUSSION

This study has identified significant regional variation in demographic characteristics, drug use patterns, and risk behaviours for bloodborne infections among IDU recruited at Ontario NEPs.

The variability in age and gender of NEP attendees across regions suggests differences in the demographics of IDU in these cities and/or that differences in program context including site, approaches to outreach, and types of services offered may result in differences in clients reached. Programmes could try to use each other's experiences to suggest ways to broaden their client base.

HIV prevalence and associated factors

This study provides previously unavailable HIV prevalence data showing the extent of HIV spread among IDU outside major cities. The use of convenience samples in this study makes it difficult to say with any certainty how representative they are of the IDU populations of each city, therefore these data must be interpreted with caution. The HIV prevalence found in this study is relatively low overall when compared to reported prevalence among IDU

TABLE V

Risk and Drug Use Behaviours Associated with HIV Positivity

| Variable | HIV-positive #/total | % | Missing Data for HIV positives* | P-value | OR and Confidence Interval |
|---|----------------------|------|---------------------------------|----------|----------------------------|
| Binge - yes | 25/244 | 10.2 | 1 | 0.004 | 3.094 (1.46-6.58) |
| Binge - no | 10/281 | 3.6 | | | |
| Duration of IDU ≤ 5 yrs | 1/111 | 0.9 | 0 | 0.006 | 11.29 (1.53-83.37) |
| Duration of IDU > 5 yrs | 35/376 | 9.3 | | | |
| Crack use - yes | 29/344 | 8.4 | 0 | 0.077 | 2.27(0.98-5.29) |
| Crack use - no | 7/180 | 3.9 | | | |
| Cocaine alone or combined with heroin - yes | 33/397 | 8.3 | 0 | 0.021 | 4.14 (1.25-13.72) |
| - no | 3/140 | 2.1 | | | |
| Condom use - always | 25/215 | 11.6 | 0 | <0.001 | 3.65 (1.46-6.58) |
| Condom use - $<$ always | 11/316 | 3.5 | | | |
| Use of needle exchange† - yes | 32/353 | 9.1 | 0 | 0.008 | 4.162 (1.45 -11.97) |
| Use of needle exchange - no | 4/171 | 2.3 | | | |

* Missing indicates HIV positives where the relevant risk information was not answered (Table III indicates overall totals missing for data on each risk behaviour).

† The use of needle exchange was categorized as "no" for those who indicated that they did not use the NEP or those who indicated that this visit was their first time at the NEP. All other responses were categorized as "yes".

in Ottawa,² Montreal,² and Vancouver,³ where rates of 21%, 17%, and 23% were reported for 1997 or 1996/97 (Vancouver). The prevalences reported for Ottawa and Montreal were also obtained from IDU attending NEPs studied as part of the Quebec SURVUDI network. The rates in our study were quite similar to reported rates of 9% in Quebec City and 5% in semi-urban areas of Quebec² in the same year. Of particular concern in the present study is the relatively higher prevalence in the Central East (mainly Toronto) and Northern (Sudbury and Thunder Bay) regions. The prevalence in Toronto appears to have gradually risen over the past several years,⁴ although it is still below 10%, which has been suggested to represent a pivotal level at which rates of infection have been observed to exhibit epidemic rises in several places around the world.⁵ Clearly, efforts to provide preventive services must continue in all of the sites studied. There is a particular need to expand resources and consider new and innovative additional strategies in the North and in Toronto; it may also be argued that such efforts could be valuable in areas which currently have relatively lower seroprevalence but where serious levels of risk behaviour remain; all regions reported rates of needle sharing with at least one other person of 37% or more.

This study identified a higher HIV prevalence among longer-term attenders of the NEP, similar to the findings in Vancouver³ and Montreal.⁶ In a cross-sectional study like this one, the time sequence as to when they first tested posi-

tive relative to when they first used NEP is not available. It may well be that this finding demonstrates that the highest-risk persons were more likely to continue to use NEPs (as opposed to entering treatment, stopping injecting, or acquiring needles elsewhere), a pattern that would be similar to that identified in Vancouver;⁷ it may also be that some relatively infrequent injectors were attracted to the NEP for the first time in order to receive the honorarium paid to participants in this study. Longer-term monitoring of trends is needed, together with more detailed questions about when IDU began to use NEPs relative to when they learned of their HIV infection, and their reasons for using NEPs (e.g., HIV positive IDU could be seeking out sterile equipment in order to avoid giving or receiving used equipment). The finding that those who self-reported as HIV positive were more likely to report consistent condom use is encouraging, since it suggests that awareness of HIV status correlated with behaviours intended to prevent further transmission to others.

This study clearly demonstrated a correlation between binge injection (defined as more than 10 injections in 24 hours) typically seen with use of cocaine, and HIV seropositivity. The correlation of HIV risk with cocaine use and binge injection is in keeping with that seen in the Saint Luc cohort in Montreal,⁸ in Vancouver³ and in the USA.^{9,10} In order to ensure that a sterile needle can be used for each injection, flexible exchange policies are essential, including no maximum limits on needles provided and no strict 1:1 exchange

requirements; in fact, the importance of providing enough needles when required should lead policy-makers to consider emphasizing distribution of as many needles/syringes as are needed, and safe disposal, as a reasonable alternative to exchange alone. Another strategy which should be examined is the provision of supervised injecting facilities to provide greater opportunity for education on safety, to be sure that needles are not shared in binging/multiple injection situations, and to ensure that enough sterile equipment is provided. Such sites would also be a reasonable response to the concern raised by the high proportion (63%) of injectors who report a history of drug overdose, since overdose can be more readily treated if it occurs in a supervised setting.

Drug treatment

Despite a change in 1996 from regulation of methadone prescribing by Health Canada to regulation by the College of Physicians and Surgeons of Ontario, it appears that many IDU who might have wished to enter methadone treatment had still not accessed it successfully. In Ontario there continues to be variation in availability of methadone provision and in service policies. NEPs can provide an excellent contact point for IDU to enter drug treatment, especially for more marginalized IDU. NEPs can assist through referral to treatment, or through provision of such services themselves if they can find a physician willing to work with them to provide methadone maintenance. It seems desirable that NEPs which have built trust with hard-to-reach clients have the capacity to provide health care services such as methadone and primary care on site.

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RÉSUMÉ

Objectifs : Mesurer la prévalence du VIH, les comportements à risque et les nouveaux besoins de services à l'intérieur de programmes d'échange de seringues de tout l'Ontario, afin d'établir des comparaisons régionales.

Méthode : Des utilisateurs de drogues injectables (UDI) recrutés grâce aux efforts du personnel des programmes d'échange de seringues (PES) de neuf villes ontariennes en 1997-1998 ont rempli des questionnaires sur leur consommation de drogues et leurs comportements et fourni des échantillons de salive et/ou de sang séché aux fins de tests anonymes et non reliés de sérodiagnostic du VIH.

Résultats : Le profil démographique et les habitudes de consommation de drogues des participants présentaient d'importants écarts régionaux. La prévalence du VIH variait de 1,4 % à 14,7 % selon la région. En plus du facteur régional, la séropositivité pour le VIH était associée à une habitude d'injection de plus de cinq ans, à la consommation de cocaïne (en poudre), à la consommation de crack, à l'injection excessive (au moins un épisode d'injection 10 fois par jour ou plus au cours des six mois précédents) et au fait d'être un utilisateur à long terme du PES. Le partage des accessoires d'injection, et surtout des accessoires autres que les seringues, comme l'eau et les réchauds, est encore un important problème, bien que dans la plupart des cas, l'accessoire en question n'ait été partagé qu'avec une seule personne. Les résultats font état d'un besoin non satisfait de traitement à la méthadone – malgré les changements à la réglementation de l'offre de méthadone qui visaient à la rendre plus accessible.

Conclusions : L'étude met en lumière le grand besoin d'améliorer la prévention du VIH chez les utilisateurs de drogues injectables, partout en Ontario. Elle indique aussi la possibilité de fournir d'autres services, comme le traitement à la méthadone, dans le cadre des PES si l'on y investit les ressources nécessaires. Les PES qui ont réussi à gagner la confiance des UDI très vulnérables pourraient leur donner accès aux services dont ils ont besoin.