



---

## Illicit Opioid Use in Canada: Comparing Social, Health, and Drug Use Characteristics of Untreated Users in Five Cities (OPICAN Study)

Benedikt Fischer, Jürgen Rehm, Suzanne Brissette,  
Serge Brochu, Julie Bruneau, Nady El-Guebaly, Lina Noël,  
Mark Tyndall, Cameron Wild, Phil Mun, and Dolly Baliunas

---

**ABSTRACT** *Most of the estimated 125,000 injection drug users (IDUs) in Canada use illicit opioids and are outside treatment (i.e., methadone maintenance treatment). Empirical data suggest that illicit opioid users outside treatment are characterized by various health and social problem characteristics, including polydrug use, physical and mental morbidity, social marginalization, and crime. Although required for evidence-based programming, systematic information on this specific substance-user population is sparse in Canada to date. This article presents and compares key characteristics of population of illicit opioid users outside treatment in five cities across Canada (OPICAN cohort). Overall, the majority of OPICAN participants regularly used both a variety of illicit opioids and cocaine or crack, reported physical and mental health (e.g., mood disorder) problems, lacked permanent housing, were involved in crime, and had their “ideal” treatment not available to them. However, key local sample differences were shown, including patterns of heroin versus prescription opioid use and levels of additional cocaine versus crack use as well as indicators of social marginalization. Illicit opioid user population across Canada differ on key social, health, and drug use indicators that are crucial for interventions and are often demonstrated between larger and smaller city sites. Differentiated interventions are required.*

**KEYWORDS** *Canada, Comorbidity, Dependence, Health, Heroin use, Illicit opioid use, Infectious disease, Methadone treatment, Polydrug use, Treatment.*

---

### INTRODUCTION

Canada is home to an estimated 80,000–125,000 injection drug users (IDUs), the vast majority of which is estimated to use illicit opioids.<sup>1,2</sup> Empirical information on illicit opioid user populations in the Canadian context is sparse, although it is highly important for policy and program development; available data are typically

---

Drs. Fischer and Rehm are with the University of Toronto and Centre for Addiction and Mental Health, Toronto, Ontario, Canada; Drs. Brissette and Bruneau are with the Centre Hospitalier de l'Université de Montréal, Montréal, Québec, Canada; Dr. Brochu is with the Université de Montréal, Montréal, Québec, Canada; Dr. El-Guebaly is with the Foothills Hospital, Calgary, Alberta, Canada; Ms. Noël is with the Institut Nationale de Santé Publique du Québec, Beauport, Québec, Canada; Dr. Tyndall is with the BC Centre for Excellence in HIV/AIDS, Vancouver, British Columbia, Canada; Dr. Wild is with the University of Alberta, Edmonton, Alberta, Canada; Ms. Baliunas is with the Centre for Addiction and Mental Health, Toronto, Ontario, Canada; and Dr. Mun is with the Responsible Gambling Council, Toronto, Ontario, Canada.

Correspondence: Benedikt Fischer, PhD, CAMH/ARF-2035, 33 Russell Street, Toronto, Ontario, Canada M5S 2S1. (E-mail: benedikt.fischer@utoronto.ca)

limited to data from the large cities and/or limited to treatment populations.<sup>3,6</sup> A review of the available patchwork of recent local illicit drug user populations in Canada suggests that such populations consist predominantly of IDUs, who are characterized by multiple health, drug use, and social problems;<sup>3,7-10</sup> however, such descriptions also suggest major differences between these populations. For example, drug overdose, infectious diseases such as human immunodeficiency syndrome (HIV) and hepatitis C (HCV), and cocaine injection prevalence levels have been reported to be more concentrated in the large urban centres, with Vancouver typically presenting the highest levels.<sup>9-12</sup> Little such indicator data have been available from other—smaller—locations within Canada for systematic comparison and the development of needs-based interventions as increasingly employed in other jurisdictions (e.g., Switzerland, Netherlands, Australia).<sup>13-16</sup>

Worldwide, illicit drug use is a major contributor to the overall burden of disease; it is associated with increased mortality, morbidity, and disability. Morbidity occurs primarily through infections and infectious diseases (i.e., HIV, HCV, HBV);<sup>17</sup> premature mortality is caused by overdose, suicide, HIV/AIDS, and end-stage liver disease. It is estimated that injection drug use (IDU) alone is associated with 0.4% of deaths and 0.8% of disability adjusted life years worldwide.<sup>17,18</sup> In Canada as well as in many other countries, a substantive share of new HIV infections and most of the new HCV infections are associated with IDU.<sup>19</sup> International research evidence suggests a substantive societal, morbidity, and mortality burden associated with illicit opioid use and specifically among those users outside treatment.<sup>20,21</sup> However, this evidence also points to an increasingly diversified and heterogeneous picture of illicit opioid use populations, with implications for both intervention needs and prospects. Specifically, illicit opioid users are at risk for drug overdose death.<sup>22-25</sup> Most illicit opioid users have injection histories, are infected with infectious disease including HCV, or engage in risk behaviours for infectious disease (i.e., HIV).<sup>26,27</sup> Increasingly, noninjection modes of illicit opioid use are being reported in different settings, resulting in lower levels of risk related to injection.<sup>28-30</sup> Besides infectious diseases, illicit opioid user populations typically have high prevalence of psychiatric comorbidity as well as polydrug dependence.<sup>31-34</sup> Many illicit opioid users generate revenue for their considerable drug expenditures through criminal activities and/or social support sources, thus also incurring major societal cost.<sup>35,36</sup> A recent cost-of-illness analysis of a local sample of illicit opioid users in Toronto found a social cost burden of \$45,000 per untreated user/year.<sup>20</sup>

In Canada and globally, methadone maintenance treatment (MMT) is currently the main treatment response for opioid dependence.<sup>21,37</sup> MMT has been shown to improve physical and mental health status, to reduce illicit drug use, infectious disease risks, and crime involvement among those retained in treatment.<sup>37-40</sup> In Canada, the availability of MMT for individuals using heroin as well as other forms of illicit opioids has substantially increased in the three large provinces of British Columbia (BC), Ontario, and Quebec, specifically in their main urban centres, in the past decade.<sup>41,42</sup> Yet, MMT practices vary considerably (e.g., “high threshold” vs. “low threshold” or “maintenance” vs. “abstinence” approaches) between and within these jurisdictions.<sup>43,44</sup> Despite recent increases in availability, the utilization of MMT is low in Canada overall compared with many other Western countries; only about 25 to 30% of the estimated illicit opioid user population are utilising MMT at any given time.<sup>21,45</sup> Alternative opioid maintenance treatments existing elsewhere—such as buprenorphine, or heroin prescription—are not currently available as regular treatment options in Canada.<sup>21,46</sup>

Given the lack of comparable data on illicit opioid user populations in sites across Canada and the essential importance of such information for needs and evidence-based intervention planning, a multisite cohort study of untreated illicit opioid users in the five cities of Vancouver, Edmonton, Toronto, Montreal, and Quebec City (“OPICAN” study) was established. The principal objectives for this study are (1) to assess the key characteristics and behaviours of untreated illicit opioid use in different local settings across Canada and (2) to monitor these indicators over time. The OPICAN study is an ongoing project component of a multiyear “Interdisciplinary Health Research Team” focusing on “Illicit Opiate Addiction Research, Treatment and Policy” (funded by the Canadian Institutes of Health Research) CIHR; other interlinked project components include animal studies, meta-analyses, and clinical feasibility studies, all targeted towards a final synthesis of results with the aim of context-specific prevention and treatment development.<sup>47</sup>

## METHODS

The OPICAN study is being conducted in the five study sites according to a uniform study protocol. To be eligible for study entry, individuals must (1) use illicit opioids on the majority of days per week and have done so for at least 1 year, (2) not have been in a drug treatment program in the previous 6 months, and (3) be at least 18 years old. Study sites used snowball recruitment techniques (by way of flyers, posters, community liaisons, and word-of-mouth); interested potential study participants were screened for eligibility according to a standard screening protocol administered in person or by telephone. Those persons deemed eligible were invited to the local study office, where they provided informed consent for the study as well as contact information for follow-up purposes. The study received ethical review board approval in all participating local institutions; however, no approval was given for the saliva antibody test component in Edmonton.

All participants completed a saliva confirmation drug test for opioid use. We ensured anonymity and confidentiality of the data collected and paid a subject fee of CDNS 20. Each participant was given a unique study code and identifier for follow-up and data processing purposes. For the baseline component, the following subject assessment components were implemented:

- (1) Semistructured, interviewer-administered questionnaire on social, health, drug use, crime, and treatment characteristics (open and closed-ended items).
- (2) Saliva immunoassay screen test for HIV antibodies (Biochem Detect v 1 screen test and Vironostika HIV1 Micro Elisa confirmation test) and HCV antibodies (Ortho Diagnostic HCV 3.0 SAvE Elisa screen test and Bio-Rad Monolisa anti-HCV Plus version2 confirmation test):<sup>48,49</sup> sensitivity and specificity values for tests for both virologic antibody strands are somewhat limited [HIV: depending on the population, collection, and testing method used, sensitivity ranges from 97.2–100%, specificity ranges from 97.7–100%.<sup>50,51</sup> HCV: sensitivity values for method used have been reported at 81% (range: 72–88%), specificity at 98% (range: 89–100%),<sup>48,52</sup> these values were confirmed with a small saliva/blood serum confirmation sample from 20 external subjects] and upward adjustment of cut-off value has likely led to underreporting for HCV; however, the practical feasibility and

acceptance benefits of the salivary testing methods with the specific research population and setting compensated for these limitations.

- (3) Composite International Diagnostic Interview (CIDI)–Short Form (Depression)<sup>53</sup>

Baseline data reported in this article were collected between March and December, 2002. Six hundred seventy-nine participants were enrolled, with enrolment caps for each site [Caps were N=200 for the larger cities (i.e., Montreal, Toronto and Vancouver), and N=100 for the smaller cities (Edmonton and Quebec City)]. Data from component 1 and 3 were locally entered into a standardized data entry shell and then centrally cleaned and analysed; saliva antibody samples for component 2 were analysed at the Public Health Laboratory of the Ontario Ministry of Health and Long-term Care. Results from component 2 were provided by study identification code and entered into the central study database. Statistical analyses were conducted using SPSS,<sup>54</sup> using study site as the major independent variable. In testing for differences between sites, the method used was based on the scaling level of the variable under consideration: analyses of variance (ANOVA) for metric data, Kruskal–Wallis and median tests where the assumptions of ANOVA failed, and table analyses for categorical data. Statistical significance was defined at the 5% level. For cross-tabulations resulting in an overall significant Pearson chi-square, the highlighted differences between cities have a minimum adjusted standardized residual of 2.0.

The OPICAN cohort will be monitored in several follow-up waves, initially until 2005.

## RESULTS

### Social, Economic, and Legal Characteristics

Table 1 summarizes that, on average, cohort participants were in their mid-30s; only the Montreal sample was slightly younger with a mean age of under 30 years. Two thirds of the cohort sample were male. Most of the participants in the cohort were white, although this proportion differed across sites; both Vancouver and Edmonton had a substantial Aboriginal group of almost one third of the overall sample in their respective subcohorts. More than half of the cohort did not have permanent housing, but lived in transitional housing or on the street; greatest differences existed between Quebec City, where three quarters of participants were permanently housed, and Vancouver, where three quarters of participants were not permanently housed.

The largest proportion of participants—about one quarter—with legal income from paid work were found in Montreal and Toronto; Vancouver had the smallest with about 6%. The main sources of income generation (by amounts generated) for the total cohort were semilegal activities (including panhandling, hustling, and sex work), drug dealing, and government support payments (welfare, social assistance, etc.).

About half of the overall cohort on average were arrested in the previous year, with just under 6 in 10 in Vancouver and just over 4 in 10 in Toronto. Most arrests were for property offences, whereas arrests for drug offences played a relatively minor role. A slightly smaller proportion of the overall cohort had been in detention in the previous year, with subcohort extremes of just over half in Vancouver and

TABLE 1. Social, economic, and legal characteristics (by city and total)

Characteristic	Percent (number)						Overall (n = 679)
	Edmonton (n = 93)	Montreal (n = 157)	Quebec City (n = 87)	Toronto (n = 141)	Vancouver (n = 201)		
Mean age, years ( $\pm$ SD) <sup>†</sup>							
Female	39.1 (6.8) 30.1 (28)	29.0 (9.3)* 26.1 (41)*	35.1 (8.9) 31.0 (27)	38.3 (8.7) 30.0 (42)	34.6 (8.9) 43.9 (87)*	34.8 (9.4) 33.3 (22.5)	
Ethnicity							
White	54.8 (51)*	88.5 (139)*	95.4 (83)*	75.9 (107)*	40.7 (81)*	68.1 (461)	
Aboriginals	31.2 (29)*	1.3 (2)*	3.4 (3)*	6.4 (9)*	32.7 (65)*	16.0 (108)	
Other	14.0 (13)	10.2 (16)	1.1 (1)	17.1 (25)	26.6 (53)	16.0 (108)	
Housing							
Permanent	53.8 (50)	52.2 (82)*	74.7 (65)*	41.8 (59)	25.4 (51)*	45.2 (307)	
Nonpermanent	46.2 (43)	47.8 (75)*	25.3 (22)*	58.2 (82)	74.6 (150)*	54.8 (372)	
Received legal paid work income	26.9 (25)	26.3 (41)*	23.0 (20)	27.7 (39)*	6.1 (12)*	20.3 (137)	
Arrested past 12 months	54.8 (51)	47.1 (74)	41.4 (36)	41.8 (59)*	59.2 (119)*	49.9 (339)	
In detention past 12 months	42.5 (37)	35.0 (55)*	32.6 (28)	42.9 (60)	51.0 (102)*	42.1 (282)	
Under judicial restraint <sup>‡</sup>	84.8 (78)*	57.5 (89)*	48.2 (41)*	83.7 (118)*	74.1 (149)	70.4 (475)	

Missing data affect cell counts for some variables.

\*Minimum adjusted standardized residual of 2.0.

<sup>†</sup>Anova was performed, and because of unequal variances, the Kruskal-Wallis (Mean rank = 218.4,  $\chi^2 = 99.44$ ,  $df = 4$ ,  $P < .005$ ) and median test (median = 36,  $\chi^2 = 60.43$ ,  $df = 4$ ,  $P < .005$ ) were also performed.

<sup>‡</sup>Including criminal record, being on probation or under bail, bench warrant or pending charges.

just over one third in Montreal. In all sites except for Quebec City, the vast majority of participants were under some form of criminal justice restraint (probation, criminal record, parole, etc.).

### **Drug Use and Injection Risks**

Table 2 summarizes that drug use patterns were rather diverse across the five local cohort populations. In the previous 30 days, heroin was the most commonly used opioid drug; it was used by a substantive majority in Vancouver and Montreal, by about half of the participants in Toronto, but by only a minority of participants in Edmonton and Quebec City. Of other opioids, hydromorphone use was most common in Quebec City, Edmonton, and Toronto, but only reported by a small minority in Vancouver and Montreal. Codeine substances were used by the majority in Toronto and Edmonton, but least commonly in Vancouver and Montreal. The use of street methadone was reported by almost one third in Toronto; use of “other” prescription opioids (e.g., meperidine, morphine, oxycodone) was reported by vast majorities in Toronto and Edmonton but by only small minorities in the other three sites.

For nonopioid drugs, most of the overall sample reported using cocaine and crack, but the usage differed considerably across sites. Cocaine use was reported by vast majorities of the local samples in Quebec City and Montreal, whereas crack use was reported by majorities in Vancouver, Edmonton, and Toronto. Majorities of participants in all sites reported combined use of opioid and nonopioid drugs (e.g., “speedballs” consisting of heroin and cocaine combinations).

Considerable variation across sites existed with respect to routes of drug administration. The vast majority of cohort participants had a lifetime injection history, yet the current prevalence of injecting drugs (i.e., in the previous 30 days) ranged from less than two thirds of participants in Toronto to more than 9 out of 10 participants in Vancouver.

A minority of subjects—with a range of less than 1 in 10 in Vancouver to more than 2 in 10 in Montreal—reported the sharing of needles in the previous 30 days; injection equipment was shared in the previous 30 days by about one quarter of the overall cohort. Somewhat less than 1 in 5 participants across the cohort reported experiencing a drug-related overdose in the previous 6 months.

### **Health Status**

The best “personal health” status was indicated by the Montreal sample with a “good or better” rating by almost 6 in 10, whereas the Toronto sample reported the worst health status with a “fair or poor” rating also by almost 6 in 10 participants. (Table 3) The most participants in Edmonton and Toronto and the least in Montreal and Quebec City stated that they had a physical health problem. Among those citing health problems, hepatitis and pain were cited overall as the two single most serious physical health problems, reported most frequently in Vancouver (hepatitis) and Quebec City (pain). On the basis of the results of salivary testing, HIV antibody positivity was greatest in Vancouver with over 1 in 5 participants; Vancouver (2 in 3 participants) and Quebec City (3 in 5) were the two sites indicating the majority of cohort participants to be HCV antibody positive (Edmonton excluded from this component of analysis).

Mental health problems, in the form of mood disorders, were self-reported by about two thirds of the cohort; anxiety disorders were self-reported by about 1 in 10 participants in the overall cohort. Standardized assessment for depression using

TABLE 2. Drug use and injection risks in past 30 days (exceptions noted)

Drug use and injection variables	Percent (number)						Overall (N = 679)
	Edmonton (n = 93)	Montreal (n = 157)	Quebec City (n = 87)	Toronto (n = 141)	Vancouver (n = 201)		
<b>Opioids</b>							
Heroin	28.0(26)*	89.8(141)*	36.8(32)*	52.5(74)*	91.0(183)*	67.2(456)	
Hydromorphone	49.5(46)*	23.6(37)*	86.2(75)*	41.8(59)*	3.5(7)*	33.0(224)	
Codeine	50.5(47)*	12.1(19)*	24.1(21)	68.8(97)*	18.4(37)*	32.5(221)	
Street methadone	28.0(26)	17.2(27)	11.5(10)	31.2(44)*	18.4(37)	21.2(144)	
Other opioids†	83.9(78)*	21.0(33)*	37.9(33)*	84.4(119)*	10.9(122)*	42.0(285)	
<b>Nonopioids</b>							
Cocaine	35.5(33)*	68.8(108)*	79.3(69)*	46.1(65)*	47.8(96)*	54.6(371)	
Crack	66.7(62)*	28.0(44)*	3.4(3)*	62.4(88)*	86.6(174)*	54.6(371)	
Combined opioids with nonopioid drugs	69.9(65)	64.1(100)*	60.5(52)*	71.6(101)	79.1(159)*	70.5(477)	
<b>Injected drugs</b>							
Lifetime	100.0(93)*	91.1(143)	96.6(84)	86.5(122)*	96.5(194)*	93.7(636)	
Past 30 days	89.2(83)	89.5(128)	91.7(77)	64.8(79)*	92.8(180)*	86.0(547)	
Shared a needle	15.7(13)	22.0(28)*	15.6(12)	6.3(5)	7.8(14)*	13.2(72)	
Shared injection equipment	30.1(25)	31.3(40)	24.7(19)	27.8(22)	21.3(38)	26.4(144)	
Overdose past 6 months	19.4(18)	17.8(28)	18.6(28)	19.9(28)	14.9(30)	17.7(120)	

Missing data affect cell counts for some variables.

\*Minimum adjusted standardized residual of 2.0

†Meperidine, treatment methadone, other opioids.

**TABLE 3. Health (by city and total)**

Health Characteristics	Percent (number)						Overall (N = 679)
	Edmonton (n = 93)	Montreal (n = 157)	Quebec City (n = 87)	Toronto (n = 141)	Vancouver (n = 201)		
Personal health assessment							
Good or better	48.4 (45)	59.6 (93)*	51.2 (44)	42.6 (60)	46.7 (91)	49.6 (333)	
Fair or poor	51.6 (48)	40.4 (63)*	48.8 (42)	57.4 (81)	53.3 (104)	50.4 (338)	
Reported a physical health problem	91.4 (85)*	54.1 (85)*	58.6 (51)*	85.1 (120)*	66.7 (134)	70.0 (475)	
Most serious problems							
Hepatitis	42.4 (36)	16.5 (14)*	17.6 (9)*	30.0 (36)	47.8 (64)*	33.5 (159)	
Pain	10.6 (9)	20.0 (17)	29.4 (15)*	15.8 (19)	9.0 (12)*	15.2 (72)	
Infectious disease tests (saliva)							
HIV antibody positive†	not requested	12.9 (20)	11.8 (10)	14.8 (19)	20.3 (39)*	15.7 (88)	
HCV antibody positive‡	not requested	35.3 (49)*	59.5 (47)	48.8 (61)*	66.3 (114)*	52.6 (271)	
Reported a mental health problem	58.1 (54)*	24.8 (39)*	26.4 (23)	45.4 (64)*	19.0 (38)*	32.2 (218)	
Most serious problems							
Mood disorder	62.3 (33)	71.8 (28)	56.5 (13)	62.5 (40)	68.4 (26)	64.5 (140)	
Anxiety disorder	13.2 (7)	10.3 (4)	0.0 (0)	18.8 (12)	10.5 (4)	12.4 (27)	
CIDI-SF Depression Survey							
Depressed	50.6 (45)	58.6 (92)*	58.6 (51)	53.9 (76)	33.7 (67)*	49.2 (331)	

Missing data affect cell counts for some variables. CIDI-SF, Composite International Diagnostic Interview-Short Form.

\*Minimum adjusted standardized residual of 2.0.

†n = 560 excludes indeterminate results.

‡n = 515 excludes indeterminate results.



the CIDI-SF instrument resulted in a positive screening result for most of the participants in all sites except for Vancouver, where this was the case for only one third of participants.

### **Health and Social Service Utilization**

Health care services were being received by substantial majorities of participants in Edmonton and Toronto, yet only by a minority in Montreal; the health care received was rated “good or better” by two thirds or more in local samples. (Table 4) In the previous 6 months, walk-in clinics were used most in Edmonton and Vancouver and least in Quebec City and Toronto; emergency rooms were used by about half the overall cohort; private physicians were used most in Toronto and Quebec City and least in Montreal and Vancouver. Needle exchange services (fixed) were accessed by clear majorities of participants in all sites except for Toronto. For other social services, welfare offices were used most often in Vancouver and least in Montreal and Quebec City; drop-in shelters were used by vast majorities of participants except for the Montreal and Quebec City sites, where only a minority proportion utilized such facilities.

### **Drug Treatment**

The greatest proportions of participants in Edmonton and Montreal, and the smallest proportions of participants in Vancouver, Quebec City, and Toronto, had involvement in any drug treatment program in the year prior to study entry. (Table 5) Somewhat less than half of all participants with such a treatment history in the overall cohort had been involved in MMT. Less than one third of the overall cohort stated that they wanted to be in an MMT program. A minority of cohort participants had tried or wanted to enter some form of drug treatment in the previous year but had been unable to access treatment. Clear sample majorities in Toronto and Edmonton, yet only minorities in the other three sites, indicated that there was an “ideal” form of treatment (meeting their self-perceived distinct treatment needs or preferences) that they would be willing to enter and utilize if it were available.

## **DISCUSSION**

Our OPICAN study findings present a unique systematic comparison of key characteristics and behaviours of illicit opioid users outside treatment in five urban study locations across Canada. The most important finding, overall, is that the five local opioid user samples assessed differ considerably on most key indicators evaluated in this study; this underlines the great need for locally accentuated and needs-based interventions.

Concretely, our study presents a couple of important findings about differential drug use patterns: First, the use of illicit opioids in the OPICAN cohort is by far not limited to heroin but includes a wide variety of prescription opioids (including diverted methadone). In Edmonton and Quebec City, for example, the primary opioid drugs used were, in fact, prescription opioids. This may be related to the dynamics of local drug cultures, or illicit drug markets in smaller locales, in which prescription opioids substitute for limited heroin supply. This observation coincides with reports of extended diverted prescription opioid use in urban centres across North America and elsewhere,<sup>55-57</sup> emphasising the need for further investigation.

**TABLE 4. Health and social service utilization (by city and total)**

Health care	Percent (number)						Overall (N = 679)
	Edmonton (n = 93)	Montreal (n = 157)	Quebec City (n = 87)	Toronto (n = 141)	Vancouver (n = 201)		
Currently receiving health care	78.5 (73)*	35.7 (56)*	50.6 (44)	63.1 (89)*	53.2 (107)	54.3 (369)	
Assessment of health care quality†							
Good or better	77.5 (55)	75.0 (42)	65.1 (28)	74.2 (66)	69.5 (73)	72.5 (264)	
Fair or poor	22.5 (16)	25.0 (14)	34.9 (15)	25.8 (23)	30.5 (32)	27.5 (100)	
Most common medical services used							
past 6 months							
Walk-in clinic	67.7 (63)*	41.7 (65)	34.5 (30)*	39.0 (55)*	55.7 (112)*	47.9 (325)	
Emergency room	51.6 (48)	46.8 (73)	59.8 (52)	44.7 (63)	42.3 (85)	47.3 (321)	
Private physician	47.3 (43)	28.2 (44)*	59.8 (52)*	66.7 (94)*	20.4 (41)*	40.5 (274)	
Most common social services used							
past 6 months							
Needle exchange (fixed)	81.7 (76)*	69.9 (109)	70.1 (61)	46.8 (66)	87.1 (175)	71.8 (487)	
Welfare office	54.8 (51)	48.7 (76)*	31.0 (74)*	52.5 (74)	74.1 (149)*	55.6 (377)	
Drop-in shelter	67.7 (63)*	27.6 (43)*	8.0 (7)*	78.0 (110)*	58.7 (118)*	50.3 (341)	

Missing data affect cell counts for some variables.

\*Minimum adjusted standardized residual of 2.0.

†Of those currently receiving healthcare.

TABLE 5. Drug treatment (by city and total)

Drug treatment	Percent (number)					
	Edmonton (n = 93)	Montreal (n = 157)	Quebec City (n = 87)	Toronto (n = 141)	Vancouver (n = 201)	Overall (N = 679)
In drug treatment past 12 months	46.2 (45)*	38.9 (61)*	18.4 (16)*	19.1 (27)*	18.5 (37)*	27.1 (184)
In methadone maintenance treatment program†	46.5 (20)	57.4 (35)	37.5 (6)	18.5 (5)*	45.9 (17)	45.1 (83)
Tried or wanted to be in drug treatment but could not in past 12 months	28.6 (26)	25.8 (40)	33.3 (29)	31.2 (44)	28.3 (56)	29.0 (195)
Want to be in a methadone or buprenorphine maintenance treatment program	32.2 (29)	32.9 (49)	34.9 (29)	22.0 (31)	36.2 (72)	31.7 (210)
Have an ideal treatment preference that respondent wishes was available	68.8 (64)*	43.6 (68)*	42.5 (37)*	73.8 (104)*	47.4 (93)*	54.4 (366)

Missing data affect cell counts for some variables.

\*Minimum adjusted standardized residual of 2.0.

†Of those in drug treatment in past 12 months.

Secondly, illicit opioid use in our study cohort is intricately linked to regular cocaine or crack use, or the use of opioid/cocaine combinations, although fundamental local differences again exist with regards to specific drug use profiles.<sup>31,58,59</sup> In this context, again, a key question is whether these pattern differences are driven by local market, drug culture, or individual preference dynamics, as they also entail considerable differences for ensuing health (i.e., injections) risks and harms. The documented varying polydrug use profiles also have major implications for the nature of opioid treatment programs as currently offered (i.e., MMT), many of which still exclude or penalize regular cocaine/crack users.

It should be further highlighted that in specific sites (e.g., Toronto), a substantial number of participants primarily use their opioid drugs by noninjection routes of administration (i.e., oral and smoking). This mirrors recent observations in some other jurisdictions<sup>60,61</sup> and has major implications for prevention and treatment. Further analyses will have to focus on the determinants and consequences (e.g., infectious disease status) of these behaviour patterns, and how these can be utilized in intervention efforts.<sup>29,30,62</sup> The OPICAN cohort, overall, presented high HCV and HIV prevalence levels. In conjunction with these infectious disease indicators, it should be of concern that many study participants still reported the sharing of needles and, even more so, injection equipment.<sup>63</sup> In times where needle exchange services are broadly available in the study sites, the remaining barriers for such risk reduction measures in the study population must be investigated and addressed.<sup>61,62</sup>

Considering wider social determinants of drug use and health, our study documents that a majority of the OPICAN participants were not permanently housed, drew substantively from semilegal or illegal income sources, and had criminal justice system (including detention) exposure. Thus, they are characterized by conditions of social marginalization as well as exposure to risk environments which have been demonstrated widely to be associated with inferior health status or outcomes.<sup>66-69</sup> It is notable, however, that on a number of health status characteristics assessed in our study, participants in the (province of) Quebec sites fared somewhat better compared to the other sites. Further investigations will have to explain the determinants and consequences of this difference on key risk and health outcomes, especially in light of the fact that participants from the two Quebec sites also reported overall levels of health and social care utilization, overall, compared to other sites.

Participants reported an overall high level of burden of both physical health (infectious disease, pain, other) and mental health (depression) problems, confirming that “opioid dependence” predominantly occurs in connection with a multitude of comorbidities and needs to be addressed as such.<sup>32,70-72</sup> This situation is emphasized by the result that half of the cohort rated their health status to be “fair” or “poor”, gauging their health status far below the Canadian general population, among whom only 12% report such status.<sup>73</sup> Importantly, a number of the comorbidities (e.g., depression) reported in the OPICAN sample have been shown to negatively influence addiction treatment prospects or outcomes.<sup>74,75</sup> At the same time, drug dependency hinders many individuals from access to general health care or receiving specialized care (e.g., HCV treatment).<sup>76,77</sup> Further analysis also needs to explore specifically to which extent the cooccurrence of opioid and cocaine/crack use is associated with psychiatric comorbidity status (and thus may be driven by potential dynamics of “self-medication”) among cohort participants,<sup>78</sup> and to what extent these specific polydrug use patterns and resulting intervention needs are not met by existing treatment services.

Given the picture of OPICAN participants' drug treatment histories as well as the limited interest in existing treatment options, our study seems to confirm that the currently existing opioid treatment landscape in Canada—consisting predominantly of MMT—is vastly insufficient.<sup>21,45</sup> Reasons for the very limited utilization of existing treatment options may lie in the distinct needs of users as well as in the current structures or practices of treatment programs.<sup>79</sup> However, given the substantial social and health burden from illicit opioid use not effectively reached by treatment as well as the desire expressed for more suitable (“ideal”) treatment by many participants, a determined needs-based expansion of treatment options must urgently occur.

As one key limitation of the OPICAN study, it needs to be pointed out that illicit opioid use is a typically hidden activity and occurs in locally and behaviourally dispersed subpopulations; the representativeness and generalisability of our study results for the phenomenon of illicit opioid use in its entirety in the sites examined, or for Canada as a whole, are thus limited. However, studies of untreated drug user populations are important for complementing information derived from treatment-population samples, which are often primarily relied on for intervention planning.

Overall, findings from the OPICAN study aim to facilitate the development of locally specific and needs-based prevention and treatment interventions for illicit opioid users; this is also the primary purpose of the Interdisciplinary Health Research Team project's (already initiated) knowledge synthesis component. An improved prevention—including context and local population specific “harm reduction” measures—and treatment landscape for illicit opiate users in Canada is urgently required.

## ACKNOWLEDGEMENT

The authors acknowledge funding support by the Canadian Institutes of Health Research and thank the OPICAN study participants and staff who made this study possible.

## REFERENCES

1. Remis R, Leclerc P, Routledge R, et al. *Consortium to Characterize Injection Drug Users in Canada* (Montreal, Toronto and Vancouver). Final report: Toronto. 1998
2. Fischer B, Rehm J. The case for a heroin substitution treatment trial in Canada. *Can J Public Health*. 1997;88:367–370.
3. Fischer B, Medved W, Gliksman L, Rehm J. Illicit opiates in Toronto: a profile of current users. *Addict Res*. 1999;7:377–415.
4. Brands B, Blake J, Marsh D. Changing patient characteristics with increased methadone maintenance availability. *Drug Alcohol Depend*. 2002;66:11–20.
5. Perreault M, Rousseau M, Mercier C, Lauzon P, Gagnon C, Cote P. Accessibility to methadone substitution treatment and reduction of damaging effects. The role of the Montreal low-threshold methadone program. *Can J Public Health*. 2003;94:197–200.
6. Lehmann F, Lauzon P, Amsel R. Methadone maintenance: predictors of outcome in a Canadian milieu. *J Subst Abuse Treat*. 1993;10:85–89.
7. Strathdee S, Patrick D, Currie S, et al. Needle exchange is not enough: lessons from the Vancouver injecting drug use study. *AIDS*. 1997;11:F59–F65.
8. Lamothe F, Vincelette J, Bruneau J, et al. Prevalence, seroconversion rates and risk factors for hepatitis B core, hepatitis C and HIV antibodies among intravenous drug users

- (IDU) of the Saint-Luc Cohort. 6th Annual Canadian Conference on HIV/AIDS Research, May 1997. *Can J Infect Dis.* 1997;8: 28A. Abstract 221.
9. Fischer B, Rehm J, Blitz-Miller T. Injection drug use and preventive measures: a comparison of Canadian and Western European jurisdictions over time. *CMAJ.* 2000;162:1709–1713.
  10. Patrick D, Tyndall M, Cornelisse P, et al. Incidence of hepatitis C virus infection among injection drug users during an outbreak of HIV infection. *CMAJ.* 2001;165:889–895.
  11. Hankins C, Alary M, Parent R, Blanchette C, Claessens C, the SurvUDI Working Group. Continuing HIV transmission among injection drug users in Eastern central Canada: The SurvUDI Study, 1995–2001. *J Acquir Immune Defic Syndr.* 2002;30:514–521.
  12. Bruneau J, Lamothe F, Franco E, et al. High rates of HIV infection among injection drug users participating in needle exchange programs in Montreal: results of a cohort study. *Am J Epidemiol.* 1997;146:994–1002.
  13. Vader J, Hammig R, Besson J, Eastus C, Eggenberger C, Burnand B. Appropriateness of methadone maintenance treatment for opiate addiction: evaluation by an expert panel. *Soz Präventivmed.* 2003;48:S1–S14.
  14. Rehm J, Gschwend P, Steffen T, Gutzwiller F, Dobler-Mikola A, Uchtenhagen A. Feasibility, safety, and efficacy of injectable heroin prescription for refractory opioid addicts: a follow-up study. *Lancet.* 2001;358:1417–1420.
  15. van den Brink W, Hendriks V, van Ree J. Medical co-prescription of heroin to chronic, treatment-resistant methadone patients in the Netherlands. *J Drug Issues.* 1999;29:587–608.
  16. Digiusto E, Mattick R, Kimber J, et al. National evaluation of pharmacotherapies for opioid dependence – why have we done it? *Drug Alcohol Rev.* 2001;20:139–141.
  17. World Health Organization. *The World Health Report 2002: Reducing risks, Promoting Healthy Life.* 2002, Geneva.
  18. Ezzati M, Lopez A, Rodgers A, Vander Horn S, Murray C, The Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. *Lancet.* 2002;360:1347–1360.
  19. Zou S, Tepper M, Giulivi A. Current status of hepatitis C in Canada. *Can J Public Health.* 2000;91:S10–S21.
  20. Wall R, Rehm J, Fischer B, et al. The social cost of untreated opiate use. *J Urban Health.* 2001;77:688–722.
  21. Fischer B, Rehm J, Kirst M, et al. Heroin-assisted treatment as a response to the public health problem of opiate dependence. *Eur J Public Health.* 2002;12:228–234.
  22. Oppenheimer E, Tobutt C, Taylor C, Andrews T. Death and survival in a cohort of heroin addicts at London clinics: a 22 year follow-up study. *Addiction.* 1994;89:1299–1308.
  23. Seal K, Kral A, Gee L, et al. Predictors and prevention of nonfatal overdose among street-recruited injection heroin users in the San Francisco Bay Area, 1998–99. *Am J Public Health.* 2001;91:1842–1846.
  24. Darke S, Zador D. Fatal heroin ‘overdose’: a review. *Addiction.* 1996;91:1765–1772.
  25. Warner-Smith M, Darke S, Lynskey M, Hall W. Heroin overdose: causes and consequences. *Addiction.* 2001;96:1113–1125.
  26. Coutinho R. HIV and hepatitis C among injection drug users. *BMJ.* 1998;317:424–425.
  27. Steffen T, Blattler R, Gutzwiller F, Zwahlen M. HIV and hepatitis virus infections among injecting drug users in a medically controlled heroin prescription programme. *Eur J Public Health.* 2001;11:425–430.
  28. Griffiths P, Gossop M, Powis B, Strang J. Transitions in patterns of heroin administration: a study of heroin chasers and heroin injectors. *Addiction.* 1994;89:301–309.
  29. van Ameijden E, van den Hoek J, Hartgers C, Coutinho R. Risk factors for the transition from non-injection to injection drug use and accompanying AIDS risk behavior in a cohort of drug users. *Am J Epidemiol.* 1994;139:1153–1163.
  30. Neagus A, Miller M, Friedman S, et al. Potential risk factors for the transition to injection among non-injecting heroin users: a comparison of former injectors and never injectors. *Addiction.* 2001;96:847–860.

31. Beswick R, Best D, Rees S, Coomber R, Gossop M, Strang J. Multiple drug use: patterns and practices of heroin and crack use in a population of opiate addicts in treatment. *Drug Alcohol Rev.* 2001;20:201–204.
32. Strain E. Assessment and treatment of comorbid psychiatric disorders in opioid-dependent patients. *Clin J Pain.* 2002;18:S14–S27.
33. Brooner R, King V, Kidorf M, Schmidt CJ, Bigelow G. Psychiatric and substance use comorbidity among treatment-seeking opioid abusers. *Arch Gen Psychiatry.* 1997;54:71–80.
34. Darke S, Ross J. Polydrug dependence and psychiatric comorbidity among heroin injectors. *Drug Alcohol Depend.* 1997;48:135–141.
35. Hall W, Bell J, Carless J. Crime and drug use among applicants for methadone maintenance. *Drug Alcohol Depend.* 1993;31:123–129.
36. Nurco D. A long-term program of research on drug use and crime. *Subst Use Misuse.* 1998;33:1817–1837.
37. National Institutes of Health. National consensus development panel on effective medical treatment of opiate addiction. *JAMA.* 1998;280:1936–1943.
38. Joseph H, Stancliff S, Langrod J. Methadone maintenance treatment (MMT: a review of historical and clinical issues. *Mt Sinai J Med.* 2000;67:347–364.
39. Ward J, Hall W, Mattick R. Role of methadone maintenance in opioid dependence. *Lancet.* 1999;353:221–226.
40. Bertschy G. Methadone maintenance treatment: an update. *Eur Arch Psychiatry Clin Neurosci.* 1995;245:114–124.
41. Strike C, Urbanoski K, Fischer B, Marsh D, Millson P. Increases in methadone maintenance treatment in Ontario, 1996–2001. *J Subst Abuse Treat.* 2005;24:39–52.
42. Fischer B. Prescriptions, power and politics: the turbulent history of methadone maintenance in Canada. *J Public Health Policy.* 2000;21:187–210.
43. Fischer B, Bisceglia D, Daniel N, Gliksman L. Methadone treatment in Ontario – Results of a physician survey. *Ann Med Interne.* 2002;153:2S11–2S21.
44. Anderson J, Warren L. Client retention in the British Columbia methadone program, 1996–99. *Can J Public Health.* 2004;95:104–109.
45. Kuo I, Fischer B, Vlahov D. Consideration of a North American heroin-assisted trial for the treatment of opiate-dependent individuals. *Int J Drug Policy.* 2000;11:357–370.
46. Bammer G, Dobler-Mikola A, Fleming P, Strang J, Uchtenhagen A. The heroin prescribing debate: integrating science and politics. *Science.* 1999;284:1277–1278.
47. Fischer B, Brissette S, Brochu S, et al. Illicit opiate addiction, treatment and policy in Canada: A *Cross-Disciplinary, Comprehensive and Concerted Research Initiative 2001*. Toronto: Centre for Addiction and Mental Health (CAMH) Submitted to the Canadian Institutes of Health Research (CIHR) for the September 2000 competition.
48. Van Doornum G, Lodder A, Buimer M, van Ameijden E, Bruisten S. Evaluation of Hepatitis C antibody testing in saliva specimens collected by two different systems in comparison with HCV antibody and HCV RNA in serum. *J Med Virol.* 2001;64:13–20.
49. Allwright S, Bradley F, Long J, Barry J, Thornton L, Parry J. Prevalence of antibodies to hepatitis B, hepatitis C, and HIV and risk factors in Irish prisoners: results of a national cross sectional survey. *BMJ.* 2000;321:78–82.
50. Ettiegne-Traore V, Ghys P, Maurice C, et al. Evaluation of an HIV saliva test for the detection of HIV-1 and HIV-2 antibodies in high-risk populations in Abidjan, Cote d'Ivoire. *Int J STD AIDS.* 1998;9:173–174.
51. Emmons W. Accuracy of oral specimen testing for human immunodeficiency virus. *Am J Med.* 1997;102:15–20.
52. Bello P, Pasquier C, Gourney P, Puel J, Izopet J. Assessment of a hepatitis C virus antibody assay in saliva for epidemiological studies. *Eur J Clin Microbiol Infect Dis.* 1998;17:570–572.
53. Patten S. Performance of the Composite International Diagnostic Interview Short Form for major depression in community and clinical samples. *Chronic Dis Can.* 1997;18:109–112.

54. SPSS 2000, 10.1 for Windows. Chicago: SPSS Inc.
55. National Drug Intelligence Center. *Information Bulletin: Oxycontin Diversion and Abuse*; 2001. Available at: [www.usdoj.gov/ndic/pubs/651](http://www.usdoj.gov/ndic/pubs/651). Accessed April 8, 2004.
56. The Fifth Estate. *Hillbilly Heroin*; 2003. Available at: [http://www.cbc.ca/fifth/main\\_hillbillyheroin.html](http://www.cbc.ca/fifth/main_hillbillyheroin.html). Accessed April 8, 2004.
57. Health and Community Services Newfoundland and Labrador. *Oxycontin Task Force: Interim Report, 2004*. Available at: <http://www.gov.nf.ca/health/publications/oxycontin-interim/default.htm>. Accessed April 8, 2004.
58. Fischer B, Kirst M, Rehm J, Marsh D, Bondy S, Tyndall M. The phenomenon of so-called 'other drug use' among opiate addicts in the North American context: evidence, consequences, questions. In: Westermann B, Bellman G, Jellinek C, eds. *Beigebrauch: Offene Grenzen der Substitution*. Weinheim, Germany: BELTZ Deutscher Studien Verlag; 2000:95–118.
59. Kosten T, Rounsaville B, Kleber H. Antecedents and consequences of cocaine abuse among opioid addicts. A 2.5-year follow-up. *J Nerv Ment Dis*. 1988;176:176–181.
60. Smyth B, O'Brien M, Barry J. Trends in treated opiate misuse in Dublin: the emergence of chasing the dragon. *Addiction*. 2000;95:1217–1223.
61. Schottenfeld R, O'Malley S, Abdul-Salaam K, O'Connor P. Decline in intravenous drug use among treatment-seeking opiate users. *J Subst Abuse Treat*. 1993;10:5–10.
62. Strang J, Griffiths P, Powis B, Gossop M. First use of heroin: changes in the route of administration over time. *BMJ*. 1992;304:1222–1223.
63. Gossop M, Griffiths P, Powis B, Williamson S. Continuing drug risk behaviour: shared use of injecting paraphernalia among London heroin injectors. *AIDS Care*. 1997;9:651–660.
64. Hankins C. Syringe exchange in Canada: good but not enough to stem the HIV tide. *Subst Use Misuse*. 1998;33:1129–1145.
65. Canadian HIV/AIDS Legal Network. *Drug Users and Studies of HIV/AIDS and Illegal Drugs*. 1999. Montreal: Canadian HIV/AIDS Legal Network.
66. Haydon E, Fischer B, Rehm J. Social determinants of (illicit) drug use and the HIV/AIDS burden. In: Fischer B, Rehm J, Haydon E, eds. *Reducing the Risks, Harms and Costs of HIV/AIDS and Injection Drug Use: A Synthesis of the Evidence Base for Development of Policies and Programs*. Background Paper 4, 2nd Annual Background Dialogue on HIV/AIDS. Warsaw: Health Canada/UNAIDS/Canadian International Development Agency; 2003.
67. Alter MJ, Kruszon-Moran D, Nainan OV, et al. The prevalence of hepatitis C virus infection in the United States, 1988 through 1994. *N Engl J Med*. 1999;341:556–562.
68. Seymour A, Oliver J, Black M. Drug-related deaths of recently release prisoners in the Strathclyde Region of Scotland. *J Forensic Sci*. 2001;45:649–654.
69. Noël L, Godin G, Alary M. Processus de marginalisation et risque pour le VIH chez les utilisateurs de drogues par injection. *Psychotropes*. 2002;8:7–27.
70. Kouyanou K, Pither C, Wessely S. Medication misuse, abuse and dependence in chronic pain patients. *J Psychosom Res*. 1997;43:497–504.
71. Fishbain D. Approaches to treatment decisions for psychiatric comorbidity in the management of the chronic pain patient. *Med Clin North Am*. 1999;83:737–760.
72. Krausz M, Verthein U, Degkwitz P. Psychiatric comorbidity in opiate addicts. *Eur Addict Res*. 1999;5:55–62.
73. Statistics Canada. *Self-rated Health, by Age Group and Sex, Household Population Aged 12 and over, Canada, 2000/01*. Available at: <http://www.statcan.ca>. Accessed April 08, 2004.
74. Alterman A, Rutherford M, Cacciola J, McKay J, Woody G. Response to methadone maintenance and counseling in antisocial patients with and without major depression. *J Nerv Ment Dis*. 1996;184:695–702.
75. McLellan A, Luborsky L, Woody G, O'Brien C, Druley K. Predicting response to alcohol and drug abuse treatments. *Arch Gen Psychiatry*. 1983;40:620–625.



76. Palepu A, Strathdee SA, Hogg RS, et al. The social determinants of emergency department and hospital use by injection drug users in Canada. *J Urban Health*. 1999;76:409–418.
77. Edlin BR, Seal KH, Lorvick J, et al. Is it justifiable to withhold treatment for hepatitis C from illicit-drug users? *N Engl J Med*. 2001;345:211–214.
78. Khantzian E. The self-medication hypothesis of substance use disorders: a reconsideration and recent applications. *Harv Rev Psychiatry*. 1997;4:231–224.
79. Fischer B, Chin A, Kuo I, Kirst M, Vlahov D. Canadian illicit opiate users' views on methadone and other opiate prescription treatment: an exploratory qualitative study. *Subst Use Misuse*. 2002;37:495–522.