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Understanding the socioeconomic profile of people who experienced opioid overdoses in British Columbia, 2014 to 2016

by Gisèle Carrière, Claudia Sanmartin, and Rochelle Garner

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"All inferences, opinions, and conclusions drawn in this article are those of the authors, and do not reflect the opinions or policies of the data steward(s)."

ABSTRACT

Background

Following the 2016 opioid overdose emergency declaration in British Columbia (B.C.), provincial stakeholders collaborated to link data that resulted in the B.C. Provincial Overdose Cohort. This database provides information about people who have experienced opioid overdoses to inform policy and intervention developments. Subsequently, Statistics Canada likewise constructed a cohort and integrated federal data to broaden the scope of the B.C. initiative. This provided federally sourced information about people's circumstances that was not otherwise available.

Methods

The Statistics Canada British Columbia Opioid Overdose Analytical File further characterizes the socioeconomic circumstances of 13,318 people who experienced illicit drug toxicity deaths and non-fatal opioid overdoses in B.C. between January 1, 2014, and December 31, 2016. Statistics Canada linked federal data on immigration, employment, the justice system and social assistance receipt in the year of, and prior to, people's first overdose.

Results

During the observation period, most people (78%) had one overdose episode, rather than several. Seven percent were immigrants or temporary residents, 41% of whom arrived in Canada more than 20 years before their index overdose. Half (49.6%) had not received social assistance, and one-third (33.8%) were employed—primarily within construction (21% of those employed)—in the year prior to their index overdose. Most employed people (65.5%) experienced periods of unemployment within five years prior to their index overdose. Employment was more prevalent among people who experienced illicit-drug toxicity death (36.1%). About 60% of people had not had any formal police contact within the two years prior to the index overdose.

Interpretation

This project demonstrated further added value to existing data by using this linkage approach and aligned with strategies underway by BC public health partners to provide cross-sectoral evidence to inform efforts to prevent and manage opioid overdoses.

Keywords

opioids, illicit drugs, linked data, administrative data

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What is already known on this subject?

- Opioid overdoses are more common among males and younger adults (i.e., aged 20 to 39).
- People who overdosed had high engagement with health services in the year prior to their overdose.
- Substance use and mental health-related concerns were the primary diagnoses among people in B.C. who were hospitalized and, subsequently, overdosed.
- Most people who overdosed in B.C. did not have a prescription for a pain-relieving opioid, and half had not had one in the five years prior to their overdose.

What does this study add?

- Seven percent of people who overdosed in B.C. were immigrants or temporary residents, 41% of whom landed in Canada more than 20 years before their index overdose.
- Among people who overdosed in B.C., half had not received social assistance.
- One-third were employed, primarily in construction, in the year prior to their index overdose, yet 65.5% of these workers experienced unemployment within the five years prior to their index overdose.
- Among people who overdosed in B.C., about 60% did not have any formal police contact within the two years prior to their index overdose and, among those who did, offences were primarily shoplifting-related.

In 2016, British Columbia's (B.C.) Provincial Health Officer declared a public health emergency in response to increases in illicit-drug overdoses and related deaths. Between 2011 and 2016, the number of illicit-drug toxicity deaths in B.C. totalled 2,788, having increased from 295 in 2011, to 991 in 2016.¹ These deaths were largely related to the use of illicit fentanyl and its analogues. In 2019, these substances were detected in 87% of illicit-drug toxicity deaths. In 2012, this proportion was 5%.¹ Although the opioid crisis is national in scope, B.C. continues to experience a disproportionately higher rate of deaths attributed to illicit drug overdoses, at 20.7 per 100,000 population (age-adjusted), relative to 8.4 for the whole of Canada.^{2,3}

In response, the B.C. government created a public health surveillance infrastructure to monitor overdoses in near real time. The B.C. Centre for Disease Control (BCCDC), various provincial departments, the B.C. First Nations Health Authority and other agencies collaborated to develop record linkages that meet information needs to help develop policy and intervention strategies. This collaboration led to the creation of B.C.'s Provincial Overdose Cohort (hereafter, the Overdose Cohort) that focused initially on basic demographics, health services use and prescription patterns of people who had experienced opioid overdoses in B.C.⁴

The Overdose Cohort revealed important information pertinent to the crisis; i.e., males comprised two-thirds (66%) of overdose cases, with close to half (49%) aged 20 to 39 years old.^{4,6} Furthermore, it revealed that people who overdosed had high engagement with health services,⁵ with 75% having visited community-based physicians, 54% having visited an emergency department and 26% having been admitted to

hospital in the year before the overdose episode. By comparison, 17% and 9% of matched B.C. population controls (no overdoses) visited an emergency department and/or were admitted to hospital, respectively. Substance use and mental health-related concerns were the most common diagnoses among people who were hospitalized and who subsequently overdosed. Given the context of a widely held view that medical prescribing contributed to the crisis, Smolina et al. used the Overdose Cohort to examine this and showed that most cohort members did not have a prescription for a pain-relieving opioid when they overdosed, and half had not had a prescription in the five years prior to their overdose.⁷ Other researchers have shown that the number of overdose deaths was 40% higher during the weeks when social assistance cheques were distributed than during the non-cheque weeks.⁸

While provincial interventions to prevent overdose deaths showed some success,⁹⁻¹¹ deaths from illicit-drug toxicity remained disproportionately high in B.C.,¹² warranting further integration of other relevant information.

In 2018, Statistics Canada worked with B.C.'s existing inter-sectoral overdose response partnership to provide a more fulsome depiction of the economic and social circumstances of individuals who had experienced an opioid overdose. Through this collaboration, Statistics Canada generated the B.C. Opioid Overdose Analytical File (BC-OOAF), a mirror version of B.C.'s Overdose Cohort, but augmented through linkages to other federal data holdings, e.g., on tax, social assistance, justice and immigration.

The objective of the present study is to use the BC-OOAF to extend and update information previously published by

Table 1
Demographic characteristics of people who overdosed in British Columbia, Canada, January 1, 2014, through to December 31, 2016

	Total overdose cohort		Non-fatal overdose cohort		Fatal overdose cohort	
	number	percent	number	percent	number	percent
Statistics Canada British Columbia Opioid Overdose Analytical File, total members	13,318	100	11,843	100	1,475	100
Sex						
Male	8,682	65.2	7,515	63.5	1,167	79.1
Female	4,626	34.8	4,318	36.5	308	20.9
Not available	10	0.1	10	0.1	0	0.0
Age group						
Mean (standard error)	42 (.14)	...	42 (.15)	...	40 (.32)	...
0 to 14 years	71	0.5	71	0.6	0	0.0
15 to 19 years	511	3.8	473	4.0	38	2.6
20 to 29 years	3,092	23.2	2,778	23.5	314	21.3
30 to 39 years	3,180	23.9	2,780	23.5	400	27.1
40 to 49 years	2,490	18.7	2,154	18.2	336	22.8
50 to 59 years	2,196	16.5	1,885	15.9	311	21.1
60 years and older	1,778	13.3	1,702	14.4	76	5.2
Number of overdose episodes per person						
1	10,389	78.0	9,158	77.3	1,231	83.5
2	1,706	12.8	1,544	13.0	162	11.0
3	587	4.4	540	4.6	47	3.2
4	270	2.0	253	2.1	17	1.2
5	143	1.1	134	1.1	9	0.6
6 or more [†]	223	1.7	214	1.8	9	0.6

... not applicable

[†] Upper limit was 30 overdose episodes

Source: Statistics Canada, Statistics Canada British Columbia Opioid Overdose Analytical File.

Statistics Canada for individuals who experienced illicit-drug toxicity deaths^{13,14} by including people who experienced non-fatal overdose events.

Methods

Statistics Canada B.C. Opioid Overdose Analytical File (BC-OOAF)

With assistance from the BCCDC, Statistics Canada applied its case-finding algorithms⁴ to define opioid overdose cases in B.C. from January 1, 2014, through to December 31, 2016, and created the BC-OOAF, which contains integrated federal data that characterize individuals' contact with the health, justice and economic systems. The approach is detailed in a companion report.¹⁵

Data sources for case ascertainment and linkage

Opioid events were identified in each of the following provincial data sources:

(i) the Medical Services Plan (MSP)

- (ii) B.C. Emergency Health Services (EHS), i.e., paramedic-attended overdoses
- (iii) B.C. coroner, i.e., confirmed illicit-drug toxicity deaths (hereafter referred to as fatal overdoses)
- (iv) Discharge Abstract Database (DAD), i.e., acute-care hospitalizations
- (v) National Ambulatory Care Reporting System (NACRS), i.e., emergency department visits.

Ministries and agencies in the province of B.C. are responsible for collecting the data for the MSP, EHS and the coroner, and they shared these data with Statistics Canada for this project. The Canadian Institute for Health Information shares the DAD and NACRS data with Statistics Canada on an annual basis. More information about these data sources is available elsewhere.¹⁶⁻¹⁹ These five data sources (MSP, EHS, B.C. coroner, DAD and NACRS) were linked at Statistics Canada. Two data sources, originally used by B.C. in its construction of the Overdose Cohort—the B.C. Drug and Poison Information Centre, and case-based reporting by emergency departments in three of the five B.C. Health Authorities—were not available to Statistics Canada and, therefore, were not included in the construction of the BC-OOAF. However, those two excluded

Table 2
Immigrant status and immigration-related characteristics of people who overdosed in British Columbia, Canada, January 1, 2014, through to December 31, 2016

	Total overdose cohort		Non-fatal overdose cohort		Fatal overdose cohort	
	number	percent	number	percent	number	percent
Statistics Canada British Columbia Opioid Overdose Analytical File, total members	13,318	100	11,843	100	1,475	100
Immigrant status at time of first overdose						
Non-immigrant	12,331	92.6	10,942	92.4	1,389	94.2
Immigrants	928	7.0	850	7.2	78	5.3
Family-class immigrants	416	3.1	380	3.2	36	2.4
Economic-class immigrants	261	2.0	239	2.0	22	1.5
Refugees	236	1.8	X	X	X	X
Other immigrants	15	0.1	X	X	X	X
Temporary residents	59	0.4	51	0.4	8	0.5
Years between landing in or entry to Canada and first overdose[‡]						
0 to 4 years	112	11.3	101	11.2	11	12.8
5 to 9 years	129	13.1	119	13.2	10	12.0
10 to 15 years	168	17.0	157	17.4	11	13.0
16 to 20 years	173	17.5	158	17.5	15	17.0
More than 20 years	405	41.0	366	40.6	39	45.0
World region of birth[‡]						
Southern Asia	290	29.4	259	28.7	31	36.0
Europe	187	18.9	172	19.1	15	17.4
Africa and the Middle East	182	18.4	171	19.0	11	12.8
Oceania and other Asia	132	13.4	117	13.0	15	17.4
South and Central America	84	8.5	78	8.7	6	7.0
Eastern Asia	64	6.5	62	6.9	8	9.3
Other countries	48	4.9	42	4.7	0	0.0

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[‡] only for immigrants or temporary residents (cohort N=987)

Source: Statistics Canada, Statistics Canada British Columbia Opioid Overdose Analytical File.

sources contributed less than 1% of unique person records and 0.5% of event records to B.C.'s Overdose Cohort.²⁰ The BC-OOAF represents individuals who experienced overdoses between January 1, 2014, and December 31, 2016, and uses the first overdose episode identified within the observation period as the index overdose.

BC-OOAF members were linked to the following Statistics Canada databases: (i) the Longitudinal Worker File,²¹ (ii) T5007 Statement of Benefits File,^{22, 23} (iii) the Longitudinal Immigration Database²⁴ and (iv) the Uniform Crime Reporting Survey²⁵ to provide information on employment and social assistance, immigration status, and contacts with police, respectively. BC-OOAF members were also linked to B.C.'s PharmaNet data,²⁶ shared with Statistics Canada by the B.C. Ministry of Health, which included information on prescription drug dispensations at the time of, and in the years prior to, the index overdose episode.

All linkages were conducted in Statistics Canada's Social Data Linkage Environment.²⁷ Survey and administrative data were

linked to the Derived Record Repository using G-Link, a SAS-based generalized record linkage software that supports deterministic and probabilistic linkage developed at Statistics Canada.²⁸ The linkage was approved by Statistics Canada's Strategic Management Committee,²⁹ and the use of the data is governed by the Directive on Microdata Linkage.³⁰ More information about these data, data governance, this record linkage method, and rates is reported elsewhere.¹⁵

Measures

Age and sex: Age (in years) was derived at Statistics Canada as the difference between the date of the index overdose and the person's date of birth (DOB). Information regarding DOB and sex was primarily obtained from the B.C. Ministry of Health Client Registry System, the Enterprise Master Patient Index (2011 to 2017).³¹ Of the 13,318 individuals described in the data file, 43 (0.3%) were missing both DOB and sex information in the B.C. Ministry of Health Client Registry System. For these individuals, DOB, age and sex were obtained from other data sources, in the following order of priority: EHS, B.C. Coroners

Table 3
Employment and social assistance characteristics of people who overdosed in British Columbia, Canada, January 1, 2014, through to December 31, 2016

	Total overdose cohort		Non-fatal overdose cohort		Fatal overdose cohort	
	number	percent	number	percent	number	percent
Statistics Canada British Columbia Opioid Overdose Analytical File, total members	13,318	100.0	11,843	100.0	1,475	100.0
Cohort that could be linked to employment and social assistance data[‡]	13,184	99.0	11,729	99.0	1,455	98.6
Employment in calendar year of first overdose[‡]						
Employed ^{††}	4,450	33.8	3,925	33.5	525	36.1
Not employed	8,734	66.2	7,804	66.5	930	63.9
Industry of employment in calendar year of first overdose[§]						
Construction (NAICS 23)	951	21.4	830	21.1	121	23.0
Administrative and support, waste management and remediation services (NAICS 56)	542	12.2	476	12.1	66	12.6
Accommodation and food services (NAICS 72)	521	11.7	465	11.8	56	10.7
Retail trade (NAICS 44-45)	436	9.8	398	10.1	38	7.2
Manufacturing (NAICS 31-33)	324	7.3	281	7.2	43	8.2
Other industries	1,676	37.7	1,475	37.6	201	38.3
Years employed in the five calendar years prior to first overdose^{††}						
None	5,397	40.9	4,909	41.9	488	33.5
1	1,377	10.4	1,223	10.4	154	10.6
2	1,295	9.8	1,163	9.9	132	9.1
3	1,161	8.8	1,038	8.8	123	8.5
4	1,265	9.6	1,084	9.2	181	12.4
5	2,689	20.4	2,312	19.7	377	25.9
Receipt of social assistance in calendar year of first overdose[‡]						
Not receiving social assistance	6,542	49.6	5,751	49.0	791	54.4
Receiving social assistance	6,642	50.4	5,978	51.0	664	45.6
Years receiving social assistance in the five calendar years prior to first overdose[‡]						
None	5,792	43.9	5,193	44.3	599	41.2
1	931	7.1	818	7.0	113	7.8
2	863	6.5	775	6.6	88	6.0
3	848	6.4	745	6.4	103	7.1
4	874	6.6	780	6.7	94	6.5
5	3,876	29.4	3,418	29.1	458	31.5

[‡] Cohort members for whom a unique social insurance number could be assigned. One hundred and thirty-four people were not included, since they were not assigned a unique social insurance number (1% of the cohort).

^{††} Defined as earning \$500 or more in a calendar year, as per T4.

[§] Among the employed. Includes cohort members for whom a unique social insurance number could be assigned. One hundred and thirty-four people were not included, since they were not assigned a unique social insurance number (1% of the cohort).

Note: NAICS stands for North American Industry Classification System.

Source: Statistics Canada, Statistics Canada British Columbia Opioid Overdose Analytical File.

Service, NACRS and DAD. Ultimately, there were 10 people for whom sex could not be determined (0.08%).

Immigrant and temporary resident status: Linkage to the Longitudinal Immigration Database identified people who held immigrant or temporary resident status in Canada at the time of the index overdose. This includes records for all landed immigrants and temporary residents, from 1980 through to 2017 (latest year available at the time of linkage). Landed immigrants were categorized according to their admission category: family-

class immigrants, economic-class immigrants, refugees, and other immigrants. Years between the landing date (for landed immigrants) or the most recent permit (for temporary residents) and the index overdose were calculated for the BC-OOAF members linked to the Longitudinal Immigration Database.

Employment and social assistance: Information about employment and receipt of social assistance in the calendar year of, and in each of the five calendar years prior to, the index overdose episode was available for those with a valid and

identifiable social insurance number (n=13,184, 99%). Employment characteristics were based on T4 information, the Government of Canada (Canada Revenue Agency) summary of employment earnings and deductions for a given year, while social assistance information was based on T5007 information, the form that reports compensation benefits paid to a person during a calendar year, e.g., disability benefits.

People were considered to be employed if their T4 earnings were \$500 or more in the calendar year. For employed people, the industry of their main job (i.e., the job with the highest income) in the calendar year is reported according to the North American Industry Classification System (NAICS). This classifies industry as follows: construction (NAICS 23); administrative and support, waste management and remediation services (NAICS 56); accommodation and food services (NAICS 72); retail trade (NAICS 44-45); manufacturing (NAICS 31-33); and all other industry codes. People were considered to have received social assistance if they were successfully linked to a T5007 form, regardless of the amount of social assistance received in the calendar year. Summary measures were also created to describe the number of years, in the five years prior to the index overdose episode, in which people were employed or received social assistance, ranging from none to all five years.

Health care use: Use of the health care system, in the year prior to the index overdose, took account of the number of visits to an emergency department, for any reason, and for selected main reasons, based on NACRS records, and the number of in-patient acute-care hospitalizations overall, for any cause, and for selected most responsible diagnoses, as identified by DAD records. The main reasons for emergency department visits and hospitalizations were based on the following diagnostic codes from the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10): opioid poisonings (T40.0 to T40.4, T40.6), other substance use-related conditions (F10 to F19), mental health-related conditions other than substance use (F00 to F09, F20 to F99), and injuries and poisonings other than opioid poisonings (S00 to T98, excluding T40.0 to T40.4 and T40.6). It should be noted that not all NACRS records provide an ICD-10 diagnostic code: 24.4% of NACRS records linked to the BC-OOAF for the two years prior to the index overdose were missing an ICD-10 code.

Prescription medications: Information on whether individuals had community dispensations for prescription medications was derived from B.C.'s PharmaNet database, which excludes medications dispensed in hospital. The following dichotomous variables were created to reflect the receipt of prescribed medications in the year (365 days) prior to the index overdose: (i) at least one dispensed prescription of any kind and (ii) at least one opioid prescription. Prescribed opioids were also further distinguished as either opioid agonist treatment or pain-related opioid medications, as per the algorithm provided by the BCCDC.

Police contacts: Measures of police contacts in the 24 months prior to the index overdose were created, and they include the number of contacts and violation types (e.g., property offences, shoplifting, offences against the administration of justice). The elapsed time between the most recent police contact prior to the index overdose was reported as a cumulative frequency of members categorized as follows: 0 to 29 days (one month), 30 to 90 days (three months), 91 to 182 days (six months), 183 to 364 days (12 months), 365 to 547 days (18 months), or 548 to 730 days (24 months) prior to the index overdose.

Results

Overall, 13,318 people who experienced one or more opioid overdose events were identified between January 1, 2014, and December 31, 2016 (Table 1). These people were primarily male (65%), with the incidence of fatal overdoses more prevalent among males than females. Half (52%) of the index overdose episodes occurred among people younger than 40 years old. Individuals who experienced fatal overdoses were slightly younger than people in the non-fatal cohort (mean age: 40 vs. 42 years old). Most people (78%) experienced one overdose episode, rather than several, during the observation period. The proportion of individuals who experienced only one overdose episode, rather than more than one, was higher among the fatal cohort (83.5%) than among individuals in the non-fatal cohort (77.3%; Table 1).

Immigration status

Seven percent of individuals were identified as landed immigrants at the time of their index overdose and, at the same time, another 0.4% as temporary residents (Table 2). Among immigrants and temporary residents described in the BC-OOAF, 41.0% arrived in Canada more than 20 years before their index overdose, and 11.3% arrived less than 5 years before their index overdose. Overall, 29.4% of immigrants or temporary residents who experienced opioid overdoses were born in Southern Asia (Table 2).

Employment, income and social assistance

Almost two-thirds (66.2%) of people were not employed in the calendar year of their index overdose (Table 3), although that figure was slightly lower among people who experienced a fatal overdose (63.9%). Among people employed during the year of their index overdose, one-fifth (21.4%) were employed in construction, followed by 12.2% in administrative and support, waste management and remediation services and 11.7%, in accommodation and food services. Over the five years preceding people's index overdose, 41% did not have paid employment, while one-fifth (20.4%) were employed in all five years (Table 3).

Approximately half (50.4%) of people received social assistance in the calendar year of their index overdose. Over the five years preceding their index overdose, 44% of people had

Table 4
Contacts with the health care system in the year prior to first overdose for people who overdosed in British Columbia, Canada, January 1, 2014, through to December 31, 2016

	Total overdose cohort		Non-fatal overdose cohort		Fatal overdose cohort	
	number	percent	number	percent	number	percent
Statistics Canada British Columbia Opioid Overdose Analytical File, total members						
Number of acute-care hospitalizations (any cause) in the year prior to first overdose	13,318	100	11,843	100	1,475	100
None	9,424	70.8	8,340	70.4	1,084	73.5
1	2,005	15.1	1,776	15.0	229	15.5
2	855	6.4	773	6.5	82	5.6
3 or more	1,034	7.8	954	8.1	80	5.4
Main reason for hospitalization in the year prior to first overdose, for people who were hospitalized[†]						
Opioid poisoning	27	0.7	21	0.6	x	x
Substance use-related conditions	1,034	26.6	940	26.8	94	24.0
Mental health-related conditions (other than substance use)	814	20.9	199	20.8	17	21.5
Injuries and poisonings (other than opioid)	803	20.6	194	20.4	18	23.0
Number of visits to emergency departments in the year prior to first overdose (for any reason)						
None	5,055	38.0	4,416	37.3	639	43.3
1	2,414	18.1	2,121	17.9	293	19.9
2	1,538	11.5	1,382	11.7	156	10.6
3 or more	4,311	32.4	3,924	33.1	387	26.2
Reasons for visits to emergency departments in the year prior to first overdose, for people with at least one visit to an emergency department^{††}						
Opioid poisoning	98	1.2	83	0.7	15	1.0
Substance use-related mental health conditions	1,415	17.1	1,292	10.9	123	8.3
Mental health-related conditions (other than substance use)	1,293	15.6	1,190	10.0	103	7.0
Injuries and poisonings (other than opioid)	3,076	37.2	2,767	23.4	309	20.9
Received prescription medication (any type) in the year prior to first overdose						
No prescription medications	1,711	12.8	1,489	12.6	222	15.1
Received prescription medication	11,607	87.2	10,354	87.4	1,253	84.9
Receipt of prescription opioids in the year prior to first overdose						
No prescription opioids	7,209	54.1	6,310	53.3	900	61.0
Prescription opioids [§]	6,109	45.9	5,534	46.7	575	39.0
Opioid agonist treatment	3,080	23.1	2,791	23.6	289	19.6
Pain-related opioids only	3,029	22.7	2,743	23.2	286	19.4

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[†] Individuals with more than one acute-care hospitalization could be hospitalized for more than one reason; 29% of cohort members (3,894) were hospitalized at least once in the year prior to first overdose in the observation period.

^{††} Individuals with more than one visit to an emergency department could have visited the emergency department for more than one reason; 62% of cohort members (8,263) visited the emergency department at least once in the year prior to first overdose in the observation period.

[§] May include individuals receiving both opioid agonist treatment and opioids primarily for pain.

Source: Statistics Canada, Statistics Canada British Columbia Opioid Overdose Analytical File.

no record of having received social assistance, while one-third (29.4%) received social assistance in all five years prior to their index overdose (Table 3).

Health care use

In the year prior to their index overdose episode, almost 62% of people visited an emergency department, with 32% having visited three or more times in that year (Table 4). The proportion of people who visited the emergency department was lower

among people who experienced a fatal overdose (57%) than among people in the non-fatal overdose subgroup (63%). Among people admitted to an emergency department, 37.2% were admitted for an injury or poisoning (other than an opioid overdose), 17.1% were seen for a substance use-related mental health condition, and 15.6% were seen for a mental health condition not related to substance use (Table 4).

Overall, about one-third (29.3%) of people were admitted to an acute-care hospital as in-patients in the year prior to their index

overdose. Fifteen percent were seen once during the year, while 7.8% were admitted three or more times. Among people who were hospitalized, more than one-quarter (26.6%) were hospitalized for substance use-related conditions, 20.9% for non-substance use-related mental health conditions, and 20.6% for injuries other than opioid poisonings (Table 4).

Most people (87.2%) were dispensed a prescription in the year prior to their index overdose; 45.9% of people were dispensed a prescription opioid product. These opioid products were classified as opioid agonist treatment (23.1%) or pain treatment (22.7%). The proportion of people who did not have a prescribed opioid product dispensed within the year before their index overdose was higher among people who experienced a fatal overdose (61.0%) than among those who did not (53.3%).

Police contacts

Almost two-thirds (61.2%) of people (Table 5) had no formal contact with police in the two years prior to their index overdose, and there was no difference in formal police contact between those who experienced fatal overdoses and those who did not (both 61.2%). Among the 38.8% of people who had formal police contact in the two years before their index overdose, 34% had only one contact, while 50% had three or more formal contacts. The leading reasons for the offences charged were largely non-violent: 16.5% of charges were for shoplifting \$5,000 or under, followed by disturbing the peace (10.9%), failure to comply with order (8.7%), and breach of probation (7.0%). The ranking and distribution of offence types did not vary according to whether or not people experienced a fatal overdose (Table 5). Furthermore, among people with formal police contact, about one-quarter (24.3%) had at least one police contact less than 30 days prior to their index overdose (Table 5). A smaller proportion of people who experienced a fatal overdose (15.4%) had police contact within that timeframe, compared with 25.4% among those who did not have a fatal overdose.

Discussion

Working collaboratively with partners in B.C., such as the BCCDC and provincial ministries and agencies, Statistics Canada created the BC-OOAF, a near-replication of the B.C. Overdose Cohort that contains additional federal information on people who experienced fatal and non-fatal opioid overdoses in B.C. between January 1, 2014, and December 31, 2016. The data enhancements focused on information about immigration status, employment, income assistance and police contacts. The linkage rates between members of the BC-OOAF and federal data sources were high,¹⁵ and comparisons between the analytical file used in this study and the B.C. Overdose Cohort revealed similar distributions of demographics and the use of health care services. However, the BC-OOAF provided new information about employment, social assistance and police contacts during the time that led up to these people's index overdose.

Results of this study indicated that immigrants and temporary residents were underrepresented among people who experienced an opioid overdose: 7% of BC-OOAF members were immigrants or temporary residents compared with 28.3% of B.C.'s provincial population in 2016.³² Results also indicated that immigrants who overdosed were primarily established immigrants who had arrived two or more decades before their index overdose and were primarily from Southern Asia. This reflects the primary source countries for immigrants in B.C., in general. The immigrant population in B.C. is largely composed of people born in Asia (61%) and primarily from China (15.5%) and India (12.6%).³²

Results indicated that, overall, people in B.C. who experienced an overdose had also experienced income and employment instability in the years that led up to their index event. Approximately 34% of this population were employed in the year of their index overdose, compared with 59.6% of the overall B.C. population, in 2016.³³ Previous research at Statistics Canada has shown that, in general, people in B.C. who experienced a fatal overdose had earnings that were far lower than the median employment incomes for employed people in the province.¹³ Similarly, the results of the present study showed signs of economic marginalization among people who had fatal and non-fatal opioid overdoses. Associations between unemployment, marginalization and illicit substance use,³⁴⁻³⁶ and, more specifically, between socioeconomic deprivation and opioid overdose, have previously been recognized.³⁷⁻⁴⁰

In a review article, Henkel reported that problematic substance use among people increased their likelihood of unemployment and decreased their chance of finding and holding down a job, and that unemployment was a significant risk factor for their subsequent development of substance use disorders.³⁴ Similar findings on economic disadvantage have been made among opioid users in B.C. and Ontario.^{3,35,41} In future work, the integration of additional federal data holdings, including information on social housing stock,⁴² could further illuminate intersections between people's socioeconomic circumstances and their overdose risk.

Among the employed people described in this analytical file, workers in the construction industry were overrepresented (21.4% of those employed) relative to the overall rates for B.C.'s population working in this industry. In B.C., workers in this industry represented 8% overall, in 2015, and 13% for males, specifically.³³ This is consistent with narrative evidence collected by the B.C. Coroners Service, which reported that 44% of people who had died of illicit drug toxicity were employed at the time of their deaths, largely (55%) in trades and transport industries (which include construction).⁴³

Almost two-thirds of people who experienced an overdose had no formal contact with the police. While the proportion of those who had at least one contact with the police in the two years prior to their index event (38.8%) was higher when compared with the provincial population in general (0.3% of B.C.'s population had been accused of a criminal incident in 2016),¹⁴

their offences were primarily non-violent. The majority of offences among the people described in the analytical file who had police contacts were related to shoplifting. These police contact and employment results underscored the recognized relationship between greater economic marginalization and more likely contact with the justice system,⁴⁴ as well as potential relationships between substance dependence, lost employment and property crimes committed to secure basic survival.⁴⁵⁻⁴⁸ Further research using the BC-OOAF is needed to fully understand the relationship of these factors to opioid overdoses.

While this study provided new information regarding the characteristics of people who experienced an opioid overdose, the following limitations are noted. First, results represented univariate associations between cohort characteristics and

outcomes that should not be interpreted as having direct effects. Second, the analysis did not include a comparative group of people among whom no overdose was detected. Third, although sources that covered much of the spectrum of health care services were used for overdose case ascertainment, and the observation period covered two years, overdoses were likely undercounted, since some people who overdosed possibly did not have any contact with medical health services.⁴⁹ Fourth, although the index overdose event was the first observed within the study period, it may not have been people’s first overdose. Fifth, while fatal overdose events were ascertained by the BC Coroners Service and defined here as those that occurred within the observation period, other people in the non-fatal overdose subgroup described in the analytical file did die from other

Table 5
Contacts with police among people who overdosed in British Columbia, Canada, January 1, 2014, through to December 31, 2016

	Total overdose cohort		Non-fatal overdose cohort		Fatal overdose cohort	
	number	percentage	number	percentage	number	percentage
Statistics Canada British Columbia Opioid Overdose Analytical File, total members	13,318	100	11,843	100	1,475	100
Number of formal contacts with police in the two years prior to first overdose						
None	8,148	61.2	7,246	61.2	902	61.2
1	1,744	13.1	1,515	12.8	229	15.5
2	845	6.3	750	6.3	95	6.4
3 or more	2,581	19.4	2,332	19.7	249	16.9
Selected reasons for formal contact with police in the two years prior to first overdose[‡] (frequency distribution of given type of violation)						
Total	23,582	100.0	21,377	100.0	2,205	100.0
Shoplifting \$5,000 or under	3,892	16.5	3,566	16.7	326	14.8
Disturbing the peace	2,562	10.9	2,363	11.1	199	9.0
Failure to comply with order	2,042	8.7	1,839	8.6	203	9.2
Breach of probation	1,656	7.0	1,491	7.0	165	7.5
Assault—level 1	1,434	6.1	1,274	6.0	160	7.3
Mischief	930	3.9	847	4.0	83	3.8
Breaking and entering	875	3.7	804	3.8	71	3.2
Possession—cannabis	837	3.5	752	3.5	85	3.9
Theft \$5,000 or under	709	3.0	649	3.0	60	2.7
Cumulative % for days between most recent prior^{††} formal contact with police and index overdose	5,170	100.0	4,597	100.0	573	100.0
0 to 29 days	1,256	24.3	1,168	25.4	88	15.4
30 to 90 days	948	42.6	857	44.1	91	31.2
91 to 182 days	852	59.1	749	60.3	103	49.2
183 to 364 days	988	78.2	854	78.9	134	72.6
365 to 547 days	656	90.9	566	91.2	90	88.3
548 to 730 days	470	100.0	403	100.0	67	100.0

[‡] Frequency of given type of violation among members of the Statistics Canada British Columbia Opioid Overdose Analytical File, in the two years prior to a person’s first overdose from January 1, 2014 through to December 31, 2016.

^{††} Within two years prior to date of index (first) overdose from January 1, 2014 through to December 31, 2016.

Source: Statistics Canada, Statistics Canada British Columbia Opioid Overdose Analytical File.

causes during this time. Under other study conditions, the fatal and non-fatal cohort designations could be applied differently. Further study of other sources of fatality information, such as death registries, could yield important additional information. Sixth, other work has shown that members of B.C. First Nations communities are overrepresented among people experiencing overdoses and overdose deaths.⁵⁰ Information used to identify Indigenous peoples was not available in the present study. Finally, since the end of this study's observation period, there may have been changes to overdose circumstances in the overdose crisis. As such, exercising caution is warranted when generalizing the current results to years beyond those reported here.

Conclusion

Understanding socioeconomic determinants associated with opioid overdose is critical to informing actionable efforts that could reduce or prevent illicit-drug harm. Partnerships and collaborative use of integrated data to inform these efforts partially addressed existing information gaps. This demonstrated that, going forward, existing data that now include federal data could be used to monitor trends over time and to inform preventive efforts. This could possibly be a first step towards using federal data holdings to integrate more sectors, such as housing.

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