

Supplementary material

eTable 1. Type of death investigations included and limitations of the federal opioid-related death data for each province and territory.

Province/Territory	Death investigations included	Limitations
Overall	<p>The data provided by the provinces and territories can include deaths with either a) completed investigations or b) ongoing investigations, in which the manner of death was believed to be an accident, suicide, or undetermined.</p> <p>These data do not include deaths due to the medical consequences of long-term substance use or overuse (for example, alcoholic cirrhosis), medical assistance in dying, trauma where use of the substance(s) contributed to the circumstances of the injury that lead to the death, but was not directly involved in the death and homicide.</p>	<p>Some data are based on ongoing investigations by coroners and medical examiners, and as such they are considered preliminary and subject to change. The time required to complete an investigation and related administrative processes is case-dependent and can range from approximately three to twenty-four months.</p>
British Columbia	<p>Includes overall counts of a) completed investigations and b) ongoing investigations in which the manner of death was believed to be unintentional.</p> <p>Includes age and sex-stratified counts of completed investigations only.</p>	<p>The stratified data (e.g., by sex and age group) used for our primary and secondary analyses are based only on opioid-related deaths for which investigations are completed. At the time of analysis, there were 2,346 opioid-related deaths currently under investigation in British Columbia (2019: 403; 2020: 545; 2021: 1,398).</p> <p>In our post-hoc time series analysis, we used the total number of opioid-related deaths represented by the sum of completed and ongoing investigations.</p>
Alberta	<p>Includes a) completed investigations and b) ongoing investigations in which the manner of death was believed to be unintentional.</p>	<p>Data on the sex of the individual based on the medical examiner's assessment is largely based on biological characteristics; In a small subset of cases where the individual was known to identify with a gender different than their biological sex, the medical examiner may indicate their identified gender.</p>

Saskatchewan	Includes completed investigations only.	Data does not include sensitive or suspicious deaths such as those defined where the decedent was involved in a criminal case or an inquest (e.g., deaths in custody).
Manitoba	Includes a) completed investigations and b) ongoing investigations in which the manner of death was believed to be unintentional.	
Ontario	Includes a) completed investigations and b) ongoing investigations in which the manner of death was believed to be unintentional.	Apparent opioid toxicity death data were captured using an enhanced data collection tool by the Office of the Chief Coroner (OCC) as of May 1, 2017. Prior to this, retrospective case information was collected using a different tool. Effective September 1, 2021, apparent opioid toxicity death data are captured in the OCC's new case management system for death investigations; as of January 2018, sex reflects the sex assigned at birth or biological characteristics at the time of death.
Quebec	Includes a) completed investigations and b) ongoing investigations in which the manner of death was believed to be unintentional.	Quebec data from 2016 to 2020 include deaths with completed investigations only; available 2021 data include unintentional deaths with ongoing investigations; counts less than five for deaths with ongoing investigations were suppressed (2021).
New Brunswick	Includes a) completed investigations, b) ongoing investigations in which the manner of death was believed to be unintentional, and c) ongoing investigations where manner of death had not been assigned at the time of reporting.	
Nova Scotia	Includes a) completed investigations, b) ongoing investigations in which the manner of death was believed to be unintentional, and c) ongoing investigations where manner of death had not been assigned at the time of reporting.	Nova Scotia suppressed all counts for age group 0 to 19 years when stratified by sex.

Northwest Territories	Includes a) completed investigations, b) ongoing investigations in which the manner of death was believed to be unintentional, and c) ongoing investigations where manner of death had not been assigned at the time of reporting.	
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eTable 2. Methods to identify accidental opioid-related deaths in the United States

Data Element	Description
US Opioid Toxicity Death Identification	We identified all opioid-related deaths that occurred between 2019 and 2021 using the ICD-10 codes outlined below.
International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) Codes	
<i>Underlying Cause of Death</i>	
X40	Accidental poisoning by and exposure to non-opioid analgesics, antipyretics and anti-rheumatics
X41	Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs, not elsewhere classified
X42	Accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified
X43	Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system
X44	Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
<i>Multiple Cause of Death</i>	
T40.0	Poisoning by Opium
T40.1	Poisoning by Heroin
T40.2	Poisoning by Other Opioids
T40.3	Poisoning by Methadone
T40.4	Poisoning by Other Synthetic Narcotics
T40.6	Poisoning by Other and Unspecified Narcotics
Restrictions	We restricted all opioid-related deaths to people under 85 years old to match the age groups used in our primary analysis. The counts of opioid-related deaths for people under 10 years old were not available given the small number of deaths (≤ 9).

eTable 3. Years of life lost due to opioid-related deaths across nine Canadian provinces and territories stratified by age and sex between 2019-2021.

	2019				2020				2021			
	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population
British Columbia*												
Age Group												
0-19	14	14.1	1,031	1.0	21	21.2	1,507	1.5	12	12.2	869	0.9
20-29	104	148.1	5,966	8.5	206	293.3	11,669	16.6	129	184.7	7,360	10.5
30-39	165	228.7	7,916	11.0	292	393.6	13,787	18.6	215	282.8	10,146	13.3
40-49	123	189.8	4,724	7.3	290	446.2	10,967	16.9	184	280.5	6,963	10.6
50-59	111	153.0	3,270	4.5	287	397.8	8,262	11.5	223	311.0	6,470	9.0
60-84	51	43.0	791	0.7	121	98.7	1,856	1.5	100	79.1	1,528	1.2
Sex												
Females	139	55.6	6,371	2.5	220	86.9	9,537	3.8	187	73.2	8,380	3.3
Males	429	173.3	17,328	7.0	997	398.4	38,512	15.4	676	267.8	24,955	9.9
Alberta												
Age Group												
0-19	13	12.1	952	0.9	23	21.3	1,647	1.5	32	29.7	2,289	2.1
20-29	140	234.8	8,073	13.5	229	387.8	13,039	22.1	311	537.3	17,759	30.7
30-39	192	271.7	9,197	13.0	333	466.0	15,746	22.0	521	729.3	24,787	34.7
40-49	128	215.0	4,916	8.3	274	450.8	10,448	17.2	356	575.1	13,533	21.9
50-59	112	202.2	3,305	6.0	224	406.8	6,496	11.8	283	516.9	8,181	14.9
60-84	34	44.2	537	0.7	84	104.6	1,285	1.6	115	137.7	1,787	2.1
Sex												
Females	163	76.7	7,601	3.6	271	126.0	12,291	5.7	433	200.0	20,419	9.4
Males	456	210.3	19,379	8.9	896	408.5	36,371	16.6	1,185	537.3	47,918	21.7
Saskatchewan												
Age Group												
0-19	1	3.3	71	0.2	7	23.2	510	1.7	4	13.3	294	1.0
20-29	21	135.1	1,219	7.8	52	340.5	2,985	19.5	73	483.9	4,225	28.0
30-39	25	146.4	1,202	7.0	73	423.6	3,474	20.2	73	424.2	3,493	20.3
40-49	26	184.9	1,020	7.3	52	362.8	1,992	13.9	84	574.3	3,205	21.9
50-59	30	205.3	892	6.1	48	336.2	1,414	9.9	64	458.4	1,858	13.3
60-84	6	26.0	93	0.4	22	92.5	346	1.5	24	98.1	377	1.5
Sex												
Females	39	69.2	1,699	3.0	86	151.7	3,855	6.8	111	195.0	5,291	9.3
Males	70	120.5	2,798	4.8	168	287.9	6,867	11.8	211	360.6	8,162	13.9
Manitoba												
Age Group												
0-19	1	2.9	75	0.2	3	8.6	224	0.6	5	14.5	364	1.1
20-29	15	77.2	864	4.4	48	247.3	2,770	14.3	53	267.1	3,049	15.4
30-39	17	89.0	818	4.3	78	402.3	3,722	19.2	98	499.7	4,688	23.9
40-49	9	53.5	346	2.1	69	407.7	2,653	15.7	55	321.2	2,102	12.3
50-59	10	57.9	298	1.7	35	205.6	1,027	6.0	38	226.4	1,117	6.7

Appendix 1, as submitted by the authors. Appendix to: Ledlie S, Juurlink DN, Tadrous M, et al. Opioid-related deaths between 2019 and 2021 across 9 Canadian provinces and territories. *CMAJ* 2024. doi: 10.1503/cmaj.231339. Copyright © 2024 The Author(s) or their employer(s). To receive this resource in an accessible format, please contact us at cmajgroup@cmaj.ca.

60-84	2	7.5	32	0.1	15	54.4	237	0.9	14	49.4	222	0.8
Sex												
Females	17	25.5	797	1.2	91	135.4	4,205	6.3	95	140.2	4,519	6.7
Males	37	54.9	1,636	2.4	157	231.5	6,429	9.5	168	245.3	7,024	10.3
Ontario												
Age Group												
0-19	21	6.7	1,515	0.5	33	10.5	2,368	0.8	43	13.9	3,079	1.0
20-29	292	140.6	16,812	8.1	432	205.0	24,570	11.7	493	234.6	28,100	13.4
30-39	415	210.6	19,949	10.1	682	335.6	32,334	15.9	796	384.2	37,740	18.2
40-49	277	149.4	10,671	5.8	527	284.5	20,064	10.8	624	336.7	23,728	12.8
50-59	313	151.9	9,271	4.5	476	233.1	13,763	6.7	532	263.6	15,450	7.7
60-84	114	36.5	1,784	0.6	177	54.9	2,735	0.8	228	68.6	3,536	1.1
Sex												
Females	397	55.5	17,576	2.5	545	75.3	24,314	3.4	693	95.3	31,460	4.3
Males	1,035	146.5	42,426	6.0	1,782	249.3	71,520	10.0	2,023	281.4	80,173	11.2
Quebec												
Age Group												
0-19	3	1.7	217	0.1	7	3.9	496	0.3	N/A			
20-29	19	17.8	1,074	1.0	37	34.8	2,097	2.0	49	47.1	2,781	2.7
30-39	27	24.1	1,292	1.2	60	53.3	2,866	2.5	113	100.3	5,332	4.7
40-49	44	40.4	1,698	1.6	40	36.1	1,546	1.4	107	95.2	4,067	3.6
50-59	40	33.1	1,207	1.0	46	38.8	1,335	1.1	100	86.3	2,898	2.5
60-84	28	13.7	450	0.2	39	18.6	613	0.3	N/A			
Sex												
Females	51	12.4	1,716	0.4	69	16.6	2,741	0.7	83	19.9	3,654	0.9
Males	110	26.4	4,223	1.0	160	38.0	6,212	1.5	286	67.7	11,425	2.7
New Brunswick												
Age Group												
0-19	0	-	-	-	0	-	-	-	0	-	-	-
20-29	2	23.0	117	1.3	5	56.8	292	3.3	6	66.7	343	3.8
30-39	8	88.4	391	4.3	6	65.6	294	3.2	8	86.1	387	4.2
40-49	5	49.8	192	1.9	11	110.2	424	4.2	15	150.8	587	5.9
50-59	6	50.3	187	1.6	9	76.6	264	2.2	5	43.1	148	1.3
60-84	6	28.8	97	0.5	7	32.7	111	0.5	5	22.7	75	0.3
Sex												
Females	14	36.8	515	1.4	17	44.4	691	1.8	16	41.5	713	1.8
Males	13	34.4	469	1.2	21	55.1	694	1.8	23	59.8	828	2.2
Nova Scotia												
Age Group												
0-19	N/A				N/A				N/A			
20-29	7	56.3	396	3.2	10	79.0	567	4.5	9	69.9	510	4.0
30-39	10	85.6	485	4.2	9	74.8	430	3.6	8	64.4	379	3.0
40-49	12	101.4	462	3.9	15	126.8	576	4.9	6	50.8	234	2.0
50-59	8	54.5	238	1.6	5	34.7	144	1.0	7	49.5	201	1.4
60-84	N/A				N/A				N/A			
Sex												
Females	10	20.8	422	0.9	11	22.6	507	1.0	8	16.3	376	0.8
Males	27	57.8	1,160	2.5	28	59.2	1,211	2.6	22	46.1	948	2.0
Northwest Territories												
Age Group												

0-19	0	-	-	-	0	-	-	-	0	-	-	-
20-29	0	-	-	-	1	147.1	56	8.2	0	-	-	-
30-39	0	-	-	-	2	280.5	93	13.0	2	278.2	93	12.9
40-49	0	-	-	-	0	-	-	-	N/A			
50-59	0	-	-	-	0	-	-	-	0	-	-	-
60-84	0	-	-	-	0	-	-	-	N/A			
Sex												
Females	0	-	-	-	0	-	-	-	0	-	-	-
Males	0	-	-	-	3	129.4	149	6.4	2	85.7	93	4.0

*Only includes opioid-related deaths with completed investigations by the coroner. Interpret with caution as a significant number of opioid-related deaths from 2019-2021 in BC were still under-investigation at the time of analysis.

eTable 4. Proportion of all-cause deaths attributable to opioids by age group and results from the Cochran-Armitage test for trend between 2019-2021.

Age Group	Year	Region									
		Canada *	British Columbia **	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Nova Scotia	Northwest Territories
Overall	2019	1.7%	2.4%	3.6%	1.9%	1.4%	2.2%	0.4%	0.5%	0.6%	0.0%
	2020	2.8%	4.7%	6.0%	3.9%	3.2%	3.2%	0.5%	0.8%	0.6%	1.2%
	2021	3.2%	3.0%	7.5%	4.5%	3.4%	3.7%	0.9%	0.7%	0.4%	0.8%
	p-value	<.001	0.003	<.001	<.001	<.001	<.001	<.001	0.3	0.3	0.7
0-19	2019	1.8%	4.6%	3.3%	0.6%	0.5%	1.9%	0.5%	0.0%	N/A	0.0%
	2020	3.2%	6.8%	4.8%	3.3%	1.4%	3.2%	1.3%	0.0%	N/A	0.0%
	2021	3.3%	3.7%	6.9%	2.5%	3.0%	4.1%	N/A	0.0%	N/A	0.0%
	p-value	<.001	0.7	0.02	0.3	0.09	0.002	0.2	N/A	N/A	N/A
20-29	2019	19.8%	21.1%	30.5%	12.9%	7.9%	25.7%	4.4%	3.1%	9.2%	0.0%
	2020	27.4%	33.7%	37.2%	23.3%	19.6%	30.9%	7.8%	6.7%	14.1%	12.5%
	2021	29.3%	20.2%	45.3%	29.1%	21.7%	33.7%	12.3%	12.5%	9.6%	0.0%
	p-value	<.001	0.4	<.001	<.001	<.001	<.001	<.001	0.0	1.0	N/A
30-39	2019	19.3%	21.9%	27.4%	10.4%	6.8%	24.6%	4.4%	8.9%	10.0%	0.0%
	2020	27.7%	30.5%	34.1%	25.0%	24.9%	32.4%	8.7%	6.3%	9.7%	9.1%
	2021	29.0%	18.9%	43.1%	21.7%	29.0%	33.7%	15.7%	7.8%	7.6%	9.5%
	p-value	<.001	0.02	<.001	0.002	<.001	<.001	<.001	0.9	0.6	1.0
40-49	2019	8.7%	11.2%	12.5%	9.3%	2.7%	10.2%	3.4%	2.9%	5.9%	0.0%
	2020	15.3%	22.2%	21.5%	14.8%	15.8%	16.9%	2.8%	5.8%	7.1%	0.0%
	2021	16.0%	12.2%	25.0%	17.2%	14.1%	18.6%	8.4%	7.0%	2.4%	N/A
	p-value	<.001	1.0	<.001	0.004	<.001	<.001	<.001	0.09	0.08	N/A

50-59	2019	3.3%	4.3%	5.2%	4.5%	1.2%	4.2%	1.0%	1.2%	1.3%	0.0%
	2020	5.6%	9.8%	9.2%	6.1%	4.1%	5.9%	1.1%	1.8%	0.8%	0.0%
	2021	6.0%	6.8%	10.6%	7.4%	4.2%	6.5%	2.7%	1.0%	1.1%	0.0%
	p-value	<.001	<.001	<.001	0.02	<.001	<.001	<.001	0.8	0.8	N/A
60-84	2019	0.2%	0.3%	0.3%	0.1%	0.0%	0.2%	0.1%	0.1%	N/A	0.0%
	2020	0.3%	0.6%	0.6%	0.5%	0.3%	0.3%	0.1%	0.2%	N/A	0.0%
	2021	0.3%	0.5%	0.8%	0.5%	0.3%	0.4%	N/A	0.1%	N/A	N/A
	p-value	<.001	0.02	<.001	0.01	0.01	<.001	0.4	0.8	N/A	N/A

*Based on Canadian provinces/territories with available data stratified by age and sex

**Only includes opioid-related deaths with completed investigations by the coroner. Interpret with caution as a significant number of opioid-related deaths from 2019-2021 in BC were still under-investigation at the time of analysis.

eTable 5. Years of life lost due to opioid-related deaths using the US average at death between 2019-2021.

	2019				2020				2021			
	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population
Canada*												
Overall	3,007	83.6	126,700	3.5	5,522	151.7	227,746	6.3	6,222	170.0	257,990	7.0
Age Group												
0-19	53	6.7	3,429	0.4	94	11.8	5,996	0.8	96	12.1	6,144	0.8
20-29	600	119.9	33,923	6.8	1,020	202.7	57,185	11.4	1,123	224.9	63,132	12.6
30-39	859	168.8	41,292	8.1	1,535	295.2	72,808	14.0	1,834	348.3	87,073	16.5
40-49	624	132.3	24,130	5.1	1,278	268.7	49,019	10.3	1,431	298.5	54,946	11.5
50-59	630	122.7	18,755	3.7	1,130	222.4	32,870	6.5	1,252	249.7	36,434	7.3
60-84	241	29.8	5,170	0.6	465	55.7	9,869	1.2	486	56.4	10,262	1.2
Sex												
Females	830	46.1	36,716	2.0	1,310	72.0	58,439	3.2	1,626	88.8	74,912	4.1
Males	2,177	121.1	89,984	5.0	4,212	231.5	169,307	9.3	4,596	251.2	183,079	10.0

*Based on Canadian provinces/territories below with available data stratified by age and sex; includes only opioid-related deaths with completed investigations by the coroner in BC. Interpret with caution as a significant number of opioid-related deaths from 2019-2021 in BC were still under-investigation at the time of analysis.

eTable 6. Years of life lost due to opioid-related deaths across eight Canadian provinces and territories (BC data excluded) between 2019-2021.

	2019				2020				2021			
	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population	Accidental Opioid-Related Deaths	Deaths Per Million	YLLs	YLL per 1000 population
Canada*												
Overall	2,439	78.7	102,416	3.3	4,305	137.2	178,057	5.7	5,278	167.4	221,603	7.0
Age Group												
0-19	39	5.6	2,830	0.4	73	10.4	5,246	0.8	84	12.1	6,027	0.9
20-29	496	115.3	28,554	6.6	814	188.0	46,376	10.7	994	231.4	56,767	13.2
30-39	694	158.9	33,334	7.6	1,243	278.8	58,960	13.2	1,619	359.4	76,898	17.1
40-49	501	123.2	19,304	4.7	988	240.6	37,702	9.2	1,247	301.4	47,458	11.5
50-59	519	117.8	15,398	3.5	843	193.4	24,443	5.6	1,029	239.5	29,853	6.9
60-84	190	27.6	2,995	0.4	344	48.3	5,329	0.7	305	41.5	4,599	0.6
Sex												
Females	691	44.6	30,325	2.0	1,090	69.5	48,603	3.1	1,358	86.2	65,033	4.1
Males	1,748	112.7	72,091	4.6	3,215	204.9	129,454	8.2	3,920	248.5	156,570	9.9

*Based on Canadian provinces/territories below with available data stratified by age and sex

eTable 7. Proportion of all-cause deaths attributable to opioids, by age group across Canada (B.C data excluded) between 2019-2021.

Canada*						
Age group	0-19	20-29	30-39	40-49	50-59	60-84
2019						
	1.5%	19.6%	18.8%	8.3%	3.2%	0.2%
2020						
	2.8%	26.2%	27.1%	14.0%	4.8%	0.3%
2021						
	3.3%	31.1%	31.2%	16.8%	5.9%	0.3%

*Based on Canadian provinces/territories below with available data stratified by age and sex