

CHAPTER 5

MORTALITY

The BC Vital Statistics Agency is responsible for the ascertainment, registration and certification of vital events. It identifies the causes of death according to the World Health Organization's International Classification of Diseases (ICD-10) coding system which has been used since 2000. Death statistics summarize events by calendar year that occurred in the province of BC.

Selected vital statistics and health status indicators are reported by Local Health Authority (LHA) in the BC Vital Statistics Agency Annual Report 2011.¹¹ In 2011 the total number of deaths in BC from all causes was 31,776, of these 371 (1.17%) were coded as drug-induced deaths. This percentage had remained stable over the previous 5-year period (2006-2010). The majority of drug-induced deaths in BC are attributed to accidental poisoning by drugs, accounting for 71.2% of drug-induced deaths. This classification includes not only illicit drugs, but also prescription and over-the-counter drugs. However, it excludes causes indirectly related to drug use such as HIV, HCV, sepsis or motor vehicle accidents. Suicide by drugs accounts for the second largest cause (22.1%) of drug-induced deaths. The distribution of causes of drug-induced deaths is shown in Table 5.1.

The *standardized mortality ratio (SMR)* is the ratio of the observed number of deaths in a population to the number of expected deaths. SMR is often used to illustrate health inequalities and excess deaths due to drug use in different geographic regions. Figure 5.1 shows the SMR due to drug-induced deaths throughout BC by Local Health Areas (LHA) in 2011. Figure 5.2 shows SMR in Vancouver LHAs. Statistically significant excess number of deaths was found in Vancouver Island North, Campbell River, Cariboo-Chilcotin, South Cariboo, Kamloops, Merritt, Penticton, Mission and Vancouver Downtown East Side.

In 2011, the observed drug-induced deaths in the Vancouver Downtown East Side Community Health Area 2 (CHA2) were almost 5 times the provincial rate; whereas the Vancouver Westside (CHA4) had a significantly lower number of deaths compared to the provincial rate. The other CHAs in the Vancouver HSDA were not significantly different compared to all of BC. Compared to previous years, the standardized mortality ratio in the Downtown East Side has declined from 7.36 in 2005 to 4.97 in 2011, but remained significantly higher than the provincial SMR.

Table 5.1 Drug-induced deaths, BC residents, 2006-2011¹¹

Cause of Death (ICD-10)	2006	2007	2008	2009	2010	2011	
	Deaths	Deaths	Deaths	Deaths	Deaths	Deaths	Percent
Psychoactive substance and drug use/abuse (F11-F16, F19)	18	25	18	15	12	10	2.7%
Accidental poisoning by drugs (X40-X44)	241	223	210	245	235	264	71.2%
Suicide by drugs (X60-X64)	58	72	68	80	74	82	22.1%
Assault by drugs and medicaments (X85)	-	-	-	-	1	-	-
Poisoning by drugs and medicaments undetermined if accidental or intentional (Y10-Y14)	9	9	9	14	15	12	3.2%
Adverse effects of drugs and medicaments (Y40-Y574, Y577-Y579, Y598, Y880)	3	5	2	8	1	2	0.5%
Other drug causes	-	-	-	1	1	1	0.3%
TOTAL	329	334	307	363	339	371	100%

Figure 5.1 Standardized mortality ratio (SMR), drug-induced deaths in BC by LHA, 2011¹¹

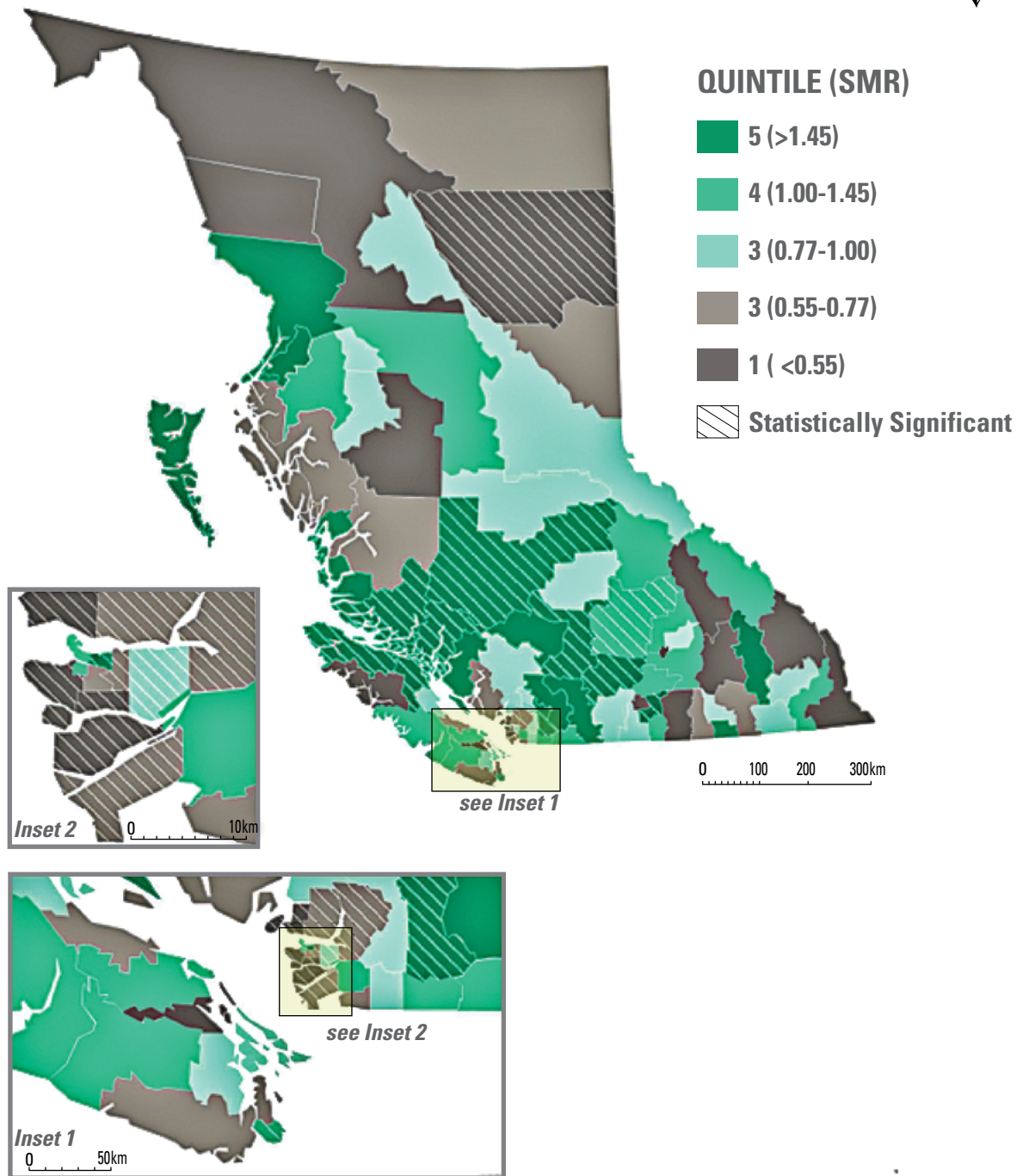
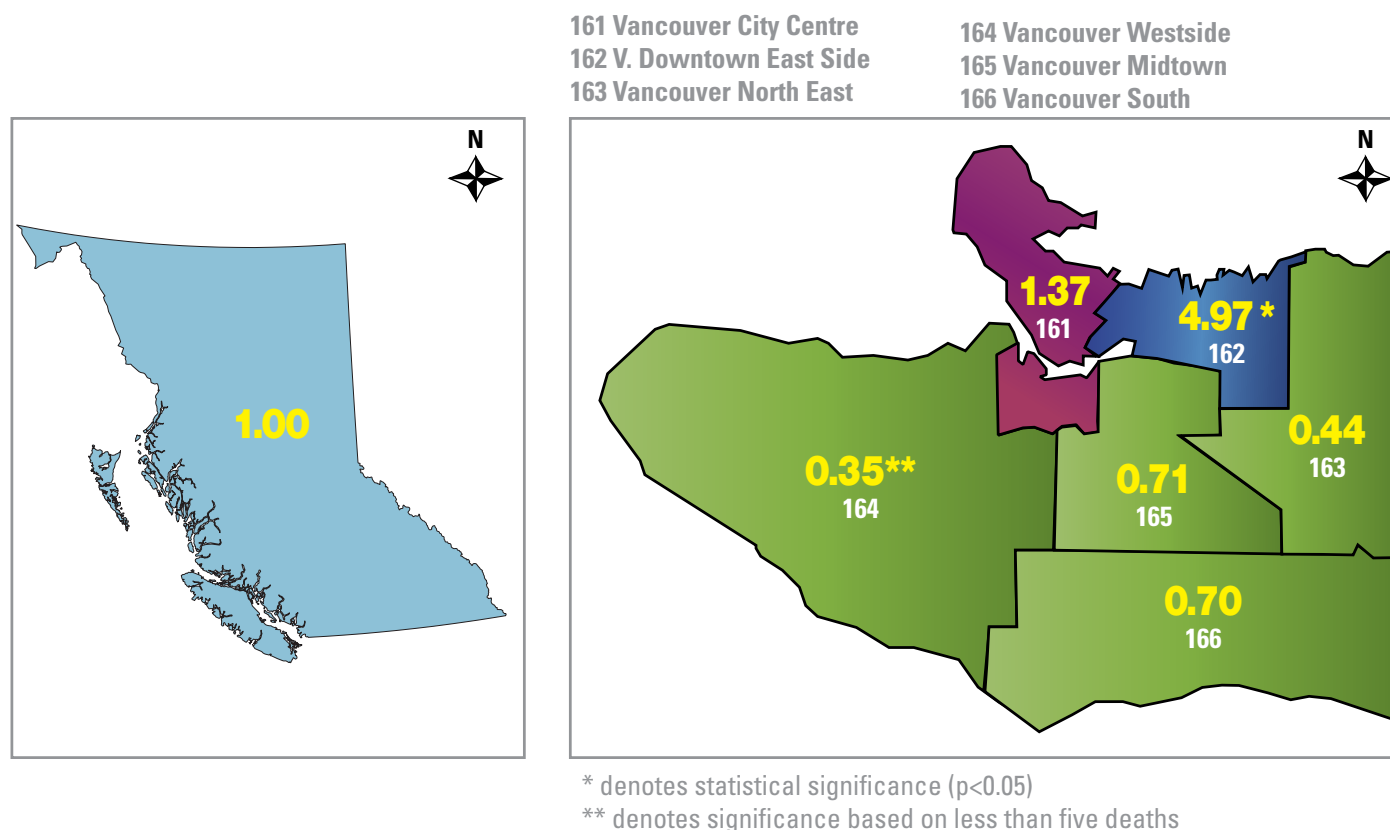


Figure 5.2 Standardized mortality ratio (SMR), drug-induced deaths in Vancouver by LHA, 2011¹¹**Table 5.2** Standardized mortality ratio (SMR), drug-induced deaths, 2006-2011¹¹

LHA	CHA	Description	2006-2010		2011		2011
			Deaths	SMR	Observed Deaths	Expected Deaths	SMR (95% Confidence Interval)
161	1	Vancouver - City Centre	86	1.24	17	12.43	1.37 (0.08-2.19)
162	2	Vancouver - DTES	188	5.11*	35	7.05	4.97* (3.46-6.91)
163	3	Vancouver - North East	29	0.55*	4	9.06	0.44 (0.12-1.13)
164	4	Vancouver - Westside	36	0.54*	4	11.47	0.35+ (0.09-0.89)
165	5	Vancouver - Midtown	33	0.71	6	8.48	0.71 (0.26-1.54)
166	6	Vancouver - South	31	0.46*	8	11.35	0.70 (0.30-1.39)
Provincial			2192	1.00	371	371	1.00 (0.90-1.11)

* denotes statistical significance ($p < 0.05$)

+ denotes significance based on less than five deaths

Illicit Drug Deaths

MORTALITY ATTRIBUTABLE (RELATED) TO SUBSTANCE USE

The Underlying Cause of Death from Vital Statistics was used to calculate deaths attributable to tobacco, alcohol and illicit drug use. All rates were standardized by age and sex using the 2001 BC population over 15 years of age as the standard. Mortality rates *attributable* to substance use declined for the period 2002-2011, although the decline is more substantial for tobacco than for alcohol and illicit drugs. As shown in Figure 5.3, death rates attributable to illicit drugs are lower than death rates attributed to alcohol and tobacco use.²⁰

Figure 5.4 shows mortality rates attributable to illicit drug use for each HA and for the whole province. VIHA consistently has the highest death rate related to drug use, although the rate shows a downward trend. The rate in NH reached its highest peak in 2010; rates in NH show the greatest variability but may be unstable due to small numbers. The highest decline in death rate was recorded in VCH, falling from 11 per 100,000 in 2005 to 6.26 cases per 100,000 residents in 2011.²⁰

Figure 5.3 Death rates related to substance use in BC, 2002-2011²⁰

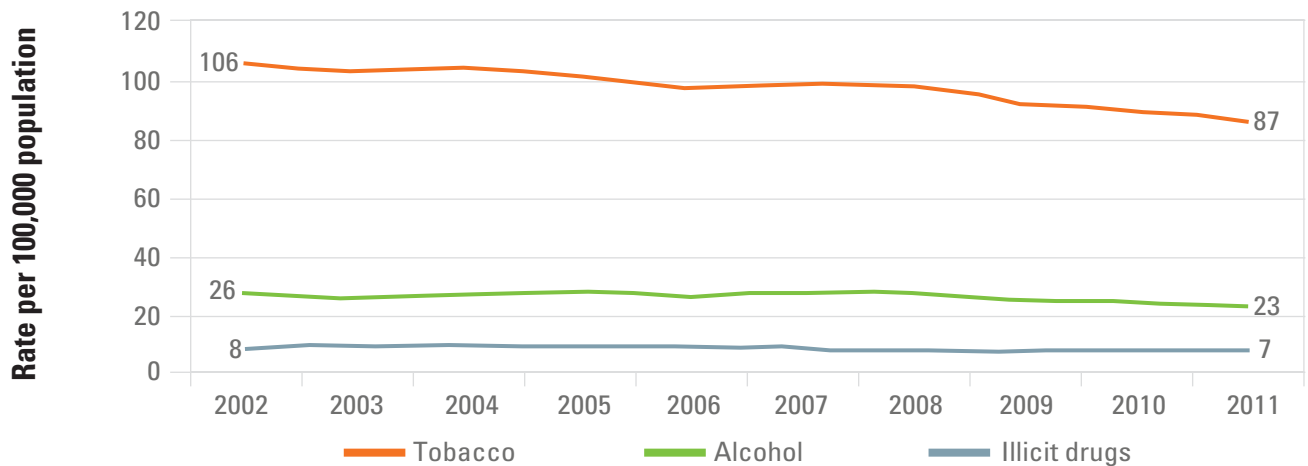


Figure 5.4 Mortality rates related to illicit drugs for BC and health authorities, 2002-2011²⁰

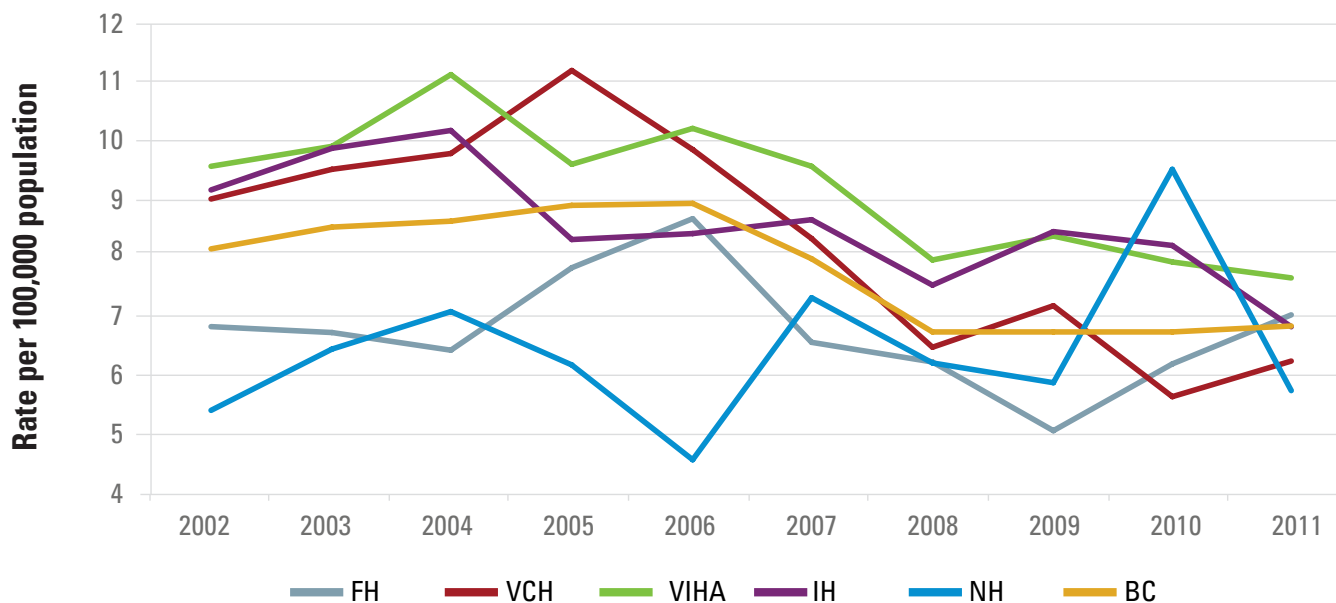
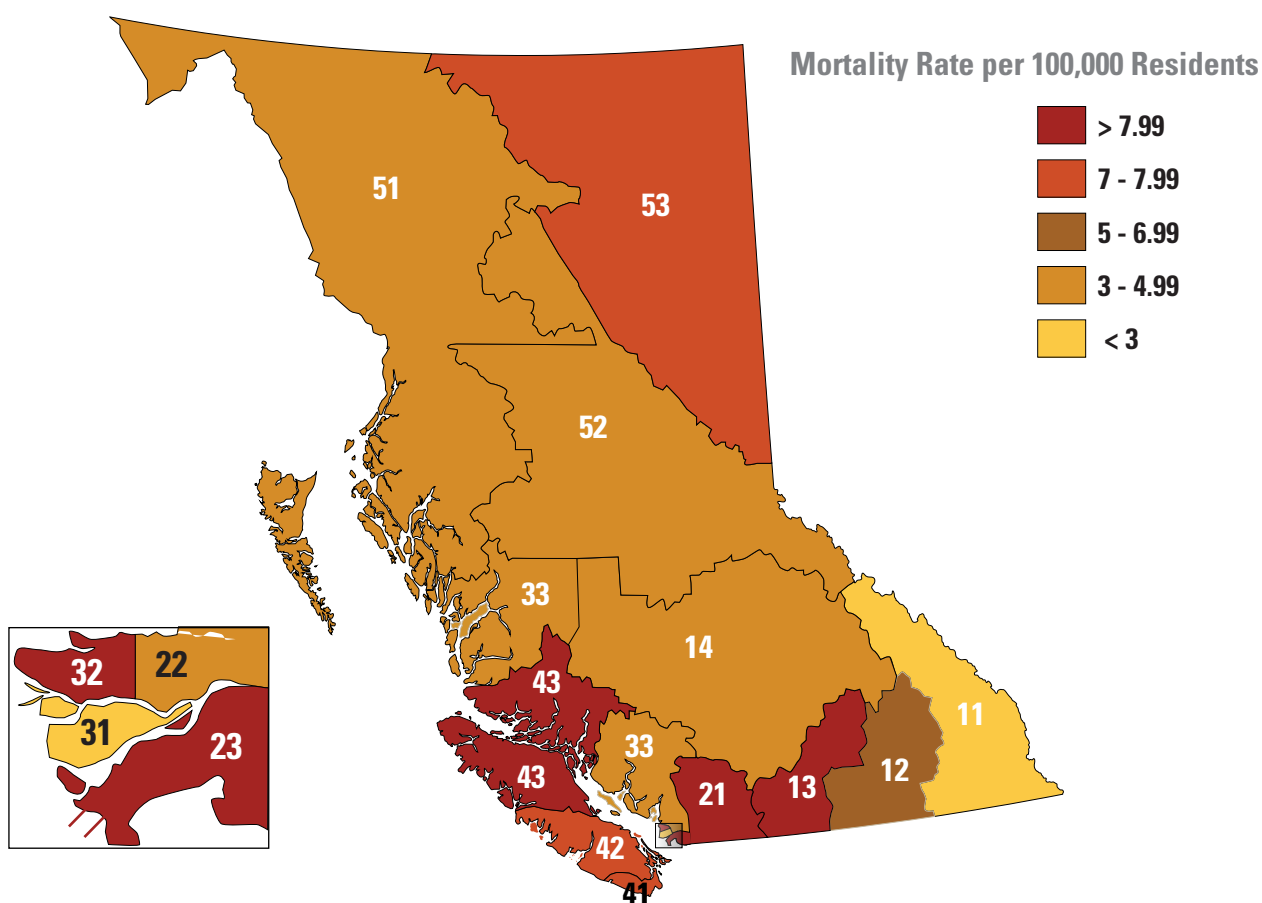


Table 5.3 Illicit drug-related mortality rates by HA. 2011²⁰

Health Authority	2011 Illicit Drug Attributable Mortality Rate per 100,000
Fraser Health	7.04
Vancouver Coastal Health	6.26
Vancouver Island Health	7.68
Interior Health	6.85
Northern Health	5.77

In 2011, there were eight HSDAs with death rates attributable to illicit drug use higher than the provincial rate i.e. above 7 per 100,000 (see figure 5.5). Fraser East was highest, followed by North Vancouver Island, Okanagan, Fraser South, Vancouver,

Northeast, South Vancouver Island and Central Vancouver Island. The lowest death rates were recorded in Richmond, East Kootenay and Fraser North.

Figure 5.5 Mortality rates attributable to illicit drugs by HSDA, 2011²⁰

11 East Kootenay (2.37)	23 Fraser South (8.94)	43 North Vancouver Island (9.33)
12 Kootenay Boundary (6.27)	31 Richmond (1.08)	51 Northwest (4.86)
13 Okanagan (8.94)	32 Vancouver (8.42)	52 Northern Interior (4.79)
14 Thompson Cariboo Shuswap (4.19)	33 North Shore/Coast Garibaldi (4.91)	53 Northeast (7.47)
21 Fraser East (9.88)	41 South Vancouver Island (7.38)	
22 Fraser North (4.18)	42 Central Vancouver Island (7.06)	

Illicit Drug Overdose Deaths (BC Coroners Service)

According to the Coroners Act (2007) all unnatural, sudden and unexpected, unexplained or unattended deaths in the province should be reported to, and investigated by, the BC Coroners Service.⁸⁰ This includes all deaths due to illicit drug use. The cause of death is established based on the information collected during investigation at the scene of death and information gathered from history, autopsy and toxicology results. A post-mortem examination (autopsy) may be required when the cause of death cannot otherwise be determined. An autopsy may not be required if a reasonable and probable cause of death can be deduced on the basis of the deceased's medical history, the circumstances surrounding the death and a careful examination of the body. Toxicological examination may be required when abuse of street drugs is suspected.

It can be performed at the Provincial Toxicology Centre or at the RCMP Forensic Laboratory if the case is part of criminal investigation. Screening tests for the most common drugs of abuse (ethanol, cannabinoids, cocaine, morphine, methadone, benzodiazepines) are followed by confirmatory tests. Screening for amphetamines/methamphetamines, LSD, PCP and other designer drugs may be done with specific requests based on history and lifestyle.⁸¹

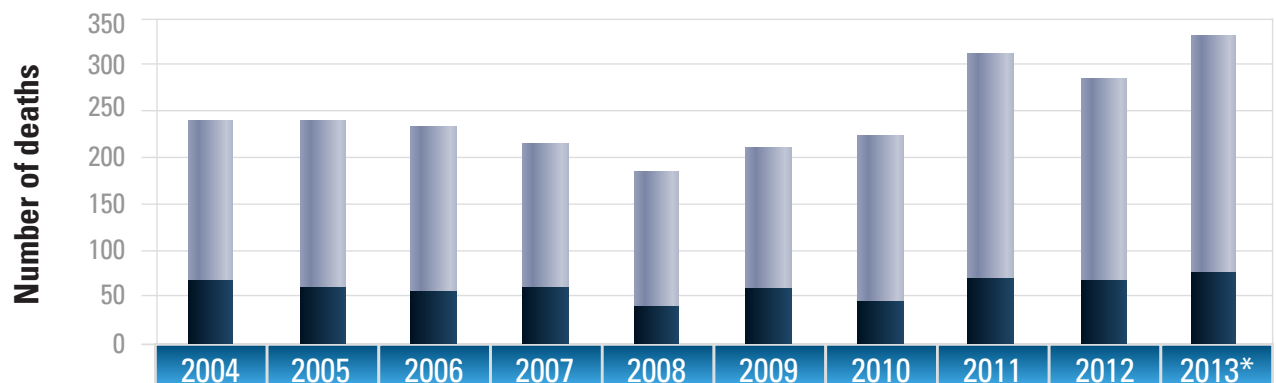
The BC Coroners Service provides monthly year-to-date illicit drug overdose death statistics, which are available to the Drug Overdose and Alert Partnership, on a password protected website. Deaths occurring in the previous 12 months may still be under investigation and should be considered provisional, thus previously reported data may change as cases are closed.

Although subject to change, the information is useful to identify trends and sudden increases. Please note that the BC Coroners Service geographic regions differ from the Health Authority (HA) and Health Service Delivery Area (HSDA) boundaries, making data comparisons difficult. For example, the Coroner's Northern Region contains areas that belong to Vancouver Coastal (Bella Coola Valley) and Interior Health (Cariboo-Chilcotin and 100 Mile House).

The Coroners Service shared provisional illicit drug overdose deaths between 2007 and 2012 including township. Sixteen communities had more than 20 deaths in that period. These communities were Vancouver (343), Surrey (182), Victoria (101), Burnaby (61), Kelowna (46), Kamloops (44), Abbotsford (42), Langley (29), Maple Ridge (28), Mission (27), New Westminster (27), Chilliwack (26), Prince George (25), Nanaimo (24), Vernon (22) and Coquitlam (21).⁸²

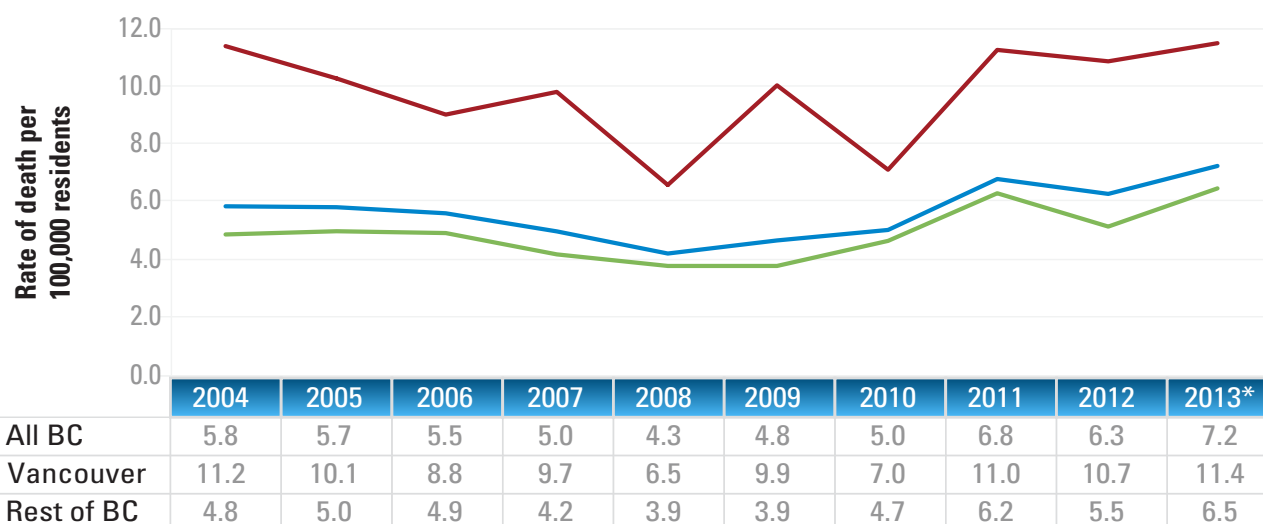
Illicit drug deaths reached a peak of 417 in BC in 1998 (191 of these in Vancouver). BC deaths were subsequently below 300 until 2011. Deaths in the City of Vancouver were relatively stable from 2004-2010. The rate of illicit drug deaths in 2013 in the City of Vancouver is higher than the rate in the rest of the province 11.4 per 100,000 in City of Vancouver, compared to 6.7 deaths per 100,000 in the rest of BC. A slight upward trend in the number and rate of illicit drug deaths has been observed in the past three years both in Vancouver and the rest of BC (Figure 5.6 and 5.7).

Figure 5.6 Number of illicit drug deaths in Vancouver and the rest of BC, 2004-2013



*Includes deaths that are still under investigation

(BC Coroners Service, personal communication, October 3, 2014)

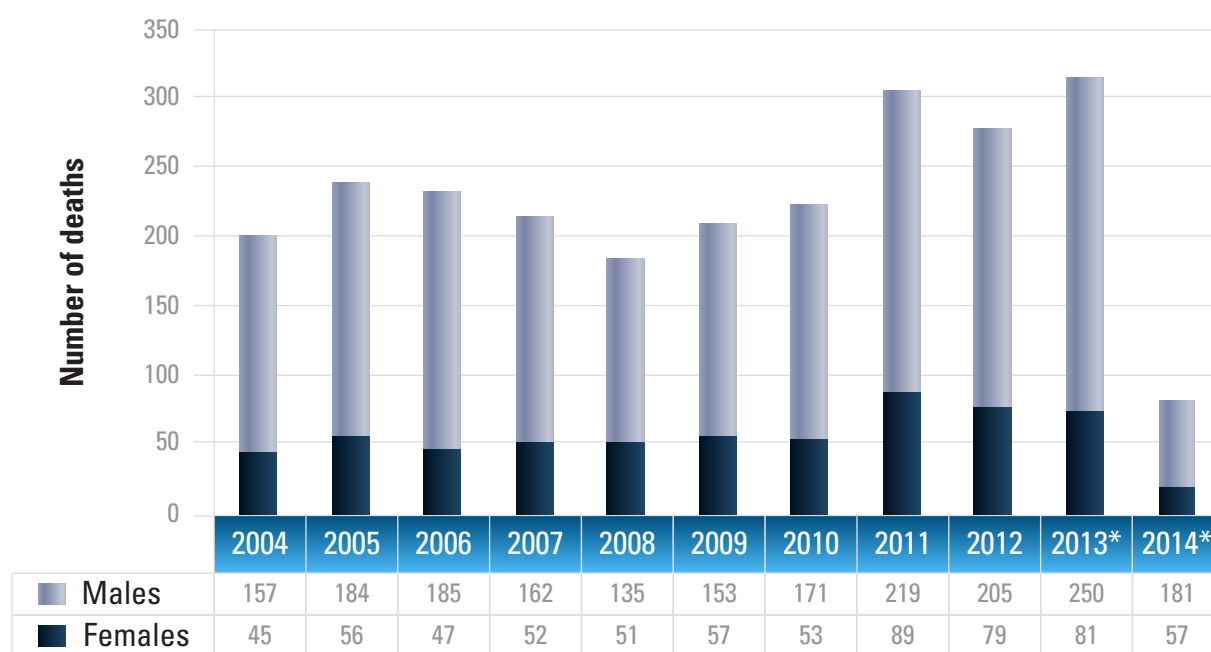
Figure 5.7 Rate of illicit drug deaths in Vancouver and the rest of BC, 2004-2013

*Includes deaths that are still under investigation

(BC Coroners Service, personal communication, October 3, 2014)

The number of male illicit drug deaths is consistently more than twice the number in females (Figure 5.8). From 2004 to 2010, the number of female illicit drug deaths ranged from 45-57 deaths,

with a mean of 52 deaths per year. During this period, male illicit drug deaths ranged from 135-185, with a mean of 164 deaths per year.

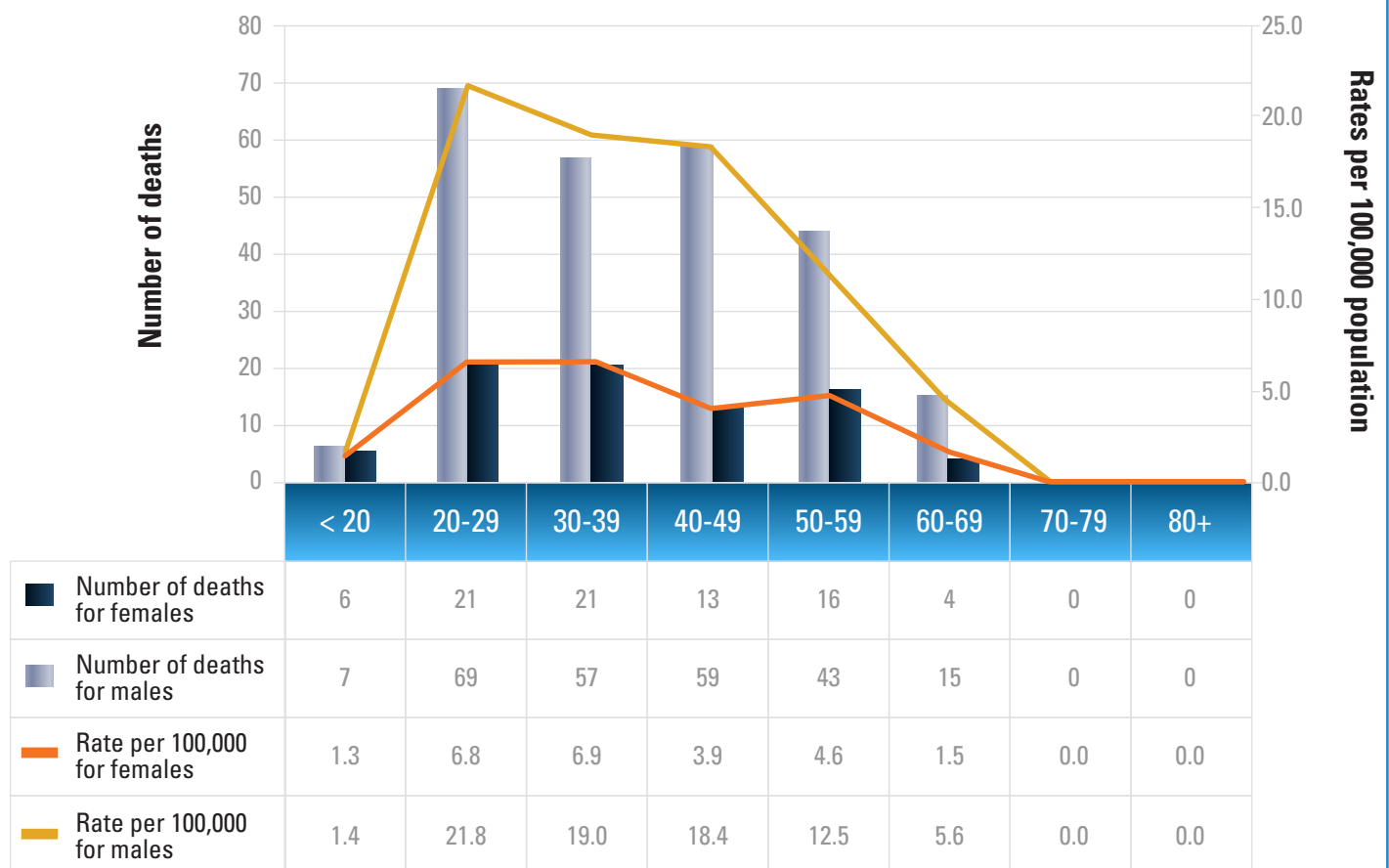
Figure 5.8 Illicit drug deaths in BC by gender, 2004-2014*

Includes cases still under investigation; 2014 only includes deaths reported between January 1 and April 30
(BC Coroners Service, personal communication, October 3, 2014)

The distribution of illicit drug deaths in 2013 across the different age groups in males and females is shown in Figure 5.9. The greatest number of drug-induced deaths in males occurred in

the 20-29 age group. This is a change from the previous report in 2007, which had the greatest number of fatalities in the 30-39 age group, suggesting a trend towards younger age of death.

Figure 5.9 Illicit drug deaths in BC by age and gender, 2013*



*Includes deaths that are still under investigation

(BC Coroners Service, personal communication, October 3, 2014)

Classification of Illicit Drug Deaths

The large majority of illicit drug deaths are classified as accidental and this trend has been consistent since 2005. From 2005-2012, accidental illicit drug deaths accounted for about 90% of all illicit drug deaths. Suicide is determined on the balance of probabilities. The element of intent is a key defining characteristic of suicide (implicit, explicit, or both). The Coroner

must be satisfied that the person intended to end his/her own life; thus a determination of suicide is made when there is clear and cogent evidence. A greater proportion of deaths remain undetermined in 2013 and 2014 as cases are still under investigation (Figure 5.10).

Figure 5.10 Illicit drug deaths in BC by classification, 2005-2014*

* Includes cases still under investigation; 2014 only includes deaths reported between January 1 and April 30

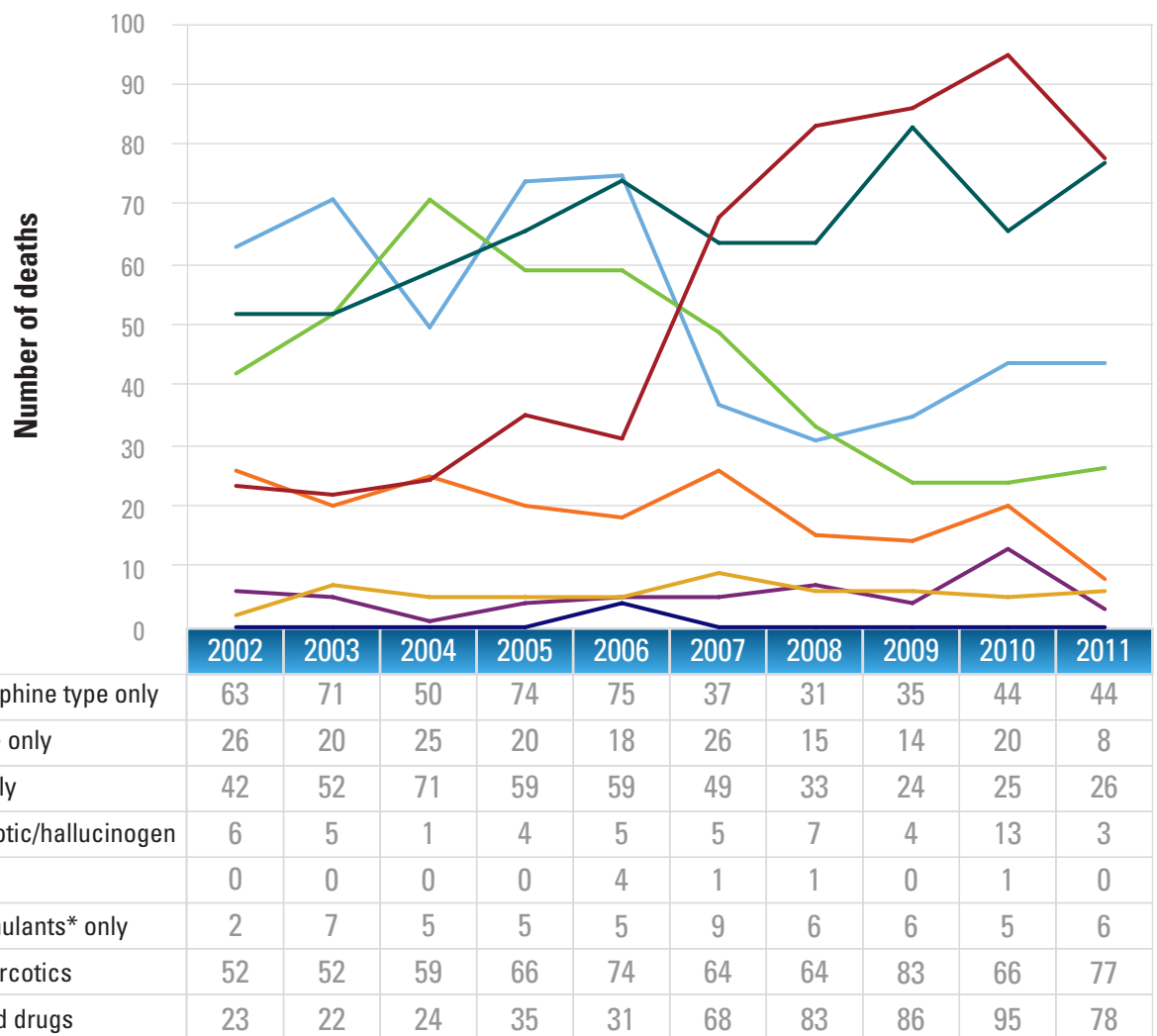
** Death due to injury inflicted by the action of another person. Homicide is a neutral term that does not imply fault or blame.
(BC Coroners Service, personal communication, October 3, 2014)

■ Illicit Drug Deaths by Type of Drug

Using data from BC Vital Statistics Agency, Figure 5.11 shows the ten-year trends in illicit drug overdose deaths from 2002 to 2011. Overdose deaths due to heroin/morphine declined 2006 to 2008, but have risen slightly since. Overdose deaths due to cocaine alone have declined steadily since 2004 but those due to mixed drugs and multiple narcotics (opioids) have generally increased over the past 5 years and remain the leading cause of death due to illicit drug overdose.¹¹

The illicit use of prescription drugs has been a long standing problem which has become more prominent in recent years with

the appearance of illicit fentanyl on the street drug market. Illicit fentanyl is manufactured in clandestine laboratories and sold on the streets as oxycodone (fake oxy) pills or heroin powder.³⁹ Because of its higher potency, the risk of accidental overdose with fentanyl is much higher and may take larger doses of naloxone to reverse. There was an increase in fentanyl related deaths from 15 in 2012 to 51 in 2013, and 49 in first eight months of 2014.⁴⁰ More information about fentanyl can be found in the [Drug Trends](#) section.

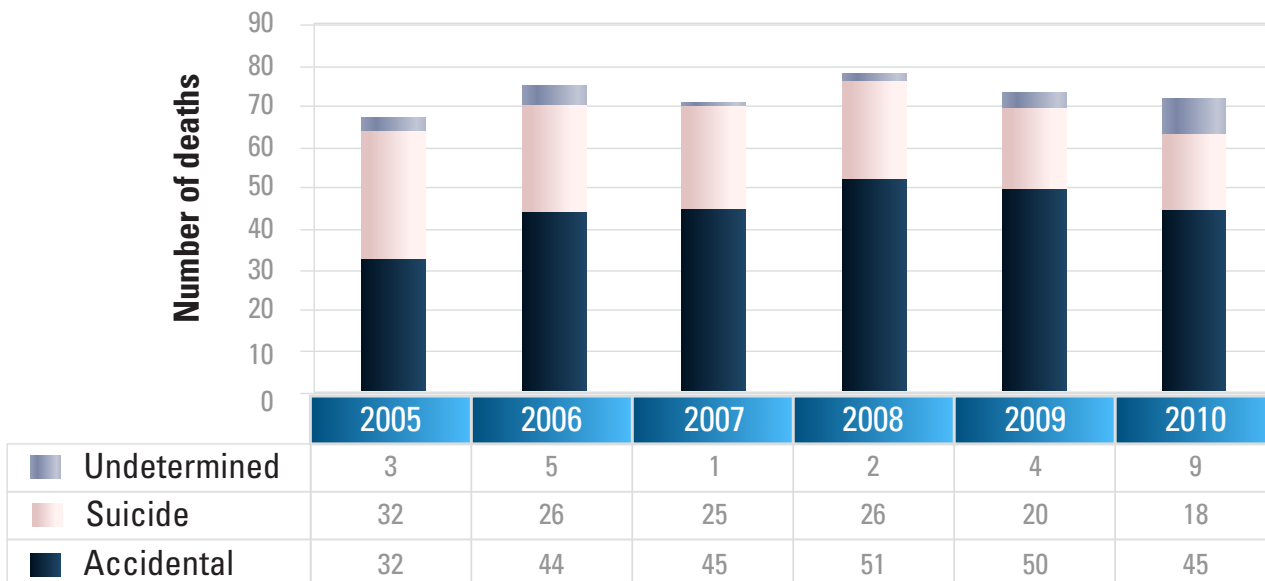
Figure 5.11 Illicit drug overdose deaths in BC by type of drug, 2002-2011¹¹

*ICD-10 codes for psychostimulants include "crystal methamphetamine" and "ecstasy"

MORTALITY DUE TO PRESCRIPTION OPIOID-RELATED OVERDOSE

The BC Coroners Service also reports overdose deaths due to prescribed opioids (codeine, hydrocodone, hydromorphone, meperidine, morphine, oxycodone and fentanyl) used alone or in combination with other opioids, benzodazepines, antidepressants and alcohol. Deaths where illicit use of prescription drugs was implicated were excluded. The highest rate of overdose death due to prescription opioids was recorded in

the Interior Health (2.8 per 100,000 population). Males and females are equally represented (51.1 vs. 48.9 %) with the highest number of deaths recorded in older age groups (40-59 years). In comparison to illicit drug overdose deaths (Figure 5.10), a greater proportion of deaths due to prescription drug overdose are classified as suicide as shown in Figure 5.12.⁸³

Figure 5.12 Prescription opioid-related overdose deaths in BC by classification, 2005-2010⁸³**MORTALITY DUE TO PSYCHOSTIMULANT USE**

Psychostimulants in the BC Vital Statistics Agency Annual Report are defined as “crystal methamphetamine” and “ecstasy”, but in recent years these substances have appeared on the market unpurified and mixed with other substances. These substances include New Psychoactive Substances (NPS) such as piperazines and analogues of methcathinone and para-methoxymethamphetamine (PMMA), which are not routinely tested for in BC Coroners’ investigations.⁸⁴ The BC Coroners Service reports illicit drug deaths where MDMA (ecstasy) is detected alone or in combination with other drugs and includes all deaths due to overdose and other causes (i.e. drowning, fall, carbon monoxide poisoning, aspiration, motor vehicle accidents). Table 5.4 shows the number of MDMA-related deaths for each Coroners Region from 2006 to 2012.⁸⁵

The BC Coroner’s Office released a bulletin in January 2012 regarding deaths where PMMA was detected and it was implicated as the primary toxic agent causing death. Between August 2011 and April 2012 seven deaths were identified where PMMA was implicated in BC (3 males, 4 females; mean age was 22 years). In Alberta 20 PMMA implicated deaths were reported. Organ failure and serotonin syndrome, with very high temperature, seizures and unconsciousness occurred. In BC public health and law enforcement actively reached out to school and university populations, Dance Safe and online drug-user websites to inform potential users of ecstasy.

Table 5.4 MDMA-related deaths by coroners regions, 2006-2012⁸⁵

Region	2006	2007	2008	2009	2010	2011	2012	%
Fraser	5	5	7	2	6	4	4	30.8
Interior	-	3	1	5	5	3	1	16.8
Island	1	2	1	5	4	2	1	15.0
Metro	-	3	11	6	3	5	5	30.8
Northern	1	-	3	3	-	-	-	6.5
Total	7	13	23	21	18	14	11	100