Child Mortality in British Columbia

2011

Prepared by the Child Death Review Unit of the British Columbia Coroners Service

BC Coroners Service
Ministry of Public Safety and Solicitor General

Released September 2016

TABLE OF CONTENTS

INTRODUCTION

ABOUT THE CHILD DEATH REVIEW UNIT

By law, every child's death in British Columbia is reported to the Coroners Service, an agency within the Ministry of Public Safety and Solicitor General. Once the coroner's investigation is concluded, all deaths are additionally reviewed by the Coroners Service Child Death Review Unit (CDRU). Under the *Coroners Act (2007)*, the CDRU has a legislated mandate to review, on an individual or aggregate basis, the facts and circumstances of child deaths in British Columbia for the purposes of discovering and monitoring trends in child deaths, and determining whether further evaluation of the deaths of children is necessary or desirable in the public interest. In fulfilling its mandate the CDRU reviews child deaths considering the impact of public health and safety and how to prevent similar child deaths in the future.

ABOUT THIS REPORT

Purpose

This report presents findings of the 294 deaths of children occurring in British Columbia during 2011. This report consists primarily of descriptive data intended to characterize child mortality in British Columbia through demographics, causes and circumstances surrounding the death of these children.

This report summarizes recommendations distributed by the BCCS in 2011, but does not formulate new recommendations pertaining to policy, practices and services. Those will be included in future CDRU special reports, which will provide in depth discussion and analysis of specific causes of infant and child death.

Key terms

The *Coroners Act* defines a **child** as a person under the age of 19 years. In some contexts, child mortality may be used to refer to deaths of infants and children under the age of five. For the purposes of this report, child mortality refers to the deaths of children under the age of 19, and children have been grouped by their age at the time of death as follows: neonate (0-28 days), infant (29 to 365 days), 1-4 years, 5-9 years, 10-14 years, and 15-18 years.

Limitations and confidentiality

Examining individual causes of child mortality in a given year in B.C. often involves analyzing and reporting on a relatively small number of events, which can present challenges both in protecting privacy and ensuring data accuracy. Under the *Coroners Act* and *Freedom of Information and Protection of Privacy Act*, provisions are made that allow the BC Coroners Service to disclose information to meet its legislative mandate and support the findings and recommendations generated by the review process. The BC Coroners Service is sensitive to the privacy of the children and families that we serve and proceeds with caution when reporting case review findings. Efforts have been made throughout the report to mitigate risks associated with analyzing and reporting on small case numbers, including collapsing data categories. In general, statistical results based on a small number of cases should be interpreted with caution given the potential for random variation.

Small discrepancies in mortality counts and rates may be evident between BCCS mortality data and that of BC Vital Statistics. This discrepancy is attributable to coding differences between the two agencies and the time delay involved in reconciling any changes between preliminary and final certifications of death. Small discrepancies could also arise with future reports as six cases were still under investigation at the time of writing.

Of note, there are slight variations between BC Coroners Service regions and the regional boundaries applied by other agencies in the province, including the Regional Health Authorities and the Ministry of Children and Family Development. A map and descriptions of the BCCS regional boundaries are provided in Appendix A.

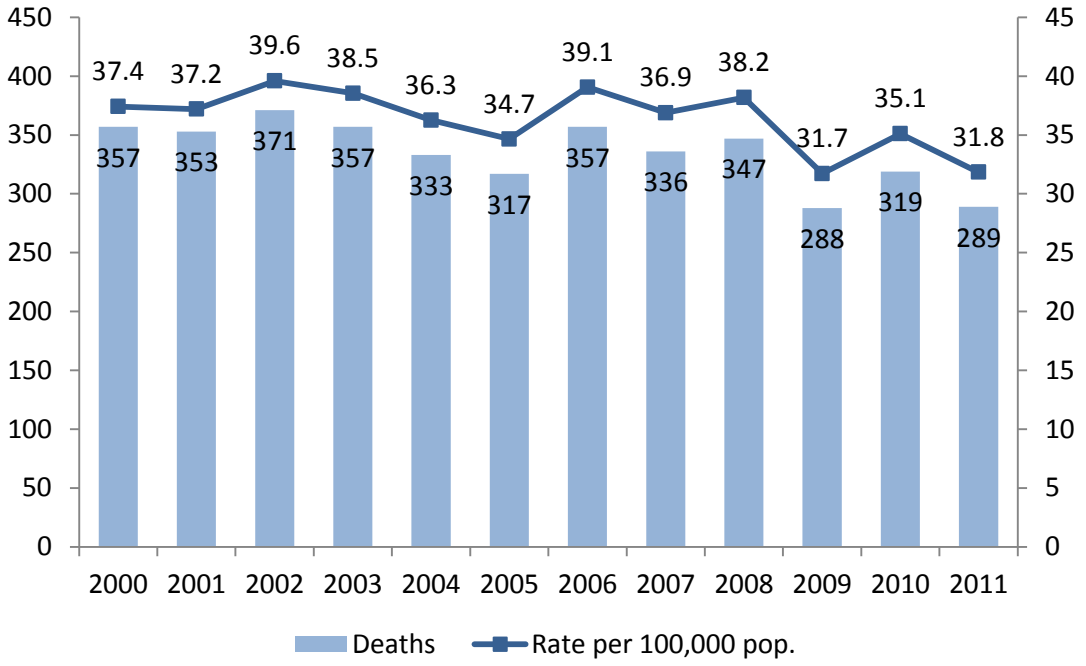
In this report mortality data is presented based on health authority boundaries. This is a change from previous BCCS reports and was done to improve use of BCCS findings for planning or delivering health services.

OVERVIEW OF CHILD MORTALITY IN BRITISH COLUMBIA

Although tragic and devastating to the families, friends and communities, children's deaths are a relatively rare event in British Columbia, especially beyond infancy. There were an estimated 907,631 children age 0-18 in British Columbia in 2011, and 294 child deaths, a rate of death of 32.4 children per 100,000 population.

In September of 2007, a revision to the Coroners Act specified that all child deaths must be reported to the BCCS. As a result of this legislative change, a greater number of child deaths are investigated each year, beginning 2008, than in previous years. This increase is primarily in natural deaths. As the BCCS did not investigate all child deaths in BC until 2008, Figure 1 (below) uses British Columbia Vital Statistics Agency counts for child deaths by year for 2000 to 2011. However, BC Vital Statistics data and BCCS data are not directly comparable due to coding differences between the two agencies and the time delay involved in reconciling any changes between preliminary and final certifications of death.

Figure 1. Child deaths, British Columbia, 2000-2011*



** This figure presents BC Vital Statistics Agency death data*

While identifying how many children die each year in British Columbia provides valuable information about overall child mortality, looking at child deaths in terms of specific causes and ages provides a more meaningful picture. This is particularly important when looking at any future preventative opportunities. Patterns of mortality change as children progress from birth to adolescence. Children experience changing risk exposure as they move through different ages and stages of development, resulting in a shift of leading causes of mortality from primarily biological conditions to predominantly injury causes. This is reflected in Table 1 which lists the three most common causes of death within the different age groups identified in this report for 2011.

TABLE 1

Leading causes of child death by age group, 0-18 years, BC, 2011

Rank	Under 1 year	1-4 years	5-9 years	10-14 years	15-18 years
1	Perinatal causes	Unintentional injuries	Cancers/ Unintentional injuries	Unintentional injuries	Unintentional injuries
2	Congenital and chromosomal anomalies	Neurologic and nervous system diseases	Cancers/ Unintentional injuries	Cancers	Suicide
3	Undetermined causes of sudden infant deaths	Congenital and chromosomal anomalies	Congenital and chromosomal anomalies	Suicide	Cancers/ Homicide

Notes:

** A forward slash ("/") indicates that there were the same number of deaths for each cause of death*

In general, children are most vulnerable to illness or death during the neonatal period of infancy (Table 2). Following the neonatal period, mortality rates decline and remain lower throughout early childhood. As children's physical and cognitive abilities, degrees of dependence, activities and risk behaviours change rapidly with age their vulnerability to external causes of mortality also increases.[1] Mortality rates increase once again as children approach adolescence, when injuries take over as the leading cause of child death.

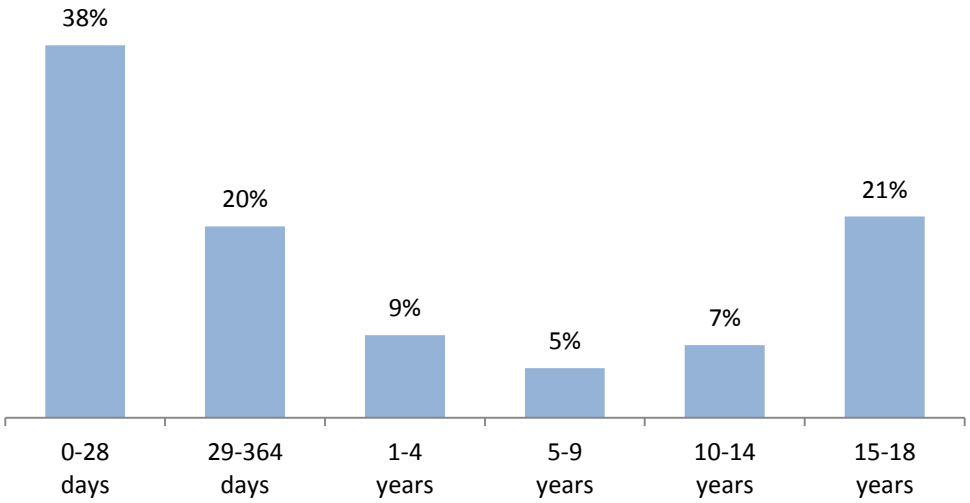
TABLE 2

Child deaths by age group, 2011		
Age Group	# Deaths	Death Rate*
0-28 days	113	256.9
29-365 days	58	131.8
1-4 years	25	14.0
5-9 years	15	6.8
10-14 years	22	9.2
15-18 years	61	27.2
Total	294	32.4

** Death rate is per 100,000 live births for children less than 1 year, and per 100,000 population for children aged 1 to 18 years*

Overall, the greatest percentage of child deaths in 2011 were infants less than 29 days (38%), followed by children 15 to 18 years of age (21%) and infants 29 to 364 days (20%) (Figure 2).

Figure 2. Percentage of child deaths by age group, 2011



Health Authority differences in child mortality in 2011

Children living in the Fraser Health Authority accounted for the highest percentage of deaths in 2011; however, Northern Health Authority had the highest child mortality rate (Table 3). In 2011, the Northern Health Authority was the only region with a child mortality rate higher than the provincial rate.

TABLE 3

Child deaths by Health Authority of residence, 2011			
Region	Deaths	%	Rate per 100,000 pop.
Fraser	118	40%	31.9
Vancouver Coastal	46	16%	24.0
Interior	45	15%	32.1
Island	42	14%	30.8
Northern	36	12%	51.2
Lived outside BC	7	2%	n/a
Total	294	100%	32.4

BC Coroners Service Categorization of Deaths

The BC Coroners Service categorizes child deaths into three main cause groups:

Group One: Natural Causes

Natural deaths refer to fatalities primarily caused by an internal disease process, such as an underlying medical condition or acquired illness, or from complications of the condition or treatment. In cases of natural death, the child is generally under the care of a physician and death is often expected. Occasionally, natural death is sudden and unexpected due to a previously undiagnosed medical condition or sudden unexpected deterioration.

Group Two: Injury Causes

Injury deaths include fatalities caused by damage to the body from external forces as well as when vital elements such as heat or oxygen are denied. Injury deaths are generally classified as **unintentional** (not purposely inflicted, such as death due to a motor vehicle crash), or as **intentional** (purposely inflicted by self or others, such as death due to suicide or homicide).

Group Three: Undetermined Causes

Undetermined causes include deaths that (because of insufficient evidence or inability to otherwise determine) cannot be reasonably categorized as natural or injury deaths. This includes cases of sudden infant deaths and fatalities due to other unknown or undetermined causes.

The distribution of natural deaths is primarily centralized to hospital and health care facilities in larger, urban cities. In contrast, injury death locations are scattered throughout the province, demonstrating both the wide dispersal of injury events throughout B.C., and the immediacy of the fatal event, as the child often did not survive to be transported to hospital. Undetermined deaths commonly occur in the child's home, with no transport out of community.

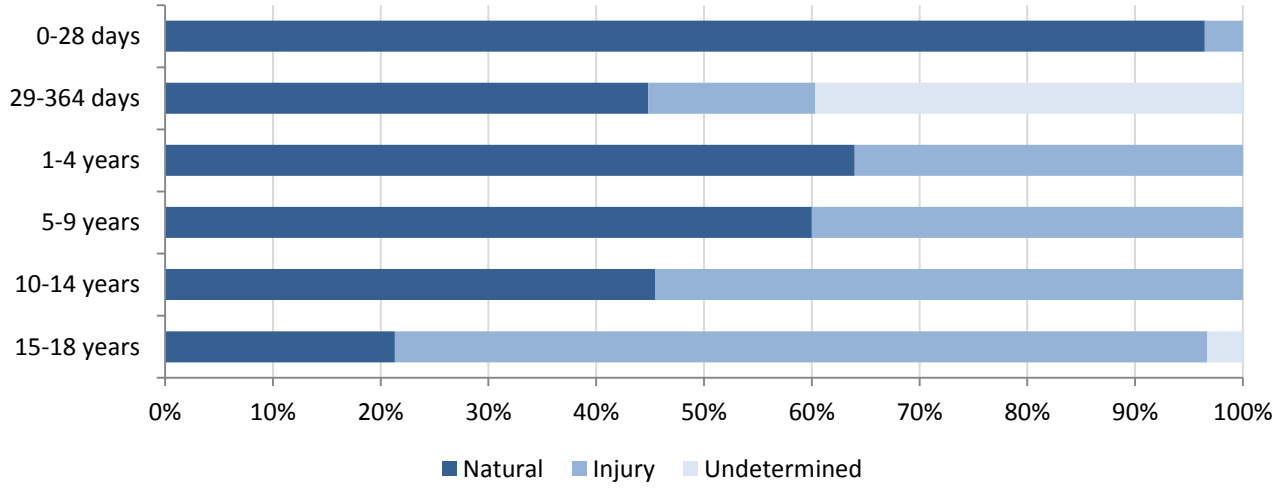
Table 4 shows that overall, natural causes of death comprise the greatest proportion of deaths involving children (62%) and that most of the natural deaths occur in the first 28 days of life (60%). Injury deaths comprise the second greatest proportion of deaths involving children (29%) and most injury deaths occur in young people aged 15 to 18 (53%). Undetermined causes of death accounted for 8% of all child deaths and occur most often with infants aged 29 to 364 days (92%). Figure 3 shows that the cause of death varies considerably within different age groups.

TABLE 4

Child deaths by main cause and age group, 2011

Age Group	Natural	Injury	Undetermined	Total
0-28 days	109	4	-	113
29-364 days	26	9	23	58
1-4 years	16	9	-	25
5-9 years	9	6	-	15
10-14 years	10	12	-	22
15-18 years	13	46	2	61
Total	183	86	25	294

Figure 3. Distribution of child deaths by main cause and age group, 2011



SECTION TWO

CHARACTERISTICS OF CHILD DEATHS

DEATHS UNDER 12 MONTHS OF AGE

Number of deaths: 171 (71 Females and 100 Males) **Mortality Rate:** 3.9/1,000 live births

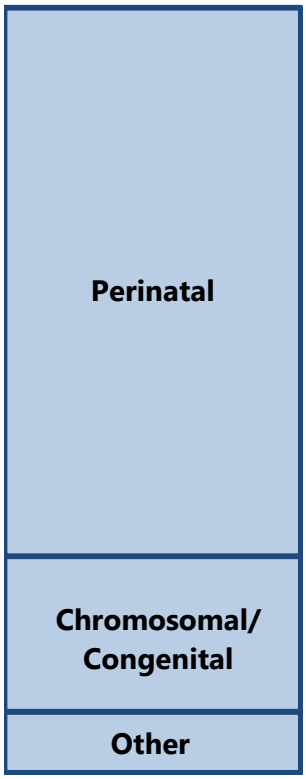
British Columbia had one of the lowest infant mortality rates in Canada in 2011 (3.9 deaths per 1,000 live births vs. the Canadian average of 4.8 deaths).

In 2011, two thirds of infants that died in BC died in their first month of life (the neonatal period) (Figure 4). This group will be considered separately (below) from infants aged 29-364 days.

Neonates (0-28 days)

Number of deaths: 113 (52 Females and 61 Males) **Mortality Rate:** 2.6/1,000 live births

Leading Causes of Death:



The majority (92%) of deaths of infants in their first month were caused by prematurity, perinatal complications and congenital anomalies.

The majority of 0-28 day olds who died in BC in 2011 were premature; 13% were born preterm (29-37 weeks) and 72% were born extremely preterm (28 weeks or less).

Maternal or pregnancy-related factors influence infant mortality risk, beginning with complications during pregnancy. Complications during pregnancy such as high blood pressure, incompetent cervix, preterm labour, gestational diabetes or premature rupture of membranes were present in almost three quarters of the infants who died of natural causes in 2011.

Males accounted for 54% of the deaths in this age group and females 46%.

Infants aged 29-364 days

Number of deaths: 58 (19 Females and 39 Males) **Mortality Rate:** 1.3/1,000 live births

Leading Causes of Death:

Undetermined
Chromosomal/ Congenital
Unintentional Injuries
Other

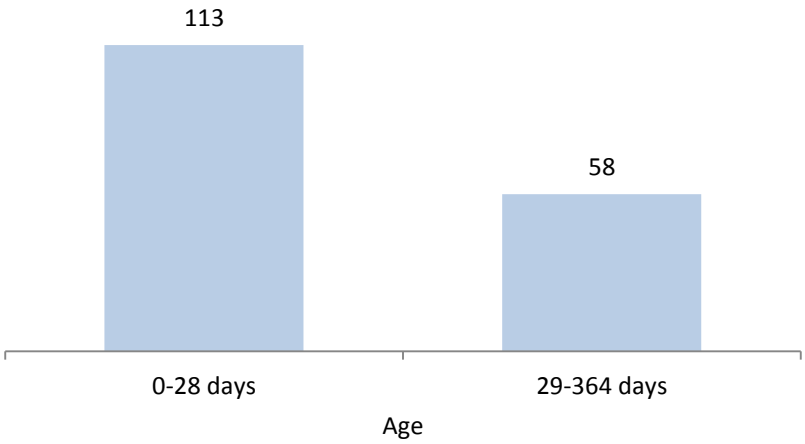
After the first month of life (the post-neonatal period), sudden unexplained infant deaths rise in incidence and become the leading cause of infant mortality. Prematurity, perinatal complications and congenital anomalies decreased to 33% of cases.

In comparison with neonates:

- A greater proportion of decedents were male (67%)
- A smaller proportion were born prematurely (33% preterm; 7% extremely preterm)
- Maternal or pregnancy-related factors were noted less frequently (less than 20% of cases)

Age:

Figure 4. Child deaths, <1 year, 2011



DEATHS BETWEEN 1 AND 4 YEARS OF AGE

Number of deaths: 25 (11 Females and 14 Males) **Death Rate:** 14.0/100,000 population

Leading Causes of Death:

Unintentional Injuries
Neurologic/ Nervous System
Chromosomal/ Congenital
Cancers
Other

The three leading causes of death in this age group accounted for nearly 70% of all the deaths.

Unintentional injuries were the leading cause of death and accounted for a third of the deaths for children between the ages of 1 and 4 years old in 2011. The leading causes of injury death were fire (n=3) and motor vehicle incidents (n=3).

Neurologic/nervous system diseases accounted for 20% of deaths, chromosomal/congenital anomalies for 16% of deaths, and cancers for 12% of the deaths in this age group.

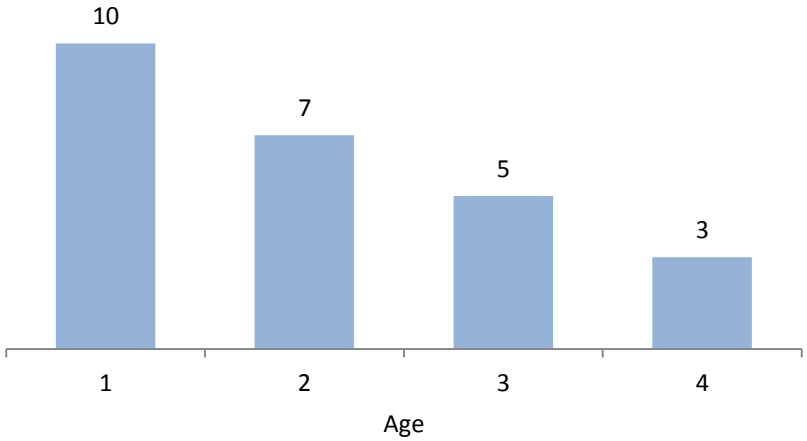
Metabolic diseases, respiratory conditions, and homicide were the causes of death captured in the "other" category.

Figure 5 shows that the number of deaths decreased with age within this age group.

In 2011, 56% of the deaths in this age group were males and 44% were females.

Age:

Figure 5. Child deaths, 1-4 years, 2011



DEATHS BETWEEN 5 AND 9 YEARS OF AGE

Number of deaths: 15 (6 Females and 9 Males) **Death Rate:** 6.8/100,000 population

Leading Causes of Death:

In 2011 cancers and unintentional injuries were the leading causes of death among 5 to 9 year old children, each accounting for 33% of deaths.

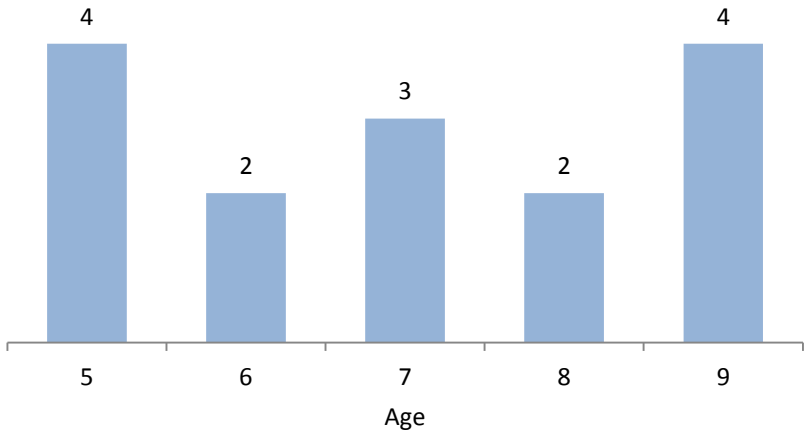
Chromosomal/congenital anomalies were the third leading cause of death in the 5 to 9 year old age group accounting for 13% of the deaths.

In 2011, more male children died than female children (60% and 40% respectively).

Unlike the 1 to 4 age group, the number of deaths in 5 to 9 year olds did not continue to decrease as children got older (Figure 6). Although the number of deaths varies by age there is no discernible pattern.

Age:

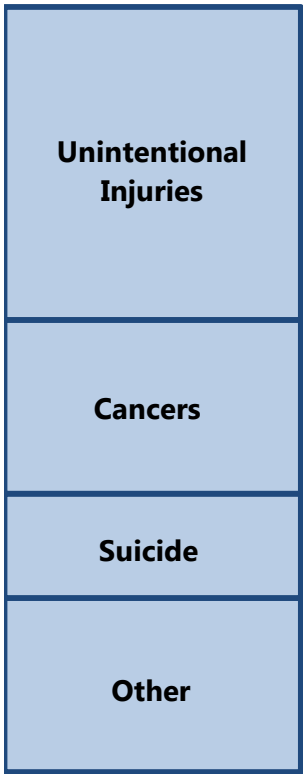
Figure 6. Child deaths, 5-9 years, 2011



DEATHS BETWEEN 10 AND 14 YEARS OF AGE

Number of deaths: 22 (10 Females and 12 Males) **Death Rate:** 9.2/100,000 population

Leading Causes of Death:



In 2011, the leading cause of death in 10 to 14 year olds was unintentional injuries which accounted for approximately 40% of all the deaths. Motor vehicle incidents were responsible for the majority of the accidental deaths.

Various forms of cancers were the second leading cause of death, accounting for 23% of all deaths in this age group.

Suicide was the third leading cause of death among 10 to 14 year old children, accounting for 14% of deaths.

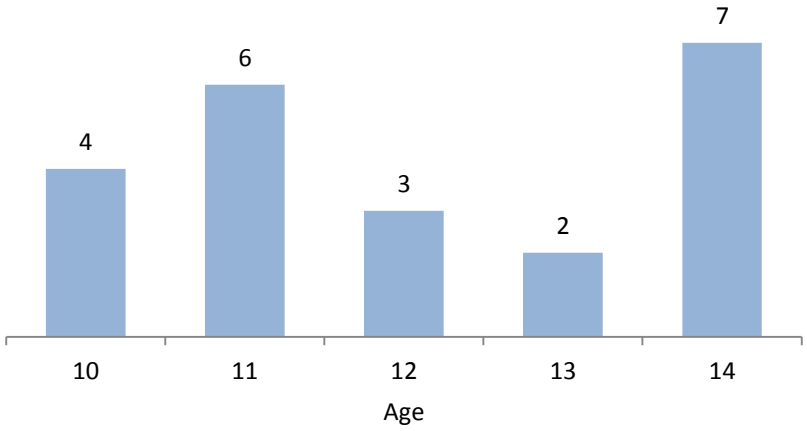
Sepsis was the most common cause of death in the 'other' category.

Overall, 55% of the decedents were male and 45% were female.

Figure 7 shows the number of deaths across the 10 to 14 year old age group. Although the number of deaths varies by age there is no discernible pattern.

Age:

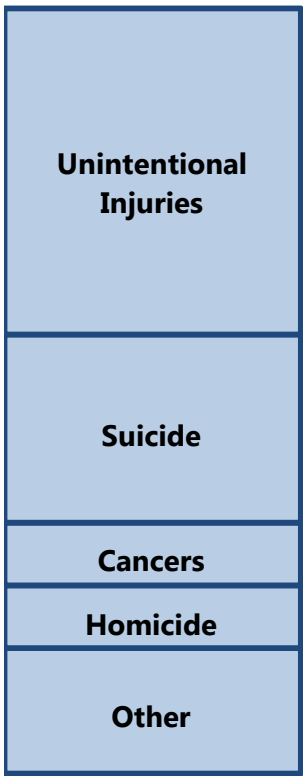
Figure 7. Child deaths, 10-14 years, 2011



DEATHS BETWEEN 15 AND 18 YEARS OF AGE

Number of deaths: 61 (21 Females and 40 Males) **Death Rate:** 27.2/100,000 population

Leading Causes of Death:



Among children aged 15 to 18 years, three of the four leading causes of death in 2011 were injury-related (unintentional injuries, suicide and homicide). Collectively, injuries accounted for 75% of all child deaths involving 15 to 18 year olds.

Of deaths due to unintentional injuries, motor vehicle crashes were responsible for the greatest number of deaths accounting for 58% of unintentional injury deaths. An additional 15% were attributed to accidental alcohol or other drug overdoses.

25% of deaths in this age group were due to suicide. Of the 15 young people who died as a result of suicide in 2011, 67% were males and 33% were females.

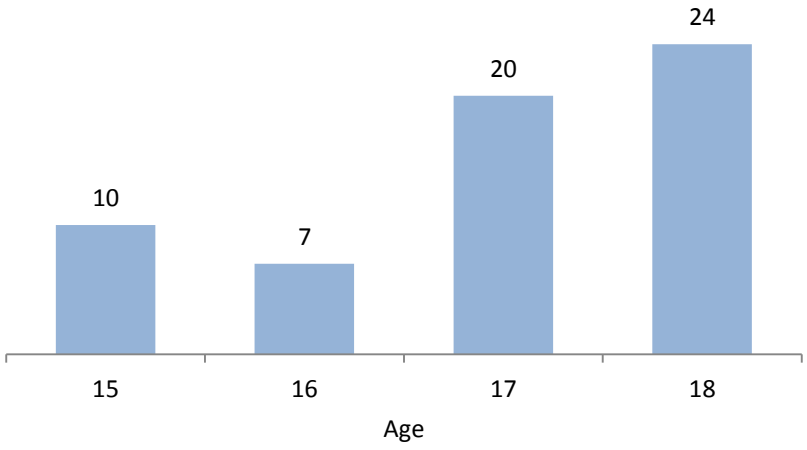
Homicides and cancers each accounted for 8% of the deaths among 15 to 18 year olds.

For this age group, more males died than females (66% and 34% respectively).

A higher number of deaths within this age group occurred at ages 17 and 18 in 2011 (Figure 8).

Age:

Figure 8. Child deaths, 15-18 years, 2011

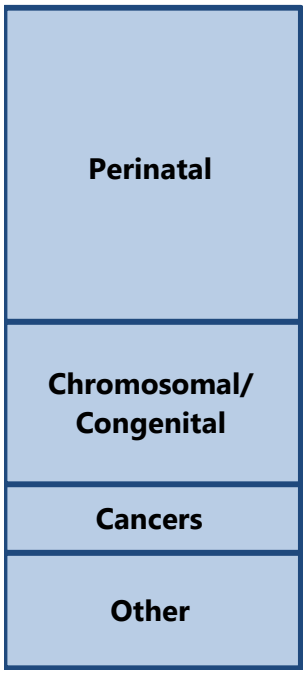


CHILD DEATHS BY CAUSE:

NATURAL DEATHS

Number of deaths: 183 (78 Females and 105 Males)

Leading Causes of Natural Death:



In 2011, 183 (62%) of the 294 child deaths that occurred in B.C. were due to natural causes. The majority of natural deaths were infants who died in the first month of life.

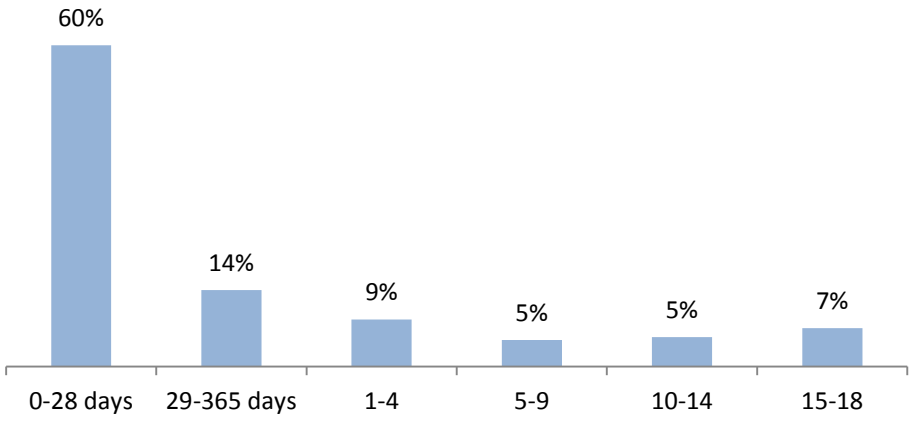
In 2011, leading causes of natural death include conditions originating in the perinatal period (47%), followed by congenital malformations and chromosomal abnormalities (25%), and cancers (10%). Leading causes of natural child death in 2011 are consistent with longitudinal patterns observed in British Columbia since 2000.

In 2011, males accounted for 57% of natural deaths and females for 43%.

As figure 9 demonstrates, almost three quarters of the children who died of natural causes in 2011 were under the age of one, with the majority of natural infant deaths occurring in the first month of life.

Age:

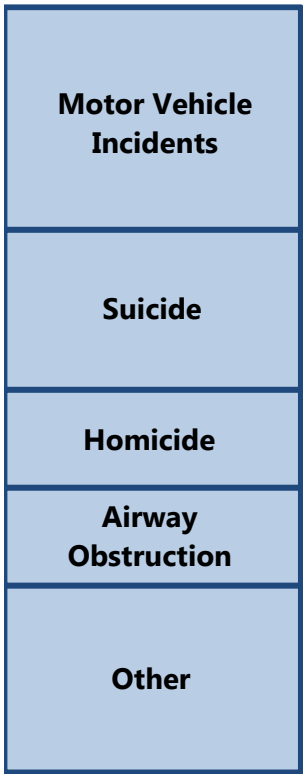
Figure 9. Percent of natural child deaths by age group, 2011



INJURY RELATED DEATHS

Number of deaths: 86 (33 Females and 53 Males)

Leading Causes of Injury Related Death:



In 2011, 86 (29%) of the 294 child deaths that occurred in B.C. were injury related. Injuries were either the first or joint first leading cause of death for all age groups beyond infancy. It is well established that older children experience higher injury mortality and hospitalization rates than younger age groups, attributable to increased exposure and experimentation as children progress through different stages of development. Motor vehicle crashes continue to be the leading cause of injury related death for children 0-18 years in B.C., followed by suicide, and homicide. Other causes of unintentional injury-related deaths in 2011 included airway obstructions, unintentional poisoning, fire, and falls.

The types of injuries commonly associated with child deaths differ from those that cause non-fatal injury. For example, falls are the leading cause of injury hospitalization in B.C. across all regions and age groups, yet account for a very small number of child deaths.[2]

Motor vehicle incidents accounted for 29% of all injury related child deaths in 2011. Sixty percent of these deaths involved youth aged 15 to 18. Fewer younger children died as the result of motor vehicle incidents. However, younger children were more likely to be killed as the result of being struck by a vehicle in non-traffic circumstances (e.g., in driveways).

The second leading cause of injury related death was suicide, with 83% of child suicides occurring in youth age 15 to 18. Children under the age of 10 years old are not seen as being able to form the intent to commit suicide. The most common means of suicide in young people is through hanging. Suicide was more prevalent in males (61%) than females (39%).

Homicide is defined as a death due to injury intentionally inflicted by action of another person. Homicide is a neutral term that does not imply fault or blame. In 2011 there were 11 deaths caused by homicide. The majority of homicides occurred in the under 1 year and 15 to 18 year old age groups. Overall 55% of the homicide victims were males and 45% were females.

In 2011 intentional injuries (suicide and homicide) accounted for a third of all child injury fatalities.

For all injury related deaths, 62% of the decedents were males and 38% were females.

Health Authority rates of fatal injuries

The highest injury mortality rate among children in 2011 was observed in the Northern Health Authority followed by the Interior and Island Health Authorities which also were above the provincial rate of 9.5 deaths per 100,000 population (Table 5). The Fraser and Vancouver Coastal Health Authorities had injury mortality rates lower than the provincial rate in 2011. Regional variations in child injury have also been observed in hospitalization data, which similarly identifies the Northern region as having the highest burden of injury in the province.[3]

TABLE 5

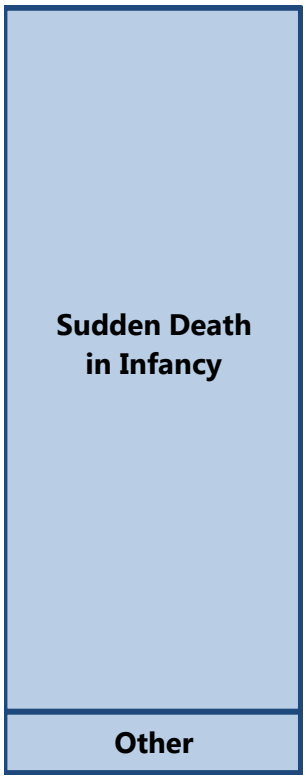
Injury deaths by Health Authority of residence, 2011

Region	Deaths	%	Rate per 100,000 pop.
Fraser	27	31%	7.3
Vancouver Coastal	5	6%	2.6
Interior	18	21%	12.9
Island	16	19%	11.7
Northern	15	17%	21.4
Lived outside BC	5	6%	n/a
Total	86	100%	9.5

UNDETERMINED DEATHS

Number of deaths: 25 (8 Females and 17 Males)

Leading Causes of Undetermined Death:



In 2011, 25 (8%) of the 294 child deaths occurring in British Columbia were due to undetermined causes.

The majority (92%) of undetermined deaths were characterized as sudden death in infants. Primarily healthy infants under one year of age died suddenly and unexpectedly in circumstances related to sleep. These deaths are investigated by an examination of the scene of death, review of medical and social records, and a complete autopsy. There are typically no causal findings on autopsy in cases of sudden infant death, although scene and social investigation may uncover one or more factors that are known to increase an infant's risk. Sudden infant deaths typically peak at two to four months of age and begin to drop again after six months. British Columbia has established safe sleep guidelines for infants which can be accessed at http://www.perinatalservicesbc.ca/NR/rdonlyres/D799441C-3E00-49EE-BDF7-2A3196B971F0/0/HPGuidelinesSafeSleep1.pdf

The number of sudden infant deaths was higher among male infants in 2011. Of the 23 infants who died suddenly, 15 (65%) were male and eight (35%) were female.

CHILDREN RECEIVING SERVICES FROM THE MINISTRY OF CHILDERN AND FAMILY DEVELOPMENT

Approximately one quarter of children who died in 2011 were in receipt of services from the Ministry of Children and Family Development (Table 6).

Of the 80 children receiving services from MCFD, 52 (65%) died of natural causes, 25 (31%) died of injury-related causes, and 3 (4%) died of undetermined causes. Across all causes, ten children were in care of MCFD at the time of their death.

TABLE 6

Child deaths by type of MCFD service received at time of death, 2011

Type of MCFD Service	Number of Deaths*
Family Services	50
Child/Youth Special Needs	37
Child Services	21
Child in Care	10
At Home Program	6
Child/Youth Mental Health	4

** A total of 80 children were in receipt of services from the Ministry of Children and Family Development (MCFD) at the time of their death. The total does not equate to 80 as some children were in receipt of more than one type of service.*

SECTION THREE

RECOMMENDATIONS MADE BY LOCAL CORONERS

A total of 10 coroners' recommendations were distributed in 2011 with respect to four children who died between 2008 and 2010. Each recommendation may be distributed to more than one agency. The agencies to which each recommendation was distributed are indicated below.

Two recommendations were made to the Ministry of Children and Family Development suggesting conducting and acting upon internal audits of foster homes in the Interior Region to ensure cribs/cradles for infants meet MCFD standards and policies. There has been no response to date.

Two recommendations were made to the Ministry of Children and Family Development regarding creation and distribution of a standardized protocol for the Interior Region to gather information related to a child's specific care requirements when being placed with a respite care provider. There has been no response to date.

A recommendation was made to the Ministry of Children and Family Development that when a practice advisory is developed it be shared across all regions. The Ministry responded that this practice is currently in place.

A recommendation was made to the College of Dental Surgeons and the College of Physicians and Surgeons regarding mandating a more comprehensive discharge plan for patients to provide a more complete picture of the procedures that have been performed for future treating physicians.
The College's responded detailing the content of current verbal and written discharge information and instructions provided to patients, and indicated that all non-hospital facilities and dental clinics would be reminded, in writing, of the importance of discharge planning and comprehensive post-operative instructions.

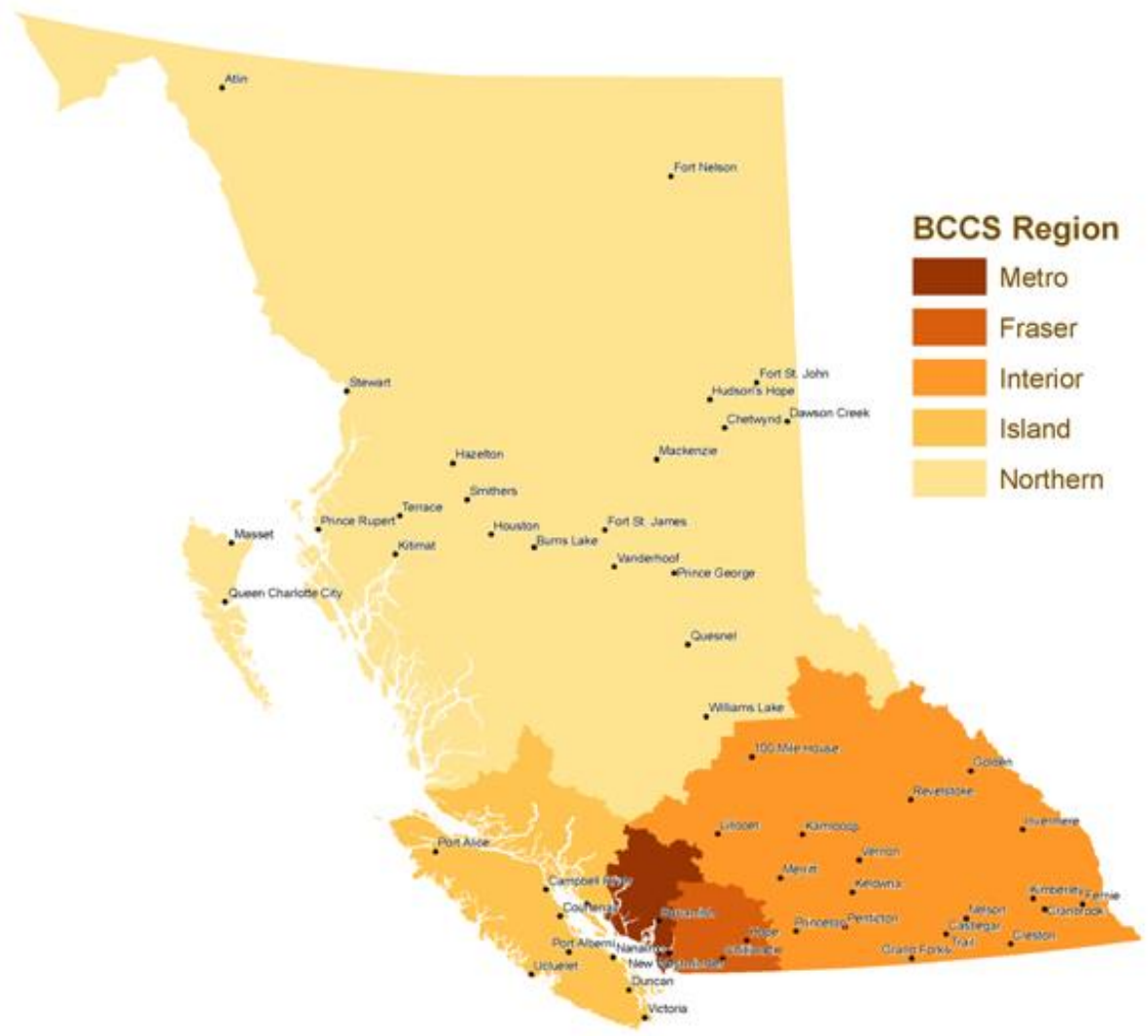
A recommendation was made to the College of Dental Surgeons and the College of Physicians and Surgeons to consider mandating multi-lingual pre- and post-operative instruction handouts.
The College's responded that this was an excellent recommendation, and that it would be provided, in writing, to all non-hospital facilities and dental clinics.

A recommendation was made to the Office of the Superintendent of Motor Vehicles to review the Coroner's Report for information purposes.

A recommendation was made to the Minister of Transportation and Infrastructure to consider issuing a public reminder regarding the hazards facing children when shoulder harnesses/seatbelts are worn incorrectly. There has been no response to date.

A recommendation was made to the Minister of Education provide the Coroner's Report, for information purposes, to the Superintendents of all schools in British Columbia.

BC CORONERS SERVICE REGIONS



Northern Region: Includes the region north, east and west from 100 Mile House to all Provincial borders, and Haida Gwaii.

Metro Region: Sunshine Coast, Sea to Sky Corridor, North Shore, Vancouver, UBC, Burnaby, Richmond, and Delta.

Fraser Region: Includes Coquitlam and Surrey to the Coquihalla Highway summit, east to Manning Park and north to Jackass Mountain bordering Merritt.

Interior Region: Includes the region north to 100 Mile House and Blue River, east to the Alberta border, south to the USA border and west to the Manning Park gate, including Ashcroft, Lytton and Lillooet.

Island Region: All of Vancouver Island, the Gulf Islands, and Powell River.

REFERENCES

[1] World Health Organization, 2008.

[2] BC Injury Research and Prevention Unit, 2010. http://www.injuryresearch.bc.ca/

[3] Growing up in BC, joint report Representative for Children and Youth & the Provincial Health Officer. http://www.health.gov.bc.ca/library/publications/year/2010/growing-up-in-bc.pdf