



Child Mortality in British Columbia

2012

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

BC Coroners Service
Ministry of Public Safety and Solicitor General

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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 307 deaths of children occurring in British Columbia during 2012. 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 2012, 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 (BCCS) 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 eight 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.

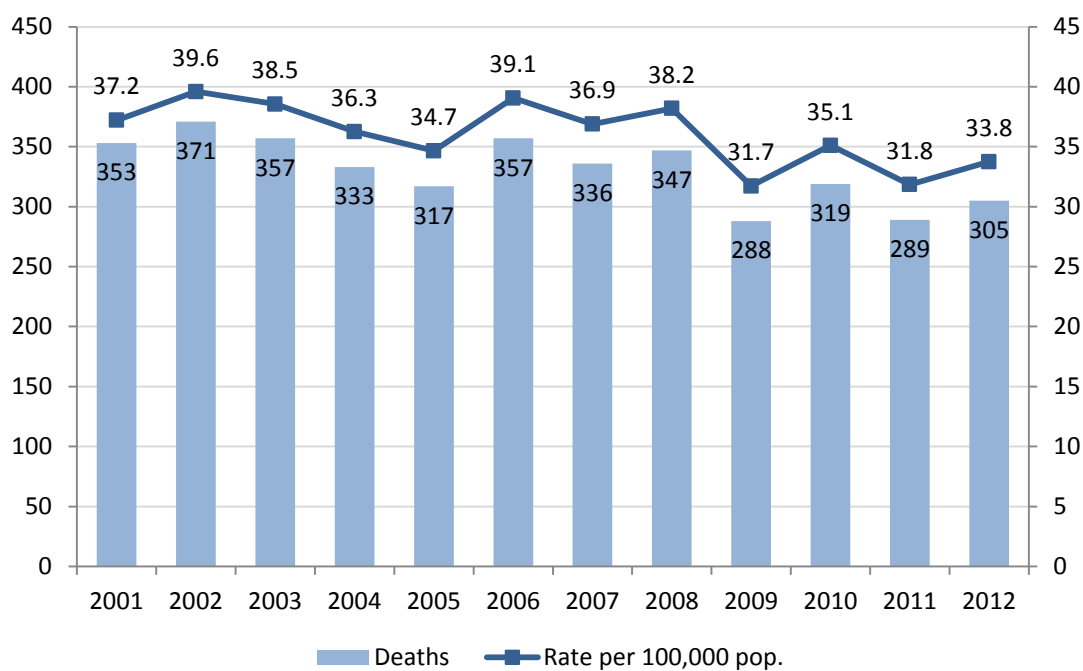
In this report mortality data is presented based on health authority boundaries. This is a change from previous BCCS reports and was done to improve use of BCCS findings for planning or delivering health services.

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 903,657 children age 0-18 in British Columbia in 2012, and 307 child deaths, a rate of death of 34.0 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 2 (below) uses British Columbia Vital Statistics Agency counts for child deaths by year for 2001 to 2012. 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, 2001-2012*



* 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 2012.

TABLE 1

Leading causes of child death by age group, 0-18 years, BC, 2012					
Rank	Under 1 year	1-4 years	5-9 years	10-14 years	15-18 years
1	Perinatal causes	Unintentional injuries	Unintentional injuries	Unintentional injuries	Unintentional injuries
2	Congenital and chromosomal anomalies	Congenital and chromosomal anomalies	Congenital and chromosomal anomalies	Other	Suicide
3	Undetermined causes of sudden infant death	Cancers	Other	Other	Cancers

Notes:

* "Other" has been used where there were multiple different means of death each accounting for two or less deaths

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.

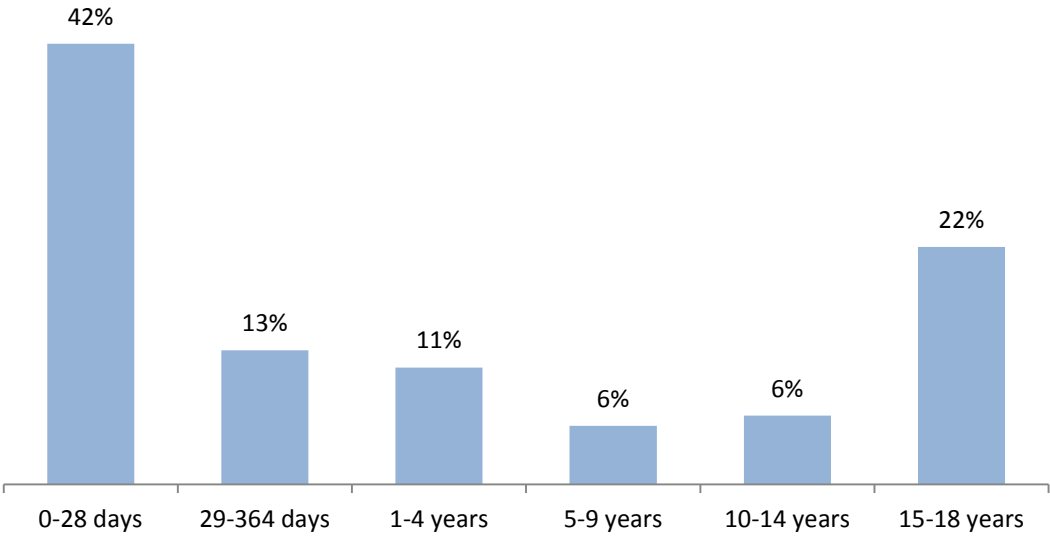
TABLE 2

Child deaths by age group, 2012		
Age Group	Deaths	Death Rate*
0-28 days	128	290.7
29-364 days	39	88.6
1-4 years	34	19.0
5-9 years	17	7.7
10-14 years	20	8.5
15-18 years	69	30.8
Total	307	34.0

* 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 2012 were infants less than 29 days (42%), followed by children 15 to 18 years of age (22%) (Figure 2).

Figure 2. Percentage of child deaths by age group, 2012



Health Authority differences in child mortality in 2012

Children living in the Fraser Health Authority accounted for the highest percentage of deaths in 2012; however, Northern Health Authority had the highest child mortality rate (Table 3).

TABLE 3

Child deaths by Health Authority of residence, 2012			
Region	# Deaths	%	Rate per 100,000 pop.
Fraser	120	39%	32.6
Vancouver Coastal	54	18%	27.9
Interior	51	17%	37.0
Island	32	10%	23.0
Northern	48	14%	63.6
Lived outside BC	7	2%	n/a
Total	307	100%	34.0

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.

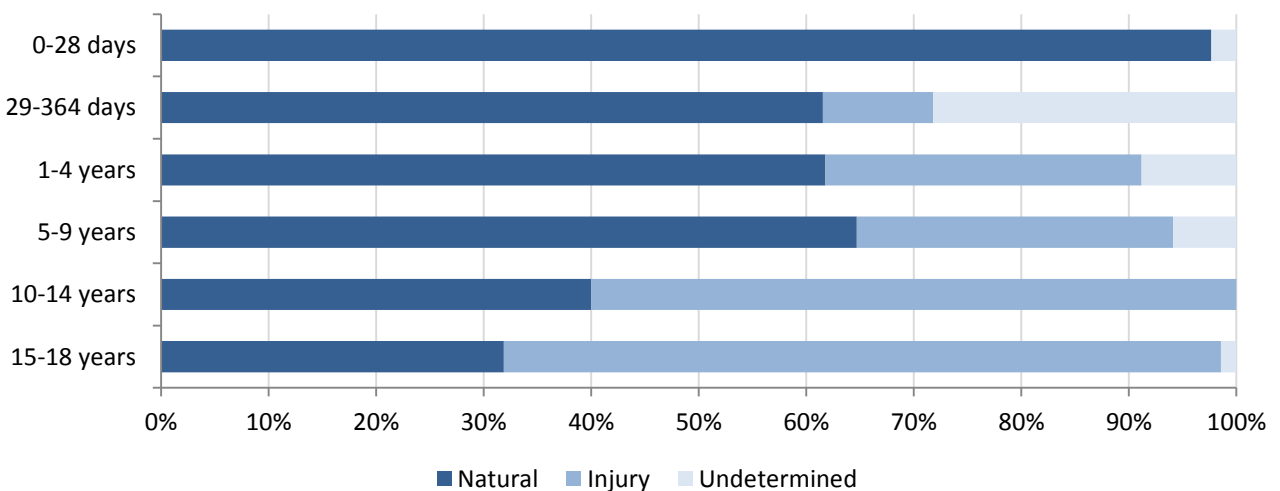
The distribution of natural deaths is primarily centralized to hospital and health care facilities in larger, urban cities. In contrast, injury death locations are scattered throughout the province, demonstrating both the wide dispersal of injury events throughout B.C., and the immediacy of the fatal 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 (69%) and that most of the natural deaths occur in the first 28 days of life (59%). Injury deaths comprise the second greatest proportion of deaths involving children (25%) and most injury deaths occur in young people aged 15 to 18 (60%). Undetermined causes of death accounted for 6% of all child deaths and occur most often with infants aged 29 to 364 days (58%). Figure 3 shows that the cause of death varies considerably within different age groups.

TABLE 4

Child deaths by main cause and age group, 2012				
Age Group	Natural	Injury	Undetermined	Total
0-28 days	125	-	3	128
29-364 days	24	4	11	39
1-4 years	21	10	3	34
5-9 years	11	5	1	17
10-14 years	8	12	-	20
15-18 years	22	46	1	69
Total	211	77	19	307

Figure 3. Distribution of child deaths by main cause and age group, 2012



SECTION TWO

CHARACTERISTICS OF CHILD DEATHS

DEATHS UNDER 12 MONTHS OF AGE

Number of deaths: 167 (72 Females and 95 Males) **Mortality Rate:** 3.8/1,000 live births

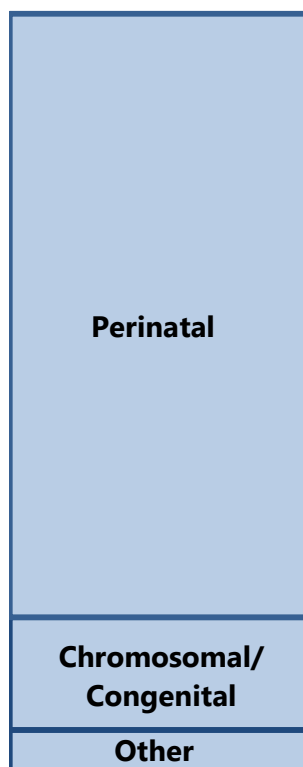
British Columbia had one of the lowest infant mortality rates in Canada in 2012 (3.8 deaths per 1,000 live births vs. the Canadian average of 4.8 per 1,000 live births*).

In 2012, three quarters 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: 128 (52 Females and 76 Males) **Mortality Rate:** 2.9/1,000 live births

Leading Causes of Death:



The majority (94%) 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 2012 were premature; 13% were born preterm (29-37 weeks) and 61% 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 three quarters of the infants who died of natural causes in 2012.

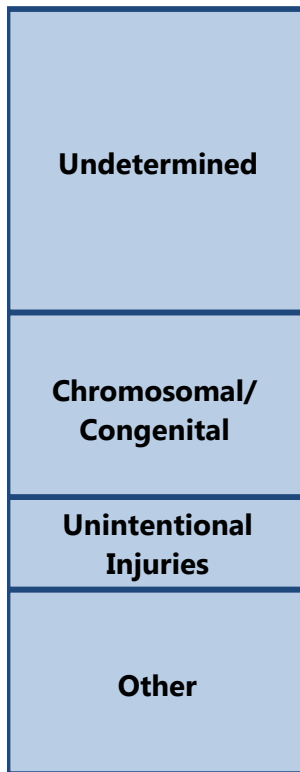
Males accounted for 59% of the deaths in this age group and females 41%.

* Statistics Canada, Accessed July 6, 2016 <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health21a-eng.htm>

Infants aged 29-364 days

Number of deaths: 39 (20 Females and 19 Males) **Mortality Rate:** 0.9/1,000 live births

Leading Causes of Death:



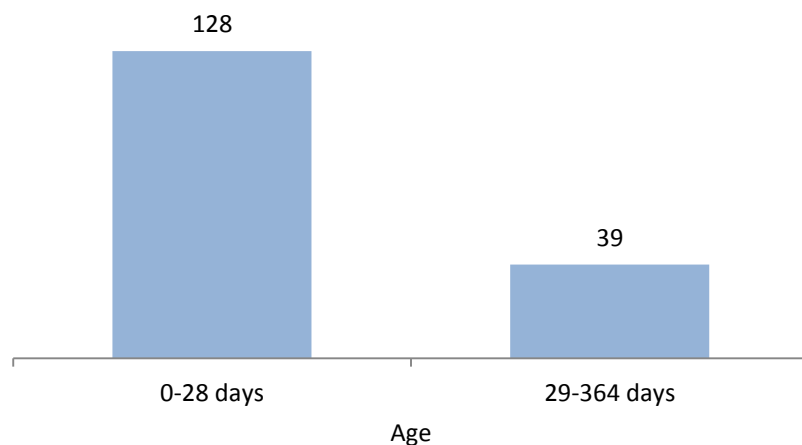
After the first month of life (the post-neonatal period), sudden unexplained infant deaths rise in incidence and take over as the leading cause of infant mortality. Prematurity, perinatal complications and congenital anomalies decreased to 38% of cases.

In comparison with neonates:

- A greater proportion of decedents were female (51%)
- A smaller proportion were born prematurely (20% preterm; 15% extremely preterm)
- Maternal or pregnancy-related factors were noted less frequently (29% of cases)

Age:

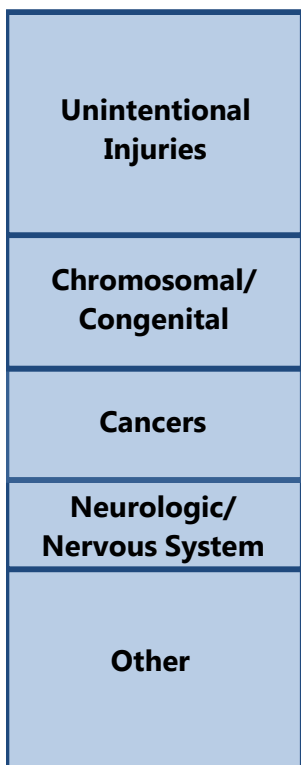
Figure 4. Child deaths, <1 year, 2012



DEATHS BETWEEN 1 AND 4 YEARS OF AGE

Number of deaths: 34 (22 Females and 12 Males) **Death Rate:** 19.0/100,000 population

Leading Causes of Death:



Unintentional injuries were the leading cause of death and accounted for nearly a third of the deaths for children between the ages of 1 and 4 years old in 2012. The leading causes of injury death were fire (n=4) and motor vehicle incidents (n=2).

Chromosomal/congenital anomalies accounted for 18% of deaths, cancers for 15% of deaths, and neurologic/nervous system diseases for 12% of the deaths in this age group.

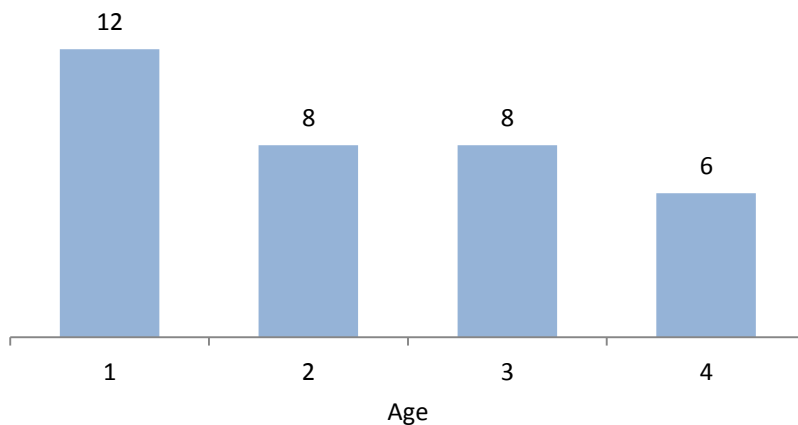
Metabolic diseases, respiratory conditions, perinatal complications and undetermined causes of death were captured in the “other” category.

Figure 5 shows that the number of deaths decreased with age within the 1 to 4 years age group.

In 2012, 35% of the deaths in this age group were males and 65% were females.

Age:

Figure 5. Child deaths, 1-4 years, 2012



DEATHS BETWEEN 5 AND 9 YEARS OF AGE

Number of deaths: 17 (7 Females and 10 Males) **Death Rate:** 7.7/100,000 population

Leading Causes of Death:

Unintentional Injuries
Chromosomal/ Congenital
Cancers
Neurologic/ Nervous System
Other

In 2012 unintentional injuries (29%) and chromosomal/congenital anomalies (23%) were the leading causes of death among 5 to 9 year old children.

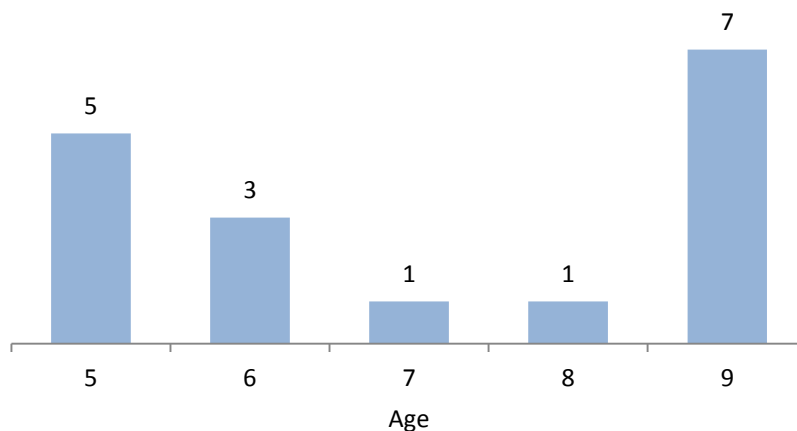
Cancers and neurologic/nervous system diseases each accounted for 12% of the deaths in this age group.

In 2012, 59% of the deaths were males and 41% of the deaths were females.

Figure 6 shows the number of deaths across the 5 to 9 year old age group.

Age:

Figure 6. Child deaths, 5-9 years, 2012



DEATHS BETWEEN 10 AND 14 YEARS OF AGE

Number of deaths: 20 (8 Females and 12 Males) **Death Rate:** 8.5/100,000 population

Leading Causes of Death:



In 2012, the leading cause of death in this age group was unintentional injuries which accounted for 55% of all the deaths. Motor vehicle incidents were responsible for the majority of the accidental deaths.

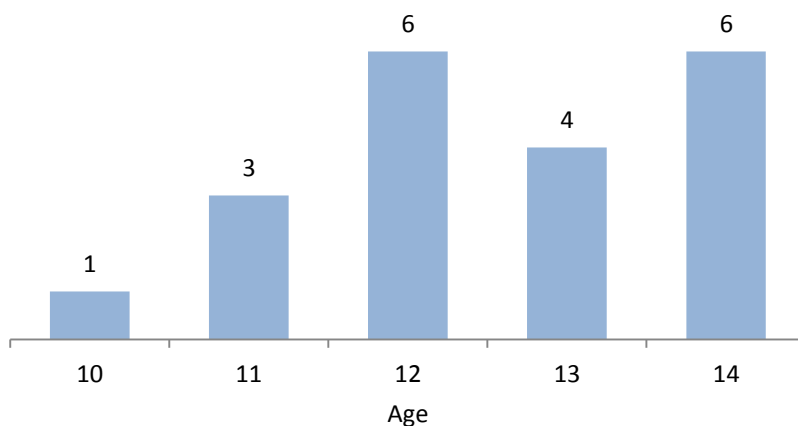
Metabolic diseases, cancers and neurologic/nervous system diseases each accounted for 10% of the deaths in this age group.

In this age group, 60% of the decedents were male and 40% were female.

Figure 7 shows the number of deaths across the 10 to 14 year old age group.

Age:

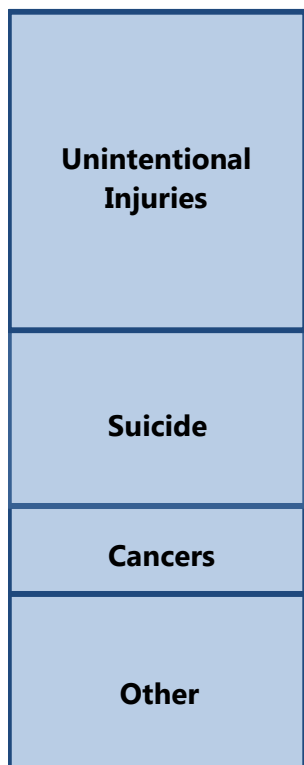
Figure 7. Child deaths, 10-14 years, 2012



DEATHS BETWEEN 15 AND 18 YEARS OF AGE

Number of deaths: 69 (36 Females and 33 Males) **Death Rate:** 30.8/100,000 population

Leading Causes of Death:



Among children aged 15 to 18 years, the leading causes of death in 2012 were unintentional injuries (42%) and suicide (23%).

Of deaths due to unintentional injuries, motor vehicle crashes accounted for 65% of deaths, while accidental alcohol and/or drug overdoses resulted in 21% of deaths.

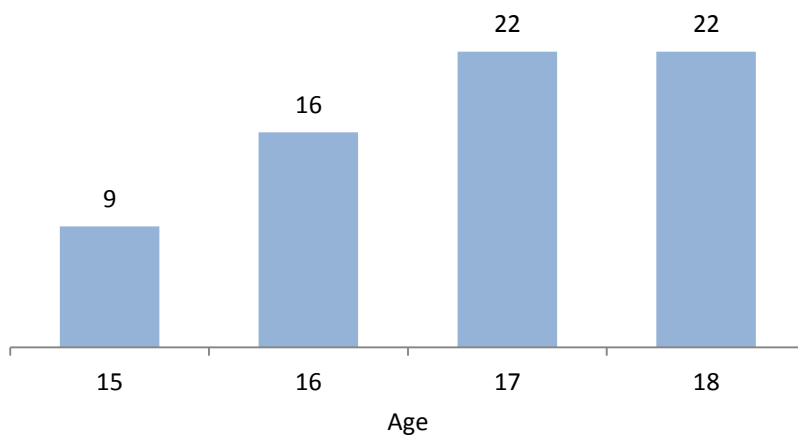
Cancers accounted for 12% of the deaths among 15 to 18 year olds.

In 2012, 48% of the 15 to 18 year olds who died were males and 52% were females. In addition, of the 16 young people who died as a result of suicide in 2012, 38% were males and 62% were females.

For this age group more deaths occurred at ages 17 and 18 (Figure 8).

Age:

Figure 8. Child deaths, 15-18 years, 2012

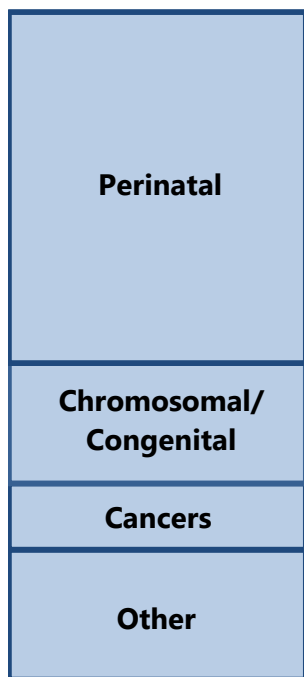


CHILD DEATHS BY CAUSE:

NATURAL DEATHS

Number of deaths: 211 (104 Females and 107 Males)

Leading Causes of Natural Death:



In 2012, 211 (69%) of the 307 child deaths that occurred in B.C. were due to natural causes. The majority of natural deaths in 2012 involved infants who died in the first month of life.

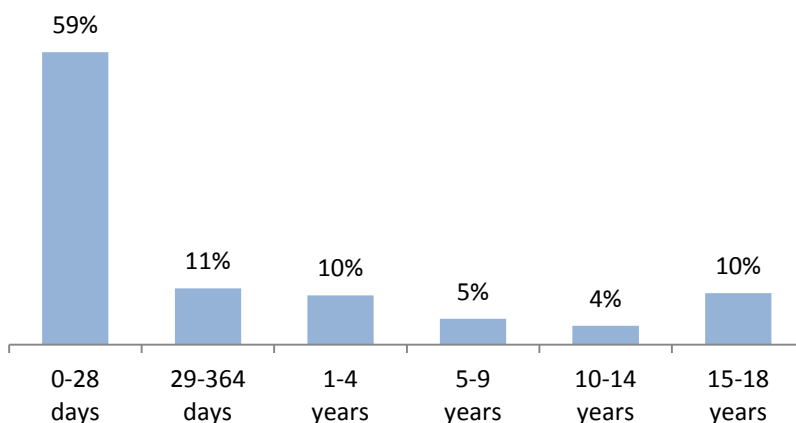
In 2012, leading causes of natural death include conditions originating in the perinatal period (53%), followed by congenital malformations and chromosomal abnormalities (18%), and cancers (10%). Leading causes of natural child death in 2012 are consistent with longitudinal patterns observed in British Columbia since 2000.

In 2012, slightly more males died of natural deaths than females (51% and 49% respectively).

As figure 9 demonstrates, almost two thirds of the children who died of natural causes in 2012 were under the age of one, with the majority of natural infant deaths occurring in the first month of life.

Age:

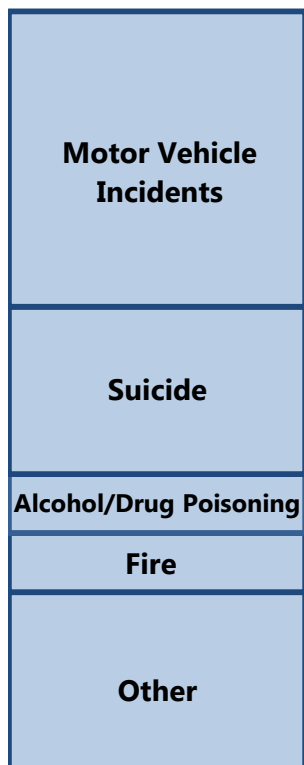
Figure 9. Percent of natural deaths by age group, 2012



INJURY RELATED DEATHS

Number of deaths: 77 (32 Females and 45 Males)

Leading Causes of Injury Related Death:



In 2012, 77 (25%) of the 307 child deaths that occurred in B.C. were injury related. Injuries were the 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. Other causes of unintentional injury-related deaths in 2012 included fire, unintentional poisoning, drowning, 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 39% of all injury related child deaths in 2012. Of these deaths, 63% involved youth aged 15 to 18. Fewer younger children died as the result of motor vehicle incidents.

The second leading cause of injury related death was suicide, with 16 of the 17 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. In 2012, more females died by suicide than males (59% and 41% respectively).

For all injury related deaths, 58% of the decedents were males and 42% were females.

Health Authority rates of fatal injuries

The highest injury mortality rate among children in 2012 was observed in the Northern Health Authority followed by the Interior and Island Health Authorities which were all above the provincial rate of 8.5 deaths per 100,000 population (Table 5). The Fraser and Vancouver Coastal Health Authorities had injury mortality rates lower than the provincial rate in 2012. Regional variations in child injury have also been observed in hospitalization data, which similarly identifies the Northern Health Authority as having the highest burden of injury in the province.³

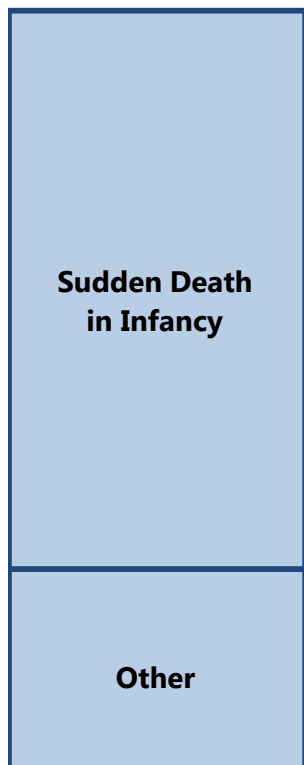
TABLE 5

Injury deaths by Health Authority of residence, 2012			
Region	Deaths	%	Rate per 100,000 pop.
Fraser	25	32%	6.8
Vancouver Coastal	5	6%	2.6
Interior	15	19%	10.9
Island	13	17%	9.6
Northern	16	21%	23.1
Lived outside BC	3	4%	n/a
Total	77	100%	8.5

UNDETERMINED DEATHS

Number of deaths: 19 (9 Females and 10 Males)

Leading Causes of Undetermined Death:



In 2012, 19 (6%) of the 307 child deaths occurring in British Columbia were due to undetermined causes.

The majority (74%) 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.perinatalervicesbc.ca/NR/rdonlyres/D799441C-3E00-49EE-BDF7-2A3196B971F0/0/HPGuidelinesSafeSleep1.pdf>

The number of sudden infant deaths was higher among male infants in 2012. Of the 14 infants who died suddenly, eight (57%) were male and six (43%) were female.

CHILDREN RECEIVING SERVICES FROM THE MINISTRY OF CHILDREN AND FAMILY DEVELOPMENT

Approximately one third of children who died in 2012 were in receipt of services from the Ministry of Children and Family Development (Table 6).

Of the 100 children receiving services from MCFD, 63 died of natural causes, 32 children died of injury-related causes, and 5 children died of undetermined causes. Across all causes, nine 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, 2012

Type of MCFD Service	Number of Deaths*
Child/Youth Special Needs	50
Family Services	48
Child Services	25
Child in Care	9
Child/Youth Mental Health	5
Youth Justice	2
Youth Agreement	1

** A total of 100 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 100 as some children were in receipt of more than one type of service.*

SECTION THREE

RECOMMENDATIONS MADE BY LOCAL CORONERS

A total of five coroners' recommendations were distributed in 2012 with respect to three children who died between 2006 and 2010.

A recommendation was made to the Interior Health Authority to consider presenting details of the case at the next Medical Quality Rounds for the Emergency Department at Caribou Memorial Hospital, with particular discussion regarding the potential for head injury in children presenting with symptoms of vomiting without diarrhea. The Interior Health Authority responded that the case would be reviewed at Caribou Memorial Hospital during their M & M Rounds.

A recommendation was made to the College of Physicians and Surgeons to include a summary of the case in the College Quarterly. There has been no response to date.

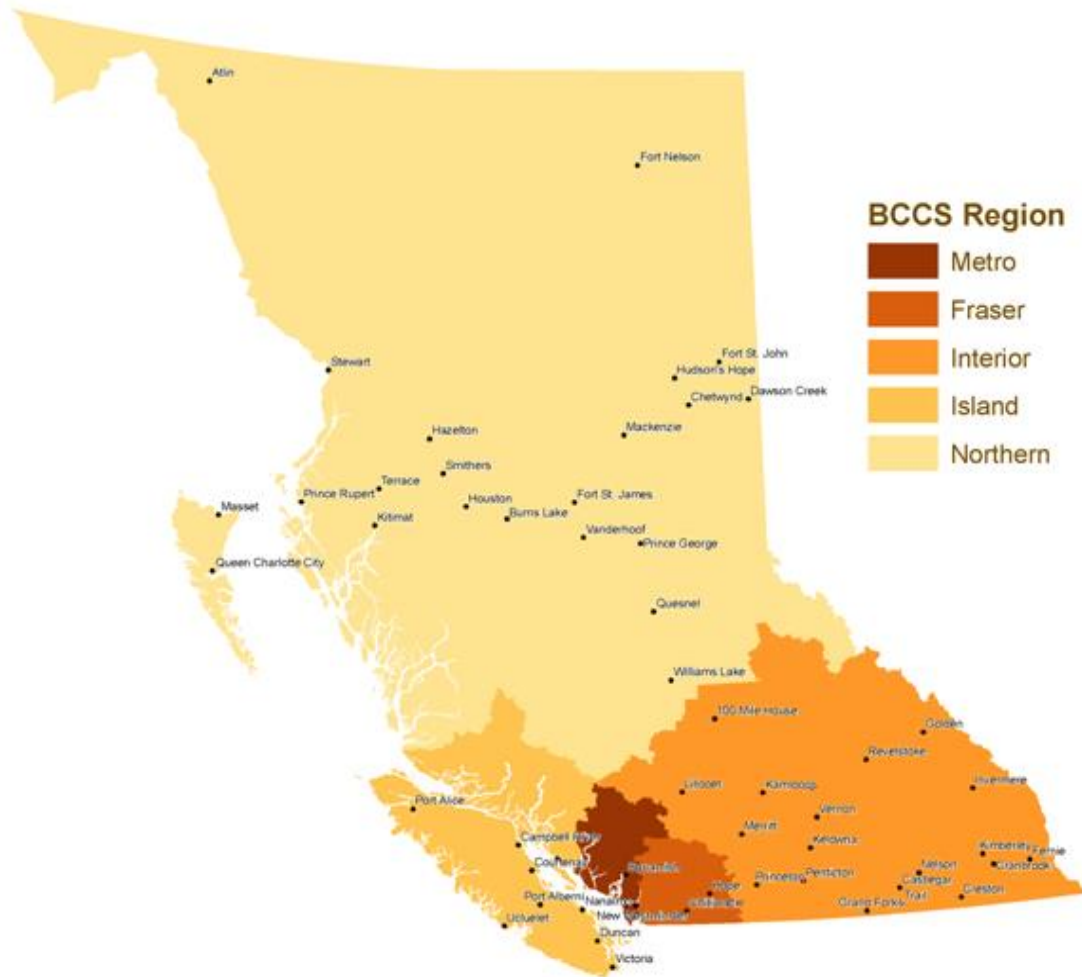
A recommendation was made to the Minister of Education that the Ministry of Education review the circumstances of the case for information and educational purposes. There has been no response to date.

Two recommendations were made to the BC Ministry of Health:

1. To reconsider the exemption under the Child Care Licensing Regulation regarding summer camps to ensure a mechanism is in place to provide oversight for all summer day camp programs, to permit monitoring and compliance to a higher standard of supervision and care that is consistent across the province
2. To consider increasing the employee to child staffing ratio under the Child Care Licensing Regulation when activities are undertaken that have a higher level of associated risk

The Ministry of Health responded that they would spend six months consulting with the Ministry of Children and Family Development and other child care stakeholder organizations to consider options in addressing these recommendations. The Ministry of Health later made two follow-up responses. The first follow-up response indicated that the Ministry of Health had developed a Water Safety Bulletin which was posted on their website, and shared with health authority Community Care Licensing Programs and the Medical Health Officers (who are responsible for the Licensing Programs) requesting that they share with their colleagues. The second follow-up response indicated that the Ministry of Health had conducted a cross Canada review of summer day camps and staff ratios that would be used to assist in a review of the current regulatory framework.

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>