

Child Mortality in British Columbia

2010

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

BC Coroners Service
Ministry of Justice

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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 Justice. 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 324 deaths of children occurring in British Columbia during 2010. 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 does not contain 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, although infant and child deaths will be indentified within the report. **Infants** refer to children under the age of one.

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.

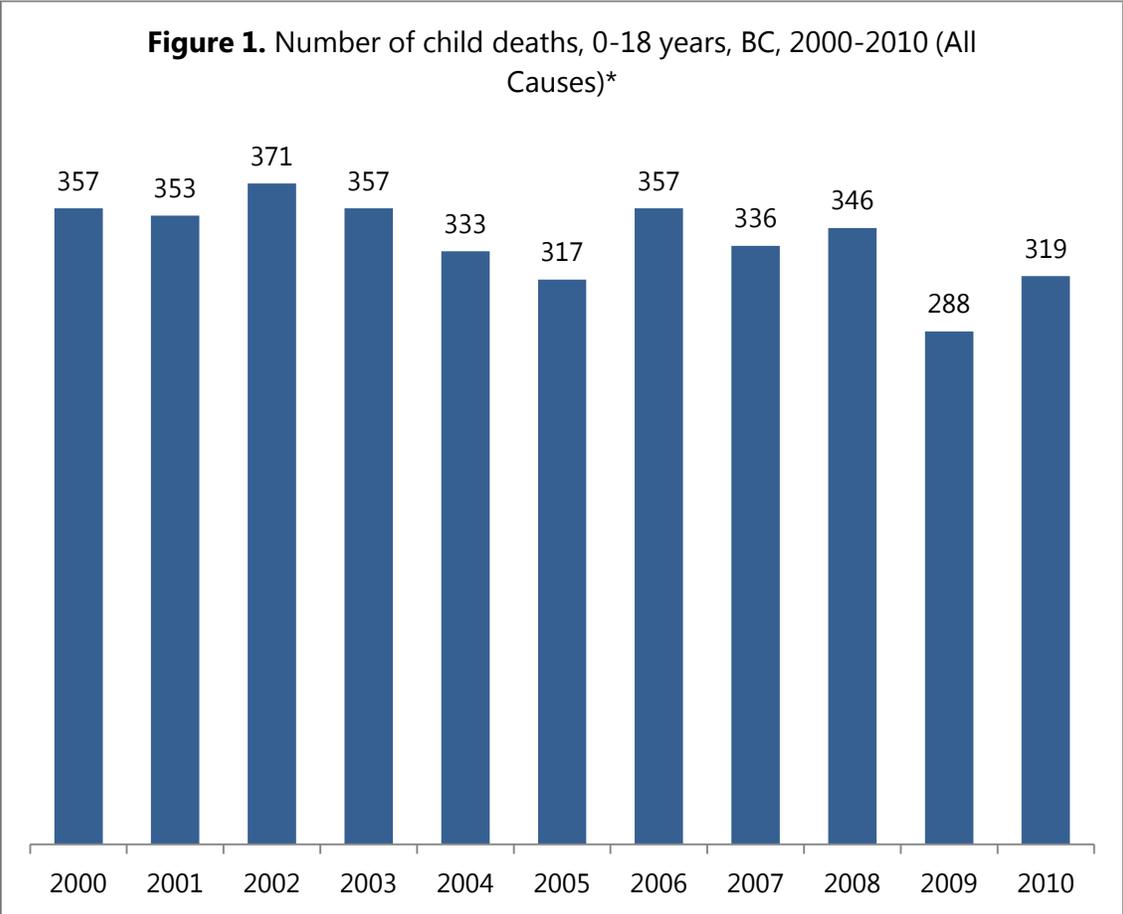
Throughout this report, small discrepancies in mortality counts and rates may be evident between BCCS mortality data and that of BC Vital Statistics. This discrepancy is attributable to coding differences between the two agencies and the time delay involved in reconciling any changes between preliminary and final certifications of death. Small discrepancies could also arise with future reports as 2 cases are 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 Health Authorities and the Ministry of Children and Family Development. A map of BCCS regional boundaries is provided in appendix A.

SECTION ONE

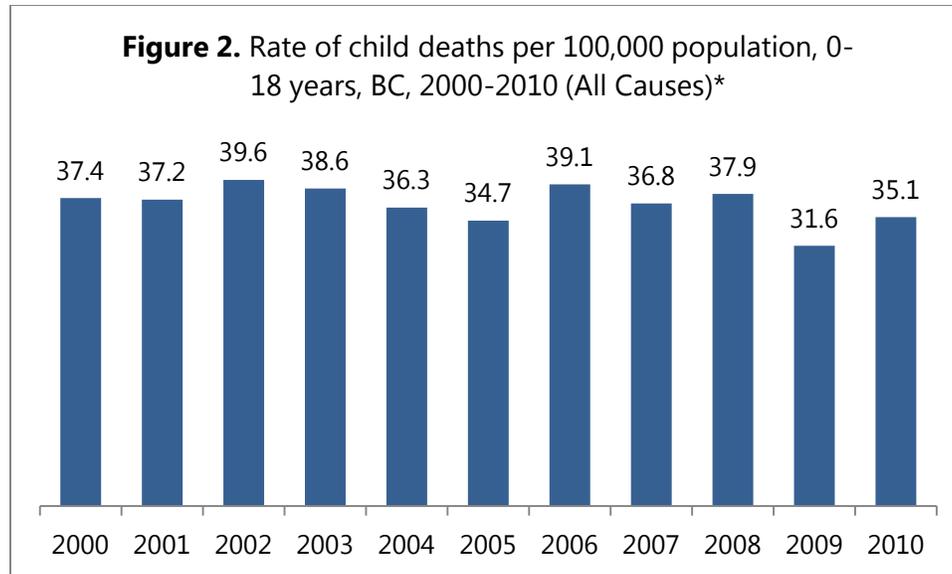
OVERVIEW OF CHILD MORTALITY IN BRITISH COLUMBIA

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 909,000 children age 0-18 in British Columbia in 2010. On average, 339 child deaths (0-18 years) have occurred in the province per year since 2000 (figure 1). The overall mortality rate for British Columbian children 0-18 years has not changed significantly during this time (figure 2).



*BC Ministry of Health, Vital Statistics Agency

Figure 2 shows the rate of child deaths has varied slightly since 2000. Small variations in mortality rates from year to year are expected and are not necessarily an indication of a trend.



*BC Ministry of Health, Vital Statistics Agency

While identifying how many children die each year in British Columbia provides valuable information on 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 2010.

TABLE 1

Leading causes of child death by age group, 0-18 years, BC, 2010					
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
2	Congenital and chromosomal anomalies	Neurologic diseases	Unintentional injuries	Suicide	Suicide
3	Undetermined causes of sudden infant deaths	Cancers	Congenital and chromosomal anomalies	Cancers	Homicide

In general, children are most vulnerable to illness or death during infancy (Table 2). Following infancy, mortality rates decline and remain lower throughout early childhood. As children’s physical and

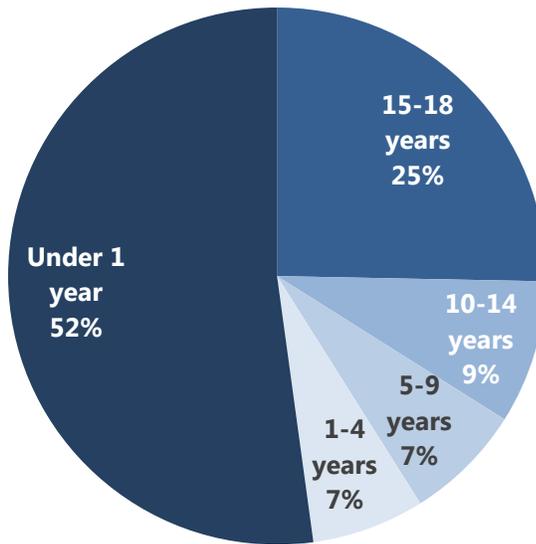
cognitive abilities, degrees of dependence, activities and risk behaviours change rapidly with age, their vulnerability to external causes of mortality also increases.¹ Mortality rates increase once again as children approach adolescence, when injuries take over as the leading cause of child death and continue to drive mortality rates upwards into middle age.

TABLE 2

Child deaths by age group, 0-18 Years, BC, 2010			
Age Group	Number of Deaths	Rate of Child Death per 100,000	Percent of total child deaths
Under 1 year	169	370	52.2
1-4 years	22	12.3	6.8
5-9 years	23	10.4	7.1
10-14 years	28	11.6	8.6
15-18 years	82	36.9	25.3
Total	324	35.7	100

Overall, the greatest percentage of child deaths in 2010 were infants less than one year of age (52%), followed by children 15 to 18 years of age (25%) (figure 3).

Figure 3. Distribution of child deaths by age group, 0-18 years, BC, 2010



Regional differences for child mortality in 2010.

Children living in the Fraser region accounted for the highest percentage of deaths; however, Northern B.C. had the highest child mortality rate in 2010 (Table 3). In 2010, the Northern, Vancouver Island and Interior regions had a higher child mortality rate than the provincial average.

TABLE 3

Child Deaths by Region of Residence, 0-18 Years, BC, 2010			
Region	Number	Percent	Rate per 100,000 Population
Fraser	102	31.5	28.6
Vancouver Metro	62	19.1	31.2
Vancouver Island	52	16.0	37.5
Interior	53	16.4	36.8
Northern	45	13.9	63.4
Lived outside BC	10	3.1	n/a
Provincial Total	324	100	35.7

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).

Group Three: Undetermined Causes

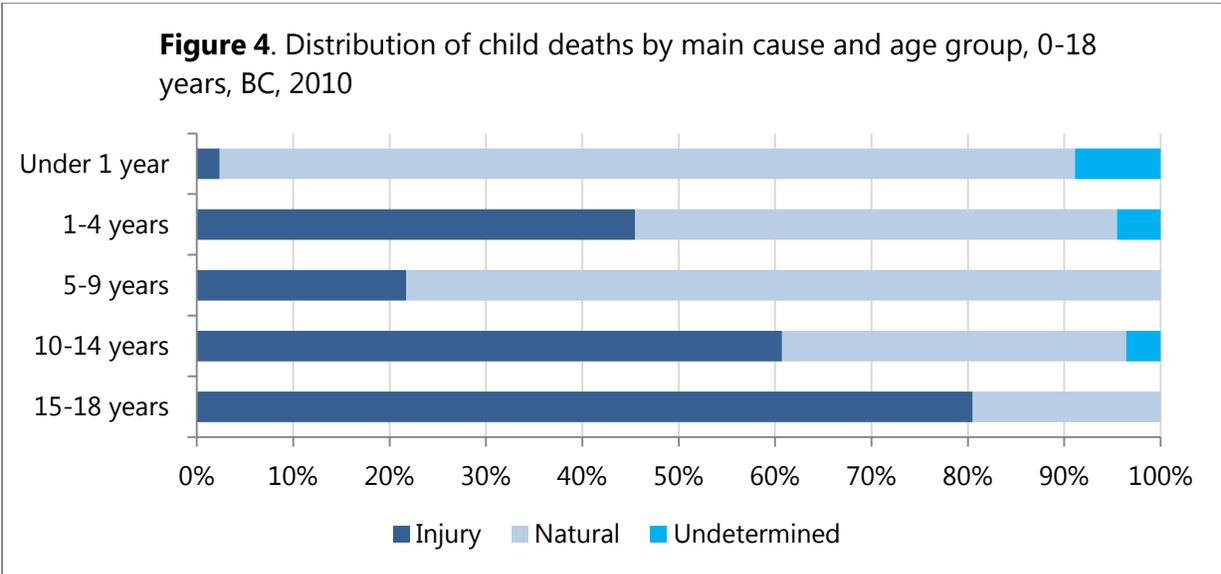
Undetermined causes include deaths that (because of insufficient evidence or inability to otherwise determine) cannot be reasonably categorized as natural or injury deaths. This includes cases of sudden infant deaths and fatalities due to other unknown or undetermined causes.

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 fatalities involving children and that most of the natural deaths occur in infancy. Injury deaths comprise the second greatest proportion of deaths involving children and most injury deaths occur in young people ages 15 to 18. Undetermined causes of death occur most often with infants. Figure 4 shows that the cause of death varies considerably within different age groups.

TABLE 4

Child deaths by main cause and age group, 0-18 Years, BC, 2010				
Age Group	Injury	Natural	Undetermined	Total
Under 1 year	4	150	15	169
1-4 years	10	11	1	22
5-9 years	5	18	-	23
10-14 years	17	10	1	28
15-18 years	66	16	-	82
Total	102	205	17	324



SECTION TWO

CHARACTERISTICS OF CHILD DEATHS

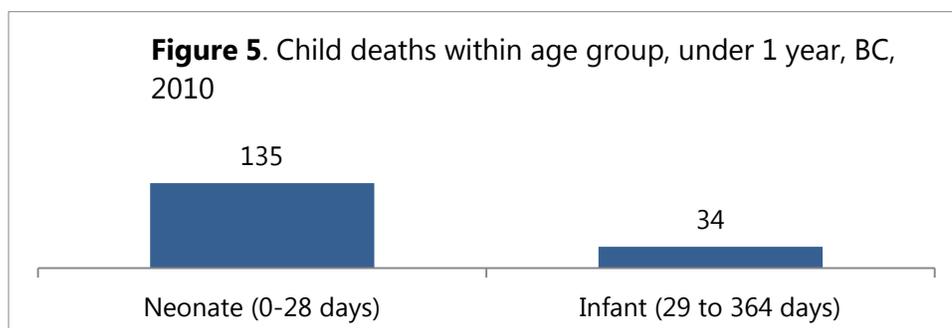
DEATHS UNDER 12 MONTHS OF AGE

Number of deaths in 2010: 169 (75 Females and 94 Males) **Mortality Rate:** 3.70/1,000 live births

Leading Causes of Death:

Perinatal Causes	<p>In 2010, eighty percent of all infant deaths occurred within the first month of life (the neonatal period)(figure 5) . The majority of these deaths were caused by prematurity, perinatal complications and congenital anomalies. 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. Collectively, perinatal conditions, congenital anomalies and sudden deaths in infancy account for approximately 80 percent of infant deaths in British Columbia.</p> <p>The majority of infants who died in BC in 2010 were premature, and had a low birth weight. A quarter of the infants were born preterm (29-37 weeks) and half were born extremely preterm (28 weeks or less). Over 60% of the infants who died had either a low (<2500 grams) or very low (<1500 grams) birth weight.</p>
Congenital and chromosomal anomalies	<p>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 more almost two thirds of the infants who died of natural causes in 2010.</p>
Undetermined causes	
Other	<p>British Columbia had one of the lowest infant mortality rates in Canada (3.8 deaths vs. the Canadian average of 5.0 deaths per 1,000 live births for 2010). Males accounted for 56% of the deaths in this age group and females 44%.</p>

Age:



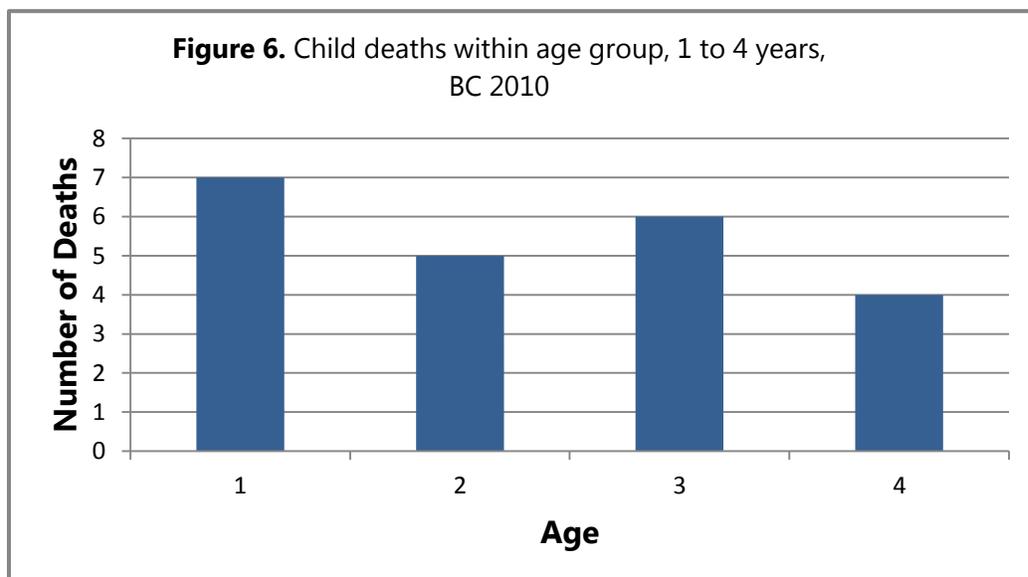
DEATHS BETWEEN 1 AND 4 YEARS OF AGE

Number of deaths in 2010: 22 (10 Females and 12 Males) **Death Rate:** 12.3/100,000

Leading Causes of Death:

Unintentional Injuries	<p>The three leading causes of death in this age group accounted for over 70% of all the deaths.</p> <p>Unintentional injuries were the leading cause of death and accounted for 45% of the deaths for children between the ages of 1 and 4 years old in 2010. Half of these deaths (n=5) involved motor vehicles.</p> <p>Diseases of the nervous system and cancers each accounted for 14% of the deaths in this age group.</p>
Diseases of the Nervous System	<p>Congenital anomalies, pneumonia, and respiratory failure were the other major causes of death captured in the other category.</p>
Cancers	<p>Figure 6 shows that the number of deaths at each age within this age group</p>
Other	<p>In 2010, 55% of the deaths in this age group were males and 45% were females.</p>

Age:



DEATHS BETWEEN 5 AND 9 YEARS OF AGE

Number of deaths in 2010: 23(15 Females and 8 Males) **Death Rate:** 10.4/100,000

Leading Causes of Death:

Cancers
Unintentional Injuries
Congenital and chromosomal anomalies
Other

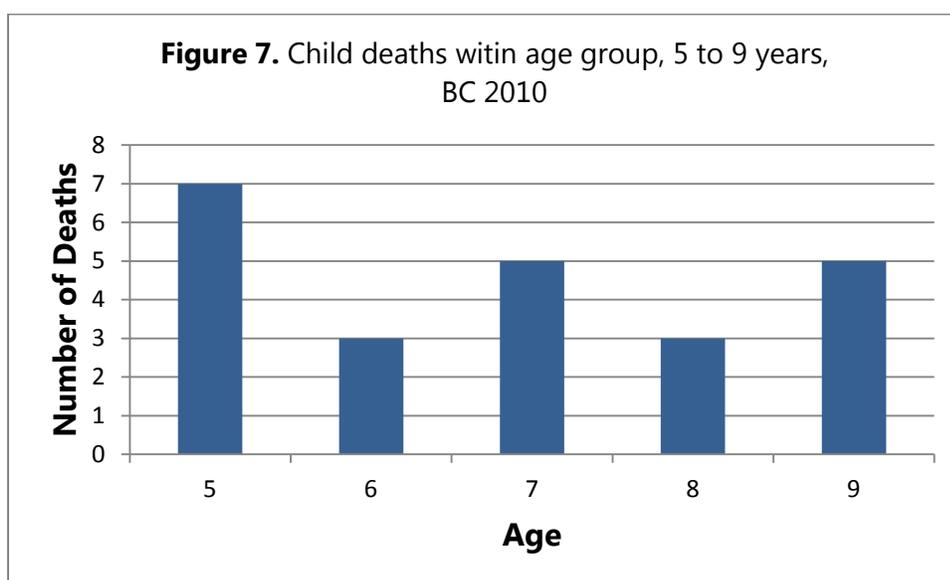
In 2010 various forms of cancer were the leading cause of death accounting for 35% of deaths among 5 to 9 year old children.

The second and third leading causes of death in the 5 to 9 year old age group were unintentional injuries and congenital anomalies. Unintentional injuries and congenital anomalies each accounted for 17% of the deaths in this age group.

In 2010, 35% of the deaths were males and 65% of the deaths were females.

Figure 7 shows that the number of deaths across the 5 to 9 year old age group. Although the number of deaths varies by age there is no discernible pattern.

Age:



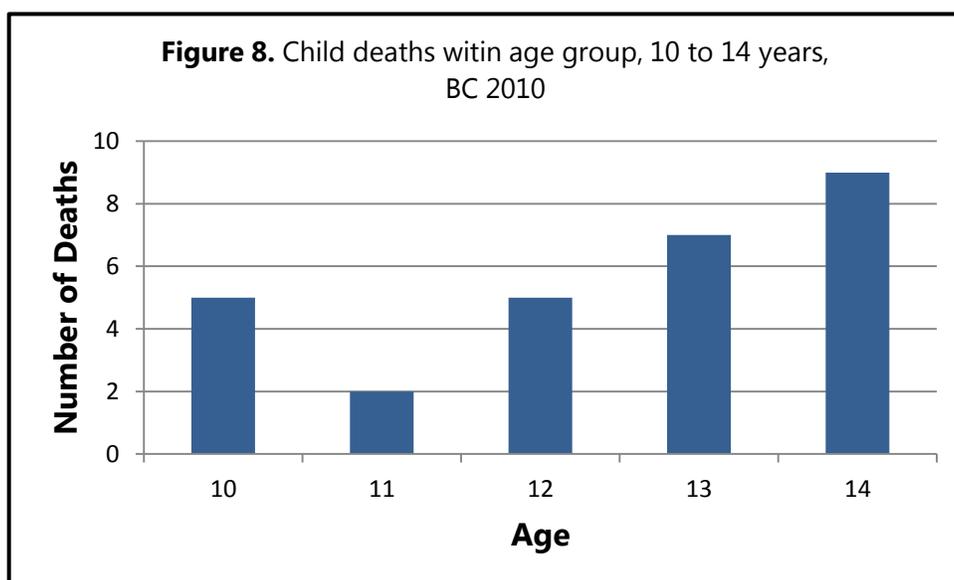
DEATHS BETWEEN 10 AND 14 YEARS OF AGE

Number of deaths in 2010: 28 (8 Females and 20 Males) **Death Rate:** 11.6/100,000

Leading Causes of Death:

Unintentional Injuries	<p>In 2010, the leading cause of death in this age group was unintentional injuries which accounted for approximately 40% of all the deaths. Motor vehicle incidents were responsible for the majority of the accidental deaths.</p>
Suicide	<p>Suicide was the second leading cause of death among 10 to 14 year old children in 2010. Suicides accounted for 21% of the deaths among this age group.</p>
Cancers	<p>Various forms of cancers were the third leading cause of death in the 10 to 14 year old age group and they accounted for 18% of all deaths in this age group.</p>
Other	<p>Congenital anomalies were the most common cause of death in the other category.</p> <p>In this age group, 71% of the deaths were males and 29% were females.</p> <p>Figure 8 shows that the number of deaths across the 10 to 14 year old age group. The highest number of deaths in this age group occurred at age 13 and 14 in 2010.</p>

Age:



DEATHS BETWEEN 15 AND 18 YEARS OF AGE

Number of deaths in 2010: 82 (32 Females and 50 Males) **Death Rate:** 36.9/100,000

Leading Causes of Death:

Unintentional Injuries
Suicides
Homicides
Other

Among children aged 15 to 18 years, the three leading causes of death in 2010 included unintentional injuries, suicide and homicide. Collectively, injuries accounted for 40 per cent of all child deaths involving 15 to 18 year olds in 2010.

Of deaths due to unintentional injuries (n=33), motor vehicle crashes were responsible for the greatest number of deaths accounting for 60% (n=20) of the deaths. An additional 12% (n=4) were attributed to accidental alcohol or other drug overdoses.

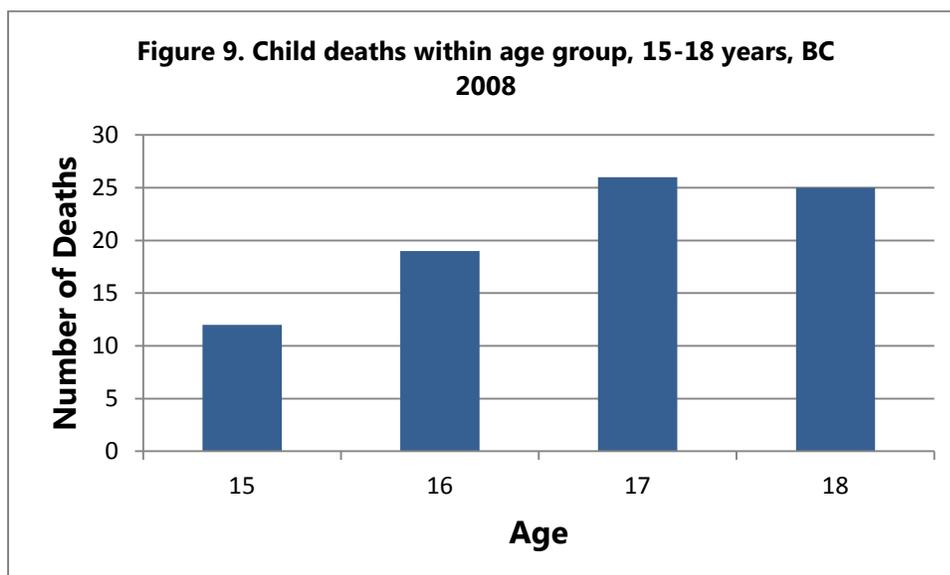
30% of deaths in this age group were due to suicides. Of the 25 young people who died as a result of suicide in 2010, 76% were males and 24% were females.

Homicides were the third leading cause of death accounting for 10% of the deaths among 15 to 18 year olds.

Among 15 to 18 year old youth, 61% of the deaths were males and 39% were females.

The highest number of deaths within this age group occurred at age 17 in 2010 (figure 9).

Age:



CHILD DEATHS BY CAUSE:

NATURAL DEATHS

Number of deaths in 2010: 205 (96 Females and 109 Males)

Leading Causes of Natural Death:

Perinatal Causes
Chromosomal/ Congenital Conditions
Cancers
Neurologic Conditions
Other

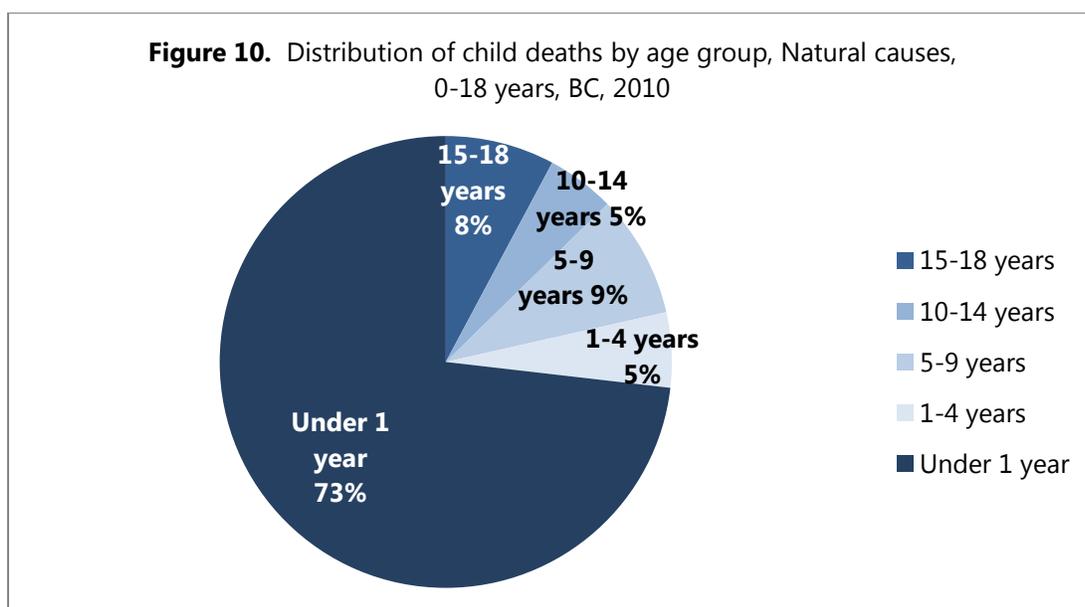
In 2010, 205 (63%) of the 324 child deaths that occurred in B.C. were due to natural causes. The majority of natural deaths in 2010 involved infants who died in the first month of life.

In 2010, leading causes of natural death include conditions originating in the perinatal period (n=91, 44%), followed by congenital malformations, deformations and chromosomal abnormalities (n=35, 17%), cancers (n=24, 12%). Leading causes of natural child death in 2010 are consistent with longitudinal patterns observed in British Columbia since 2000.

Similar numbers of female and male children died of natural causes in 2010 with males accounting for 53% of the deaths and females 47%

As figure 10 demonstrates almost three quarters of the children who died of natural causes in 2010 were under the age of one.

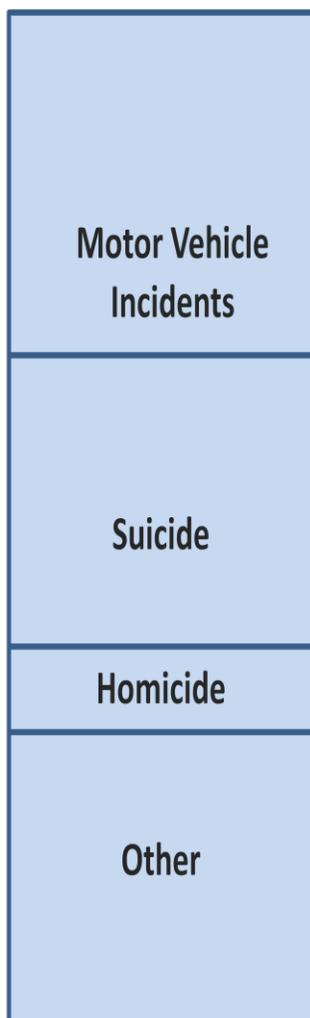
Age:



INJURY RELATED DEATHS

Number of deaths in 2010: 102 (40 Females and 62 Males)

Leading Causes of Injury Related Death:



In 2010, 102 (31%) of the 324 child deaths that occurred in B.C. were injury related. Injuries were either the first or second 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, homicide. Other causes of injury related deaths in 2010 included falls, airway obstructions, unintentional poisoning, drowning and fire.

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 33% (n=34) of all injury related child deaths in 2010. Almost 60% (n=20) 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.

The second leading cause of injury related death occurred by suicide with 25 of the 31 suicides occurring in youth age 15 to 18. Suicide numbers were historically high in 2010 accounting for 30% of all child injury related deaths. 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 than females.

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 2010 there were 9 deaths caused by homicide. Almost 90% of the homicides occurred in the 15 to 18 year old age group. Overall 33% of the homicides involved males and 67% females.

In 2010 intentional injuries (suicide and homicide) accounted for almost a third of all child injury fatalities.

For injury related deaths, 61% of the deaths were males and 39% of the deaths were females.

Regional rates of fatal injuries in the province.

The highest injury mortality rate among children in 2010 was observed in the Northern region followed by Vancouver Island and the Interior regions which also were above the provincial average of 11.2 per 100,000 population (table 5). The Fraser and Vancouver Metro regions had injury mortality rates lower than the provincial average in 2010. Regional variations in child injury have also been observed in hospitalization and survey data, which similarly identify the Northern region as having the highest burden of injury in the province.^{3,4}

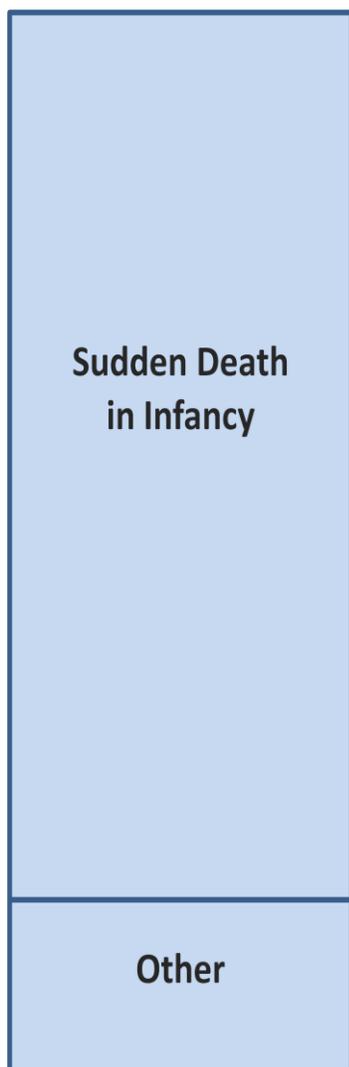
TABLE 5

Injury Deaths by Region of Residence, 0-18 Years, BC, 2010			
Region	Number	Percent	Rate per 100,000 Population
Fraser	21	20.6	5.9
Vancouver Metro	12	11.8	6.5
Vancouver Island	20	19.6	14.4
Interior	19	18.6	13.2
Northern	22	21.6	31.0
Lived outside BC	8	7.8	n/a
Total	102	100	11.2

UNDETERMINED DEATHS

Number of deaths in 2010: 17 (4 Females and 13 Males)

Leading Classification of Undetermined Death:



In 2010, 17 (5%) of the 324 child deaths occurring in British Columbia were due to undetermined causes.

The majority (14, 82%) 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 begins 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 notably higher among male infants in 2010. Of the 14 infants who died suddenly, 10 (71%) were male and four (29%) were female.

There were few cases of undetermined classifications of death in any of the other age groups identified within this report. In those cases the cause of death could not be determined.

CHILDREN RECEIVING SERVICES FROM THE MINISTRY OF CHILDREN AND FAMILY DEVELOPMENT

Approximately one quarter of children who died in 2010 were in receipt of services from the Ministry of Children and Family Development (table 6). Many of these 72 children were medically fragile children supported through the province's At Home program.

Of the 72 children receiving services from MCFD 42 (58 %) died of natural causes, 25 (35%) children died of injury-related causes, and 5 (7%) children died of undetermined causes. Across all causes, fourteen 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, Ages 0-18 years, 2010	
Type of MCFD service	Number of Deaths*
At Home Program	32
Family Services	23
Child in Care	14
Child/Youth Mental Health	8
Youth Justice	2
Youth Services	2

* A total of 72 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 72 as some children were in receipt of more than one type of service.

APPENDIX A

RECOMMENDATIONS MADE BY LOCAL CORONERS

A total of 18 coroners' recommendations were made with respect to 9 children who died in 2010. Although the recommendations were made with respect to children who died in 2010 the recommendations may have been issued at a later date when the coroners report was issued.

4 of the recommendations involved sharing coroners reports with the agencies for educational purposes. Responses are pending

5 of the recommendations were made to the Ministry of Education with respect to student monitoring, documentation, staff education, expulsion processes and suicide reviews. The Ministry of Education responded to the recommendations and how they were being addressed.

2 of the recommendations were made with respect to discharge planning and multilingual preoperative and post operative instructions. The recommendation for multilingual information was accepted and an explanation of discharge planning processes was provided.

2 of the recommendations involved child care licensing regarding staffing and supervision levels. The recommendation resulted in a water safety bulletin which was distributed to community care licensing programs and medical health officers.

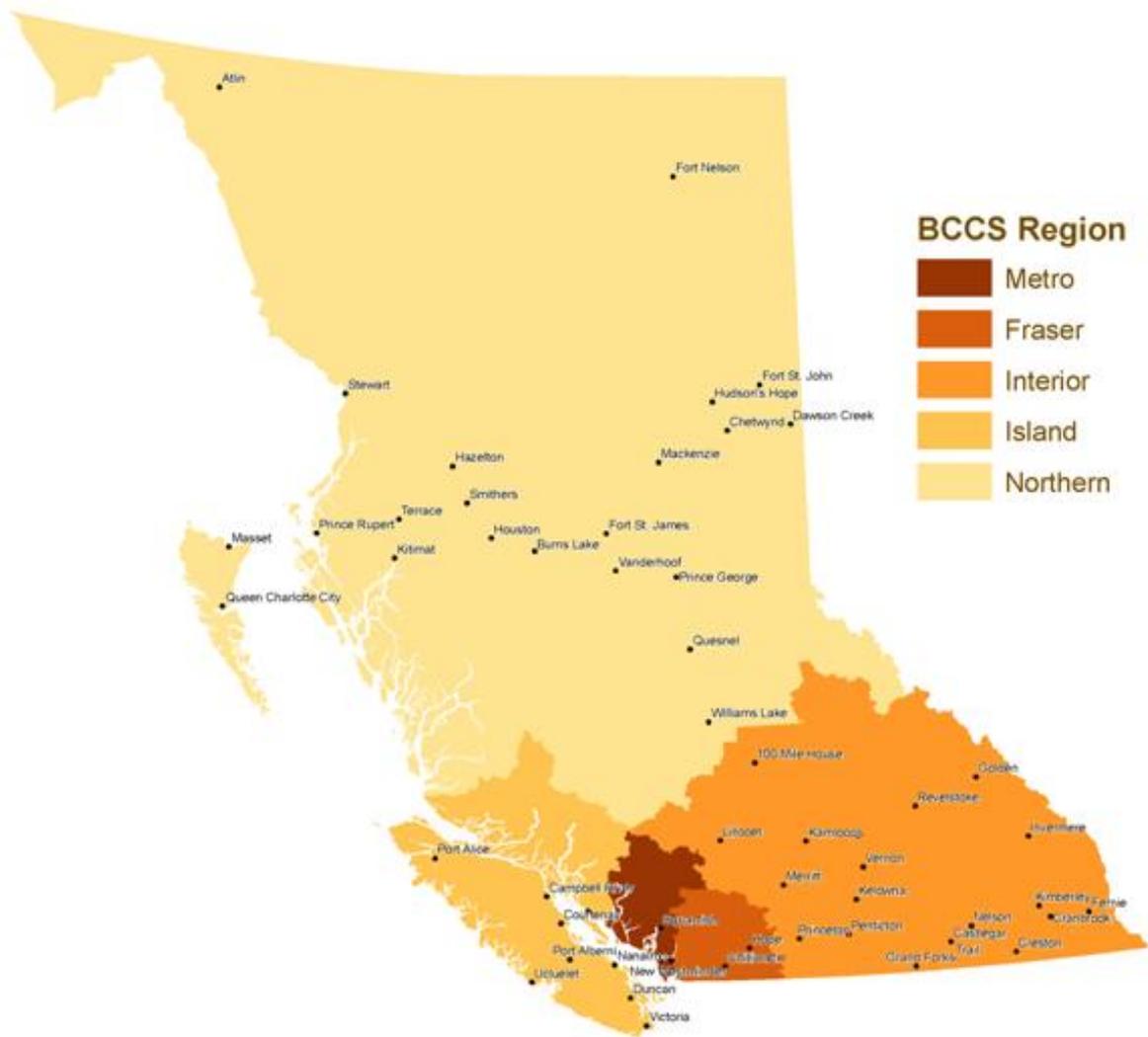
A recommendation was made to the Vancouver Island Health Authority with respect to providing parents with a guide to child and youth mental health services. The Vancouver Island Health Authority created a guide and distributed approximately 1500 copies.

A recommendation was made to the Ministry of Children and Family Development regarding the inclusion of safe sleep practices in child protection investigations involving infants. The Ministry for Children and Family Development created a practice directive with respect to assessing safe sleep risks.

A recommendation was made with respect to issuing a reminder of the hazards of incorrect usage of child shoulder harness/seatbelts. The response from the Minister of Transport is pending

Additionally, a public inquest into the death of a tenth child also issued 23 recommendations related to mental health care treatment and administrative and facility practices, as well as sharing the verdict with identified stakeholders.

MAP OF BC CORONERS SERVICE REGIONS



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>

⁴ A Picture of Health: Highlights from the 2008 BC Adolescent Health Survey (AHS IV). <http://mcs.bc.ca/pdf/AHS%20IV%20March%2030%20Final.pdf>