

Child Mortality in British Columbia

2009

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 287 deaths of children occurring in British Columbia during 2009. 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.

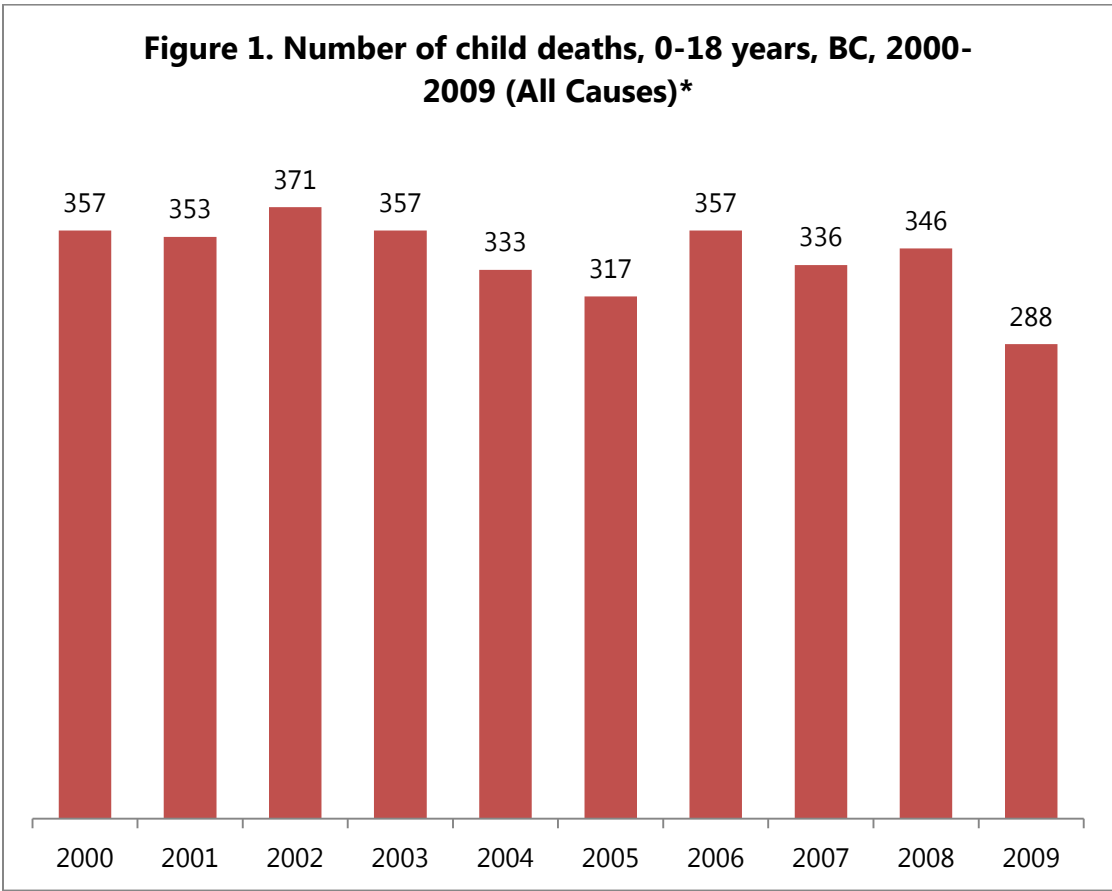
Throughout this report, small discrepancies in mortality counts and rates may be evident between BCCS mortality data and that of BC Vital Statistics. This discrepancy is attributable to coding differences between the two agencies and the time delay involved in reconciling any changes between preliminary and final certifications of death. Small discrepancies could also arise with future reports as 3 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

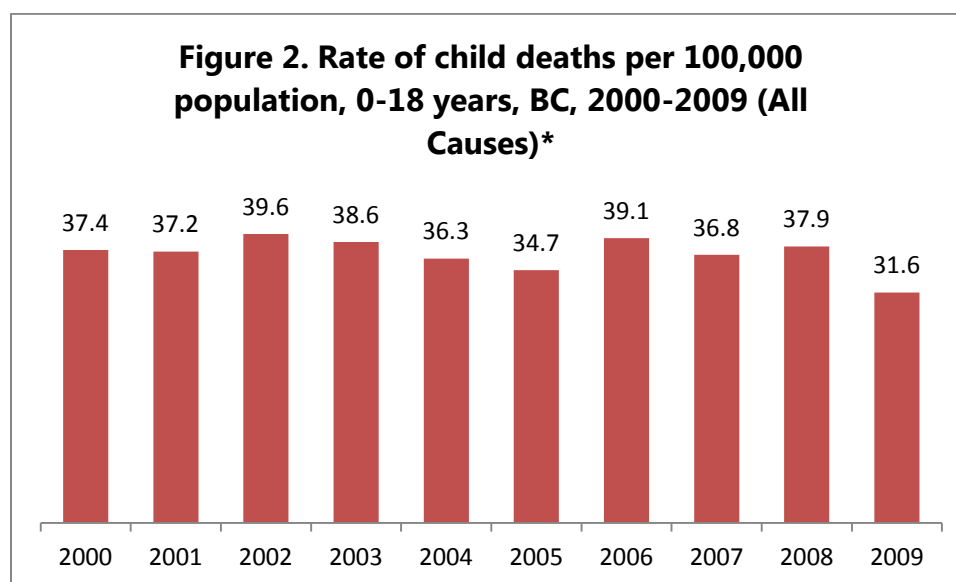
OVERVIEW OF CHILD MORTALITY IN BRITISH COLUMBIA

Although devastating to the families who are impacted by the death of a child, children’s deaths are a relatively rare event in British Columbia especially beyond infancy. There were an estimated 911,000 children age 0-18 in British Columbia in 2009. On average, 341 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 2009.

TABLE 1

Leading causes of child death by age group, 0-18 years, BC, 2009					
Rank	Under 1 year	1-4 years	5-9 years	10-14 years	15-18 years
1	Perinatal causes	Cancers	Cancers	Unintentional injuries	Unintentional injuries
2	Congenital and chromosomal conditions	Unintentional injuries	Unintentional injuries	Congenital and chromosomal anomalies	Suicide
3	Undetermined causes of sudden infant deaths	Respiratory causes	Respiratory causes	Cancers	Cancers

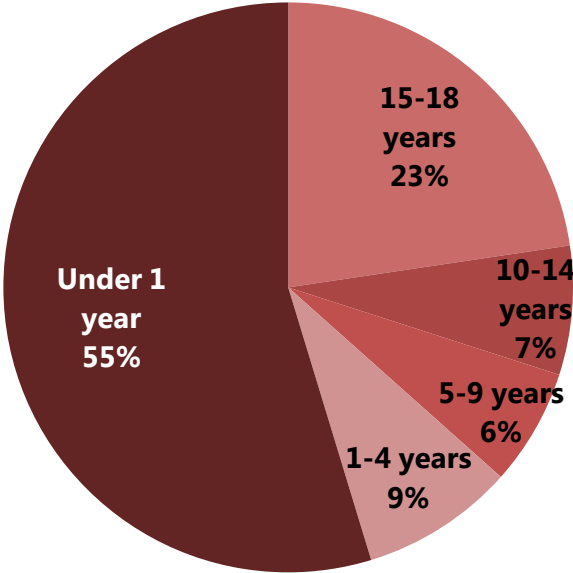
In general, children are most vulnerable to illness or death during infancy (Table 2). Following infancy, mortality rates decline and remain lower throughout early childhood. As children’s physical and cognitive abilities, degrees of dependence, activities and risk behaviours change rapidly with age, 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, 2009			
Age Group	Number of Deaths	Rate of Child Death per 100,000	Percent of total child deaths
Under 1 year	157	335	54.7
1-4 years	25	14.3	8.7
5-9 years	19	8.6	6.6
10-14 years	21	8.5	7.3
15-18 years	65	29.0	22.6
Total	287	31.5	100

Overall, the greatest percentage of child deaths in 2009 were infants less than one year of age (55%), followed by children 15 to 18 years of age (23%) (figure 3).

Figure 3. Distribution of child deaths by age group, 0-18 years, BC, 2009



Regional differences for child mortality in 2009.

Children living in the Fraser region accounted for the highest percentage of deaths; however, Northern B.C. had the highest child mortality rate in 2009 (Table 3).

TABLE 3

Child Deaths by Region of Residence, 0-18 Years, BC, 2009			
Region	Number	Percent	Rate per 100,000 Population
Fraser	77	26.8	21.6
Vancouver Metro	65	22.6	33.1
Vancouver Island	53	18.5	37.9
Interior	40	13.9	27.4
Northern	48	16.7	66.6
Lived outside BC	3	1.0	n/a
Unknown	1	0.3	n/a
Provincial Total	287	100	31.5

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

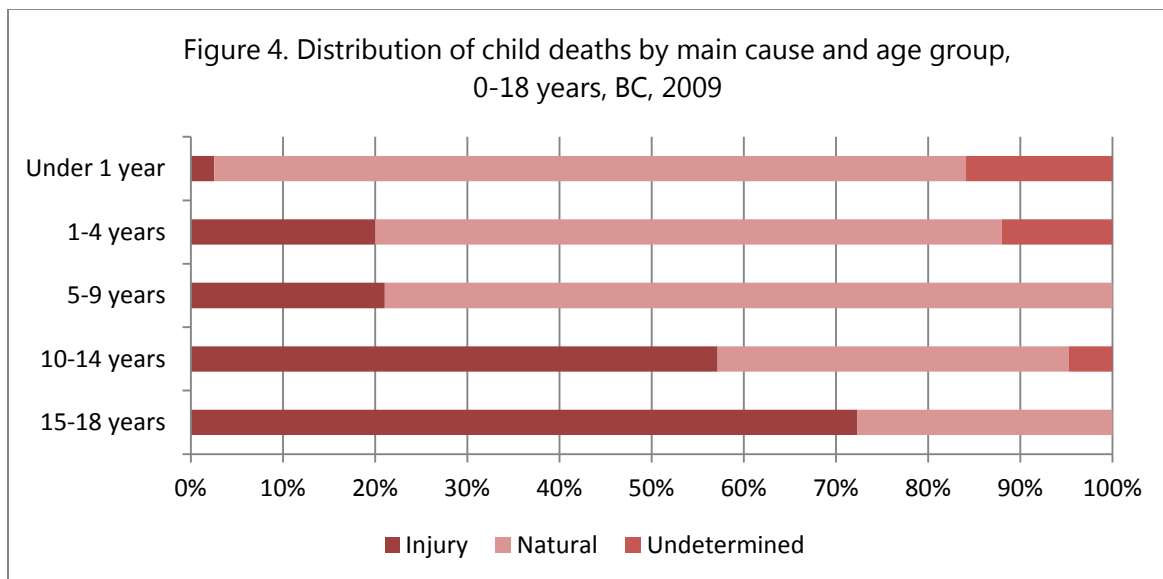
Undetermined causes include deaths that (because of insufficient evidence or inability to otherwise determine) cannot be reasonably categorized as natural or injury deaths. This includes cases of sudden infant deaths and fatalities due to other unknown or undetermined causes.

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, 2009				
Age Group	Injury	Natural	Undetermined	Total
Under 1 year	4	128	25	157
1-4 years	5	17	3	25
5-9 years	4	15	-	19
10-14 years	12	8	1	21
15-18 years	47	18	-	65
Total	72	186	29	287



SECTION TWO

CHARACTERISTICS OF CHILD DEATHS

DEATHS UNDER 12 MONTHS OF AGE

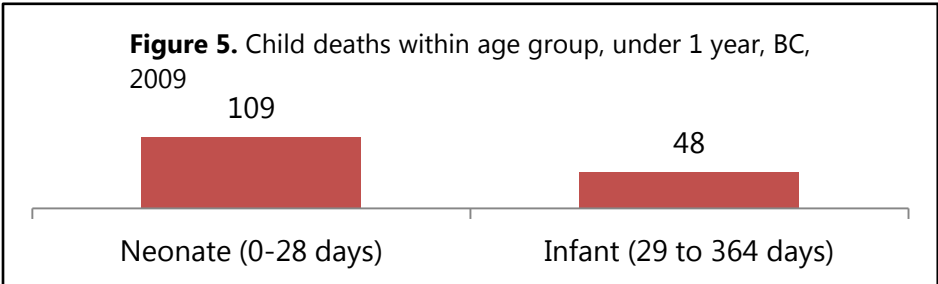
Number of deaths in 2009: 157 (84 Females and 73 Males) **Mortality Rate:** 3.35/1,000 live births

Leading Causes of Death:

Perinatal Causes	<p>In 2009, almost 70% of all infant deaths occurred within the first month of life (the neonatal period)(figure 5) .</p> <p>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 accounted for approximately 85 percent of infant deaths in British Columbia in 2009.</p>
Congenital and chromosomal conditons	<p>The majority of infants who died in BC in 2009 were premature and had a low birth weight. Two thirds were born preterm (29-37 weeks) or extremely preterm (less than 28 weeks). Low (<2500 grams) or very low (<1500 grams) birth weight is a risk factor independent of gestational age at birth. Over half of the infants who died had a low or very low birth weight.</p>
Undetermined causes of sudden infant death	<p>Maternal or pregnancy-related factors influence infant mortality risk, beginning with complications during pregnancy. The CDRU collected data related to complications such as maternal infection or high blood pressure, incompetent cervix, preterm labour, gestational diabetes or premature rupture of membranes. Complications during pregnancy were present in more than half the infants who died of natural causes in 2009.</p>
Other	

British Columbia has one of the lowest infant mortality rates in Canada (3.5 deaths vs. the Canadian average of 4.9 deaths per 1,000 live births). Males accounted for 46% of the deaths in this age group and females 54%.

Age:



DEATHS BETWEEN 1 AND 4 YEARS OF AGE

Number of deaths in 2009: 25 (16 Females and 9 Males) **Death Rate: 14.3/100,000**

Leading Causes of Death:

Cancers	<p>The three leading causes of death in this age group accounted for just over half of all the deaths.</p> <p>Various forms of cancers were the leading cause of death among children aged 1 to 4 who died in 2009 and accounted for 20% of the deaths.</p>
Unintentional Injuries	<p>Unintentional injuries were the second leading cause of death and accounted for 16% of the deaths for children between the ages of 1 and 4 years old. All of these deaths (n=4) involved a motor vehicle.</p>
Respiratory Causes	<p>Deaths resulting from respiratory causes also accounted for 16% of the deaths for children aged 1 to 4 years old in 2009.</p>
Other	<p>Congenital anomalies, metabolic anomalies and undetermined causes of death were the other major causes of death captured in the other category.</p> <p>Figure 6 shows that in 2009 the number of deaths decreased with age with 80% of the deaths occurring among the 1 and 2 year olds.</p> <p>In 2009, 36% of the deaths in this age group were males and 64% were females.</p>

Age:



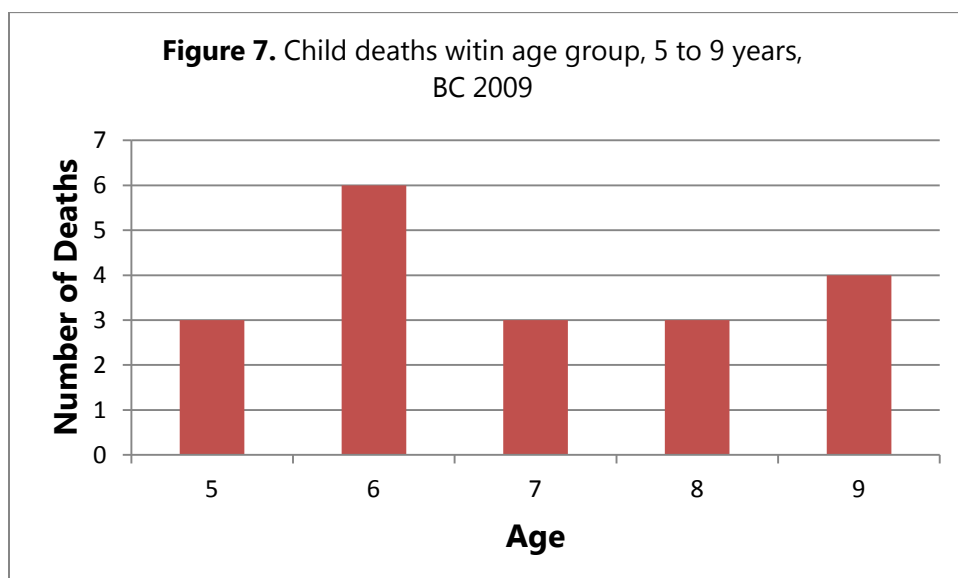
DEATHS BETWEEN 5 AND 9 YEARS OF AGE

Number of deaths in 2009: 19 (2 Females and 17 Males) **Death Rate:** 8.6/100,000

Leading Causes of Death:

Cancers	<p>As children age deaths due to injuries continued to increase as a percentage of child deaths.</p> <p>Various forms of cancer were the leading cause of death among 5 to 9 year old children in 2009, accounting for over 30% of deaths.</p>
Unintentional Injuries	<p>Unintentional injuries were the second leading cause of death in 2009 accounting for just over 20% of all deaths. The unintentional injuries were caused by such things as motor vehicle incidents, fire and drowning.</p>
Respiratory Causes	<p>Respiratory causes also accounted for approximately 20% of deaths in this age group.</p> <p>In 2009, 89% of the deaths in this age group were males and 11% were females.</p>
Other	<p>Unlike the 1 to 4 age group the number of deaths in this age group did not continue to decrease as children got older. Figure 7 shows that the number of deaths were more evenly distributed across the 5 to 9 year old age group.</p>

Age:



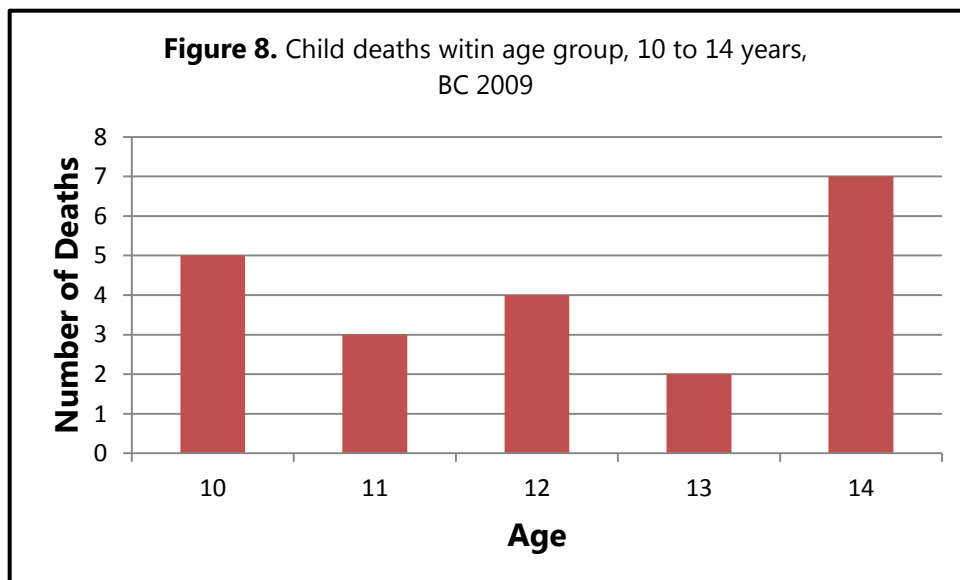
DEATHS BETWEEN 10 AND 14 YEARS OF AGE

Number of deaths in 2009: 21 (10 Females and 11 Males) **Death Rate:** 8.5/100,000

Leading Causes of Death:

Unintentional Injuries	<p>The leading cause of death in this age group was unintentional injuries which accounted for 48% of all the deaths. Motor vehicle crashes (n=4) were responsible for 40% of the accidental deaths and fire (n=3) accounted for 30% of the accidental deaths.</p>
Congenital and chromosomal conditions	<p>Congenital and chromosomal anomalies were the second leading cause of death in the 10 to 14 year old age group in 2009, and they accounted for 14% of all deaths in this age group.</p>
Cancers	<p>Deaths related to various forms of cancer were the third leading cause of death in this age group and accounted for 10% of the deaths.</p>
Other	<p>In this age group, 52% of the deaths were males and 48% were females.</p> <p>Figure 8 shows the number of deaths for each age within the 10 to 14 year old age group for 2009.</p>

Age:



DEATHS BETWEEN 15 AND 18 YEARS OF AGE

Number of deaths in 2009: 65 (15 Females and 50 Males) **Death Rate:** 29/100,000

Leading Causes of Death:

Unintentional Injuries
Suicides
Cancers
Other

Among children aged 15 to 18 years, the three leading causes of death in 2009 included unintentional injuries, suicide and various forms of cancer.

Collectively, injuries accounted for 50% of all child deaths involving 15 to 18 year olds in 2009. Of deaths due to unintentional injuries (n=32), motor vehicle crashes were responsible for the greatest number of deaths accounting for over two thirds of the deaths (n=22). An additional 19% (n=6) were attributed to accidental alcohol or other drug overdoses, or fire.

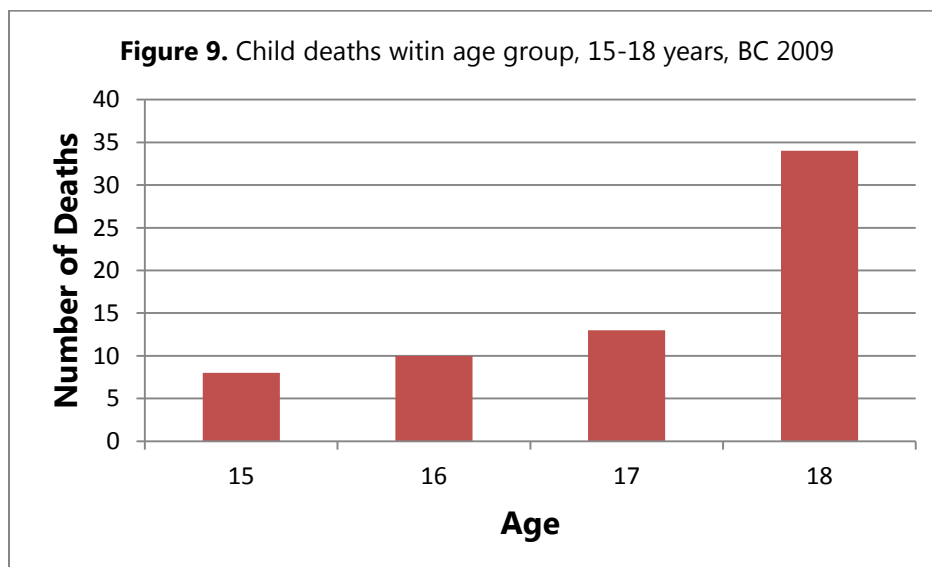
Fifteen percent of deaths in this age group were due to suicides which accounted for 10 of the 11 child and youth suicides that occurred in 2009.

Various forms of cancers were the third leading cause of death accounting for 12% of the deaths among 15 to 18 year olds.

Among 15 to 18 year old youth, 77% of the deaths were males and 23% were females.

In 2009, the number of deaths increased with age across this age group with the highest number of deaths occurring at the age of 18 (figure 9).

Age:



CHILD DEATHS BY CAUSE

NATURAL DEATHS

Number of deaths in 2009: 186 (96 Females and 90 Males)

Leading Causes of Natural Death:

Perinatal Causes
Chromosomal/ Congenital Conditions
Cancers
Other

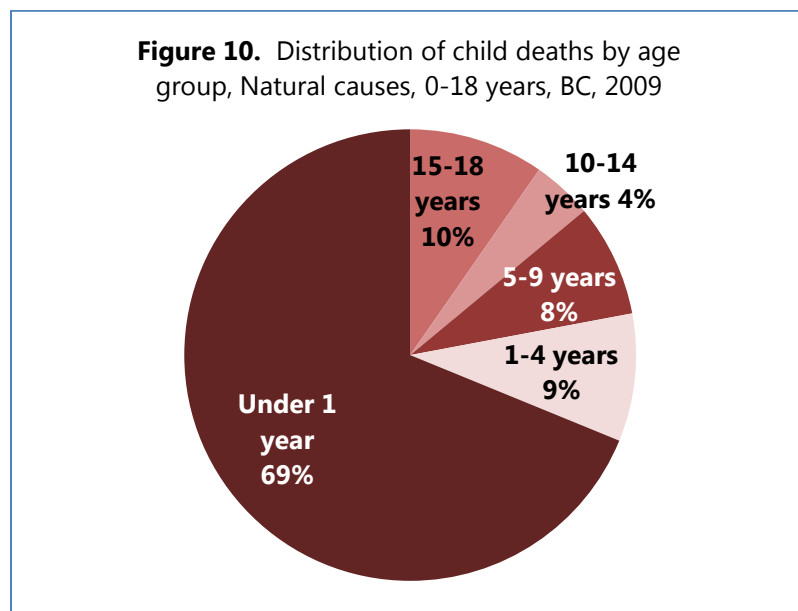
In 2009, 186 (65%) of the 287 child deaths that occurred in B.C. were due to natural causes. Almost 60% of natural deaths in 2009 involved infants who died in the first month of life.

In 2009, leading causes of natural death include certain conditions originating in the perinatal period (n=80, 43%), followed by congenital malformations, deformations and chromosomal abnormalities (n=37, 20%) and cancers (n=22, 12%). Leading causes of natural child death in 2009 are consistent with longitudinal patterns observed in British Columbia since 2000.

Similar numbers of female and male children died of natural causes in 2009 with males accounting for 48% of the deaths and females 52%

As figure 10 demonstrates 69% of children who died of natural causes in 2009 were under the age of one.

Age:



INJURY RELATED DEATHS

Number of deaths in 2009: 72 (19 Females and 53 Males)

Leading Causes of Injury Related Death:

Motor Vehicle Incidents	In 2009, 72 (25%) of the 287 child deaths that occurred in B.C. were injury related. Injuries were the leading cause of death for children age 10 to 18 and the second leading cause of death for children aged 1-9. The proportion of death due to injury increased with age, the highest percentage occurring among children aged 15 to 18 years old (n=32, 44%). 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 were the leading cause of injury related death for children 0-18 years in B.C. in 2009, followed by suicide, homicide, fire and drowning.
Suicide	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
Homicide	Motor vehicle incidents accounted for 43% (n=31) of all injury related child deaths in 2009. Over 70% (n=22) 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.
Fire	
Drowning	
Other	The second leading cause of injury related death in 2009 occurred by suicide and was almost exclusively connected to youth age 15 to 18 where 10 of the 11 suicides occurred. Suicide accounted for 15% 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 2009 there were 8 deaths caused by homicide, half occurred in the 15 to 18 year old age group. In 2009 all of the homicides involved males.

Intentional injuries (suicide and homicide) accounted for just over 25% of all child injury fatalities.

Deaths resulting from fires were the fourth leading cause of injury related death in 2009. Fire related deaths accounted for just under 10% of the injury related deaths.

In 2009, 4 young people drowned which accounted for 6% of the injury related deaths.

Regional rates of fatal injuries in the province.

The highest injury mortality rates among children in 2009 were observed in the Northern and Vancouver Island regions which were above the provincial average of 7.9 per 100,000 population (table 5). 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}

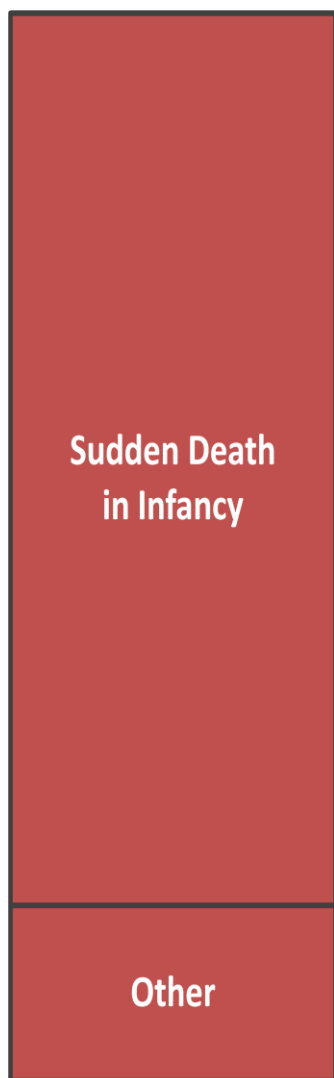
TABLE 5

Injury Deaths by Region of Residence, 0-18 Years, BC, 2009			
Region	Number	Percent	Rate per 100,000 Population
Fraser	18	25.0	5.0
Vancouver Metro	10	13.9	5.1
Vancouver Island	14	19.4	10.0
Interior	11	15.3	7.5
Northern	18	25.0	25.0
Lived outside BC	1	1.4	n/a
Total	72	100	7.9

UNDETERMINED DEATHS

Number of deaths in 2009: 29 (12 Females and 17 Males)

Leading Classification of Undetermined Death:



In 2009, 29 (10%) of the 287 child deaths occurring in British Columbia were due to undetermined causes.

The majority (24, 83%) of undetermined deaths were characterized as sudden death in infancy. 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>

In 2009, the number of sudden infant deaths was similar between male and female infants. Of the 24 infants who died suddenly, 13 (54%) were male and 11 (46%) 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 classification was either the result of two or more causes, neither of which could be ruled out, or in rare instances where no cause could be determined.

CHILDREN RECEIVING SERVICES FROM THE MINISTRY OF CHILDREN AND FAMILY DEVELOPMENT

Approximately one quarter of children who died in 2009 were in receipt of services from the Ministry of Children and Family Development (table 6). Many of these 74 children were medically fragile children supported through the province's At Home program.

Of the 74 children receiving services from MCFD 47 (64 %) died of natural causes, 14 (19%) children died of injury-related causes, and 13 (18%) children died of undetermined causes. Across all causes, thirteen 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, 2009	
Type of MCFD service	Number of Deaths*
At Home Program	33
Family services - mandated	26
Family services - voluntary	13
Child in care	13
Other out of care	2
Youth Services	1
Youth Justice	1

** A total of 74 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 74 as some children were in receipt of more than one type of service.*

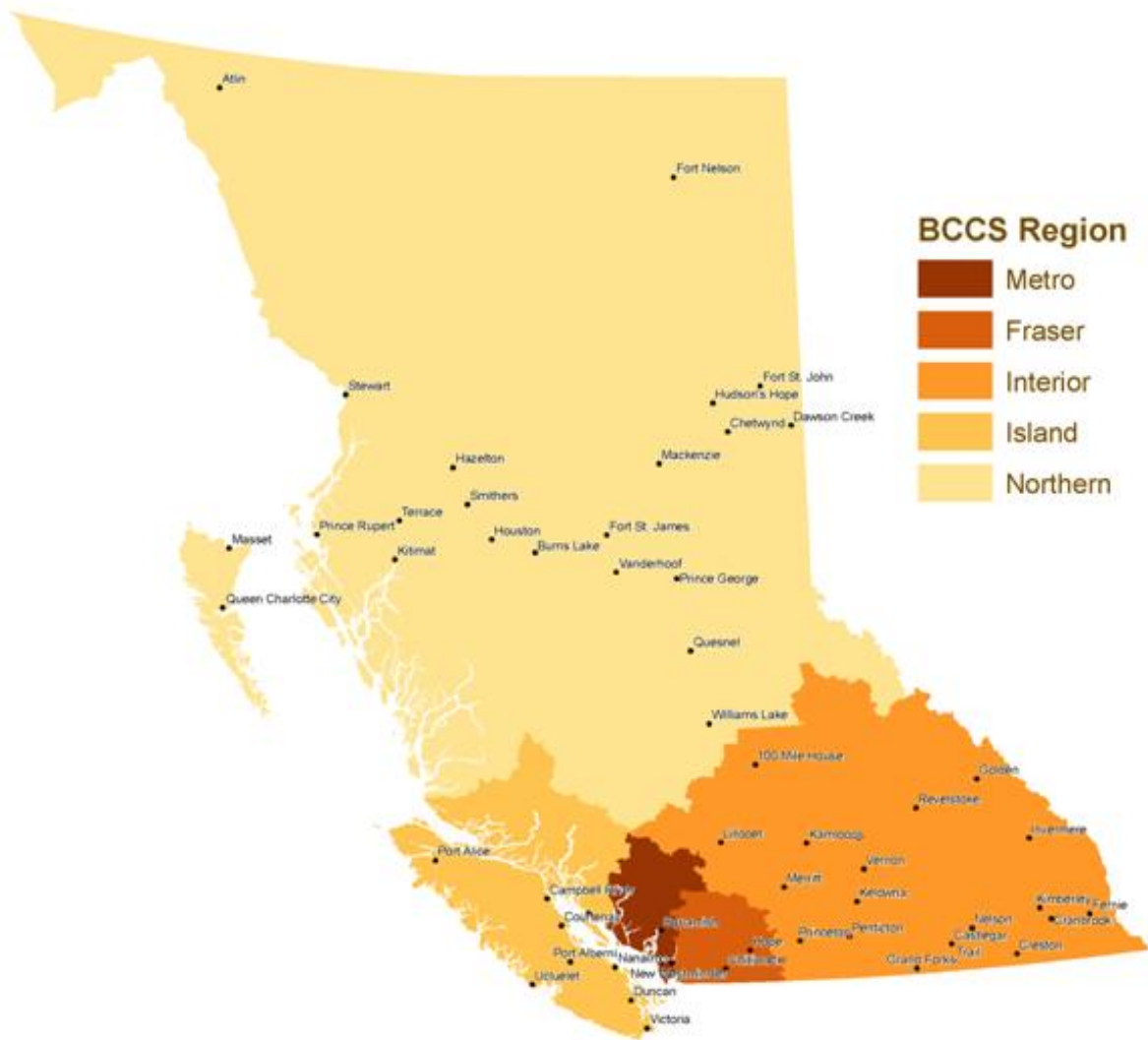
APPENDIX A

RECOMMENDATIONS MADE BY LOCAL CORONERS

The following 3 coroners' recommendations were made with respect to one child who died in 2010 and each was addressed:

1. That specific instructions and information on safe sleeping practices be included within the Safety section in the Newborn Care Path Guidelines for Public Health Nurses.
2. That Public Health Nurses provide information to new parents on the topic of safe sleeping practices when meeting with the parent either by phone or in person.
3. That specific instructions and information on safe sleeping practices be integrated into the curriculum for new hires to the Public Health Units of the Fraser Health Authority.

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>