



Child Mortality in British Columbia

2008 Update

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 344 deaths of children occurring in British Columbia during 2008. 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.

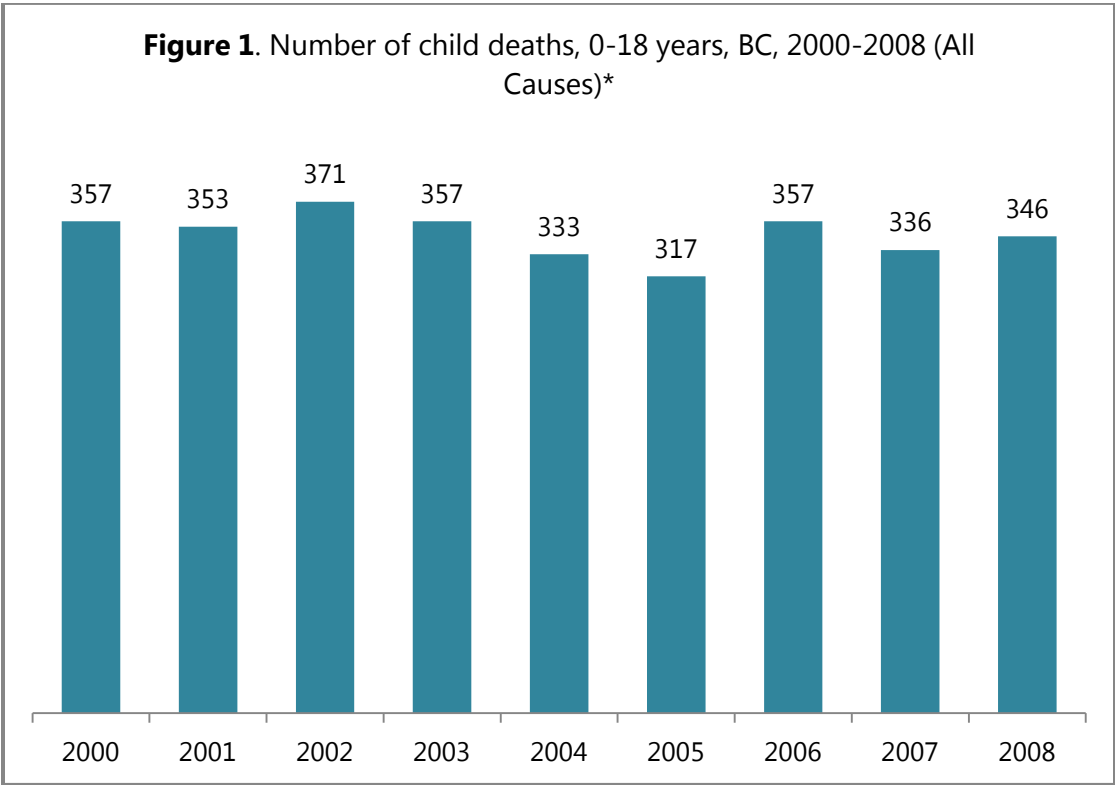
Throughout this report, small discrepancies in mortality counts and rates may be evident between BCCS mortality data and that of BC Vital Statistics. This discrepancy is attributable to coding differences between the two agencies and the time delay involved in reconciling any changes between preliminary and final certifications of death. Small discrepancies could also arise with future reports as 8 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

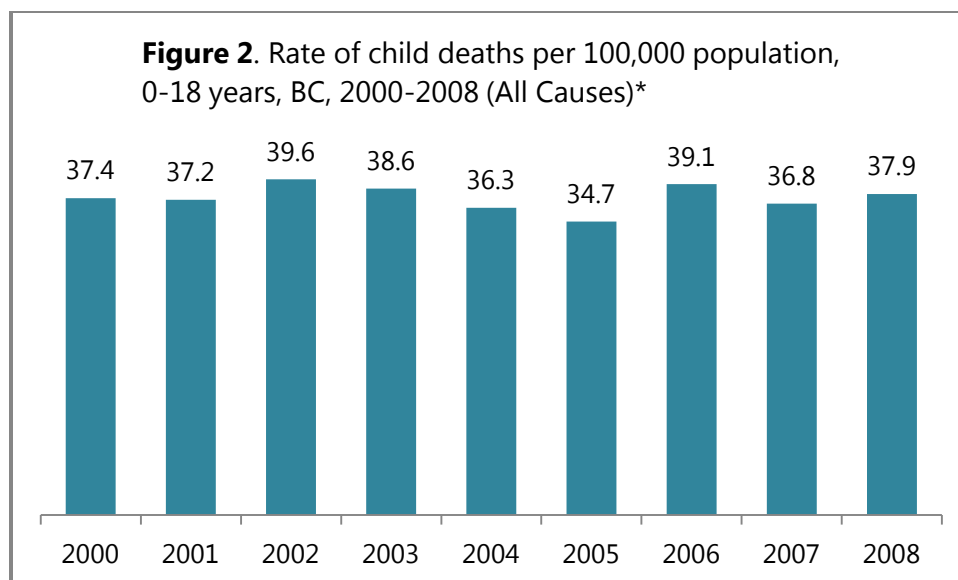
OVERVIEW OF CHILD MORTALITY IN BRITISH COLUMBIA

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 912,000 children age 0-18 in British Columbia in 2008. On average, 348 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. In all age groups more males die than females with 60% of all child deaths being males.



*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 2008.

TABLE 1

Leading causes of child death by age group, 0-18 years, BC, 2008					
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	Neurologic diseases	Cancers	Cancers	Suicide
3	Undetermined causes of sudden infant deaths	Cancers	Congenital and chromosomal anomalies	Circulatory system anomalies	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

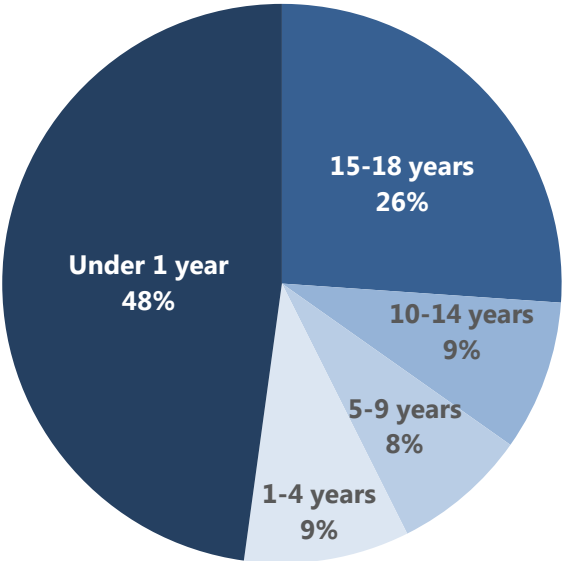
cognitive abilities, degrees of dependence, activities and risk behaviours change rapidly with age, their vulnerability to external causes of mortality also increases.¹ Mortality rates increase once again as children approach adolescence, when injuries take over as the leading cause of child death and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

TABLE 2

Child deaths by age group, 0-18 Years, BC, 2008			
Age Group	Number of Deaths	Rate of Child Death per 100,000	Percent of total child deaths
Under 1 year	166	360	48.3
1-4 years	32	18.7	9.3
5-9 years	26	11.8	7.6
10-14 years	30	12.0	8.7
15-18 years	90	39.7	26.2
Total	344	37.7	100

Overall, the greatest percentage of child deaths in 2008 were infants less than one year of age (48%), followed by children 15 to 18 years of age (26%) (figure 3).

Figure 3. Distribution of child deaths by age group, 0-18 years, BC, 2008



Regional differences for child mortality in 2008.

Children living in the Fraser region accounted for the highest percentage of deaths; however, Northern B.C. had the highest child mortality rate in 2008 (Table 3). Both the Northern and Vancouver Island regions had a higher child mortality rate than the provincial average.

TABLE 3

Child Deaths by Region of Residence, 0-18 Years, BC, 2008			
Region	Number	Percent	Rate per 100,000 Population
Fraser	118	34.3	33.2
Vancouver Metro	62	18.0	31.7
Vancouver Island	62	18.0	43.8
Interior	53	15.4	36.1
Northern	38	11.0	52.1
Lived outside BC	10	2.9	n/a
Unknown	1	0.3	n/a
Provincial Total	344	100	37.7

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

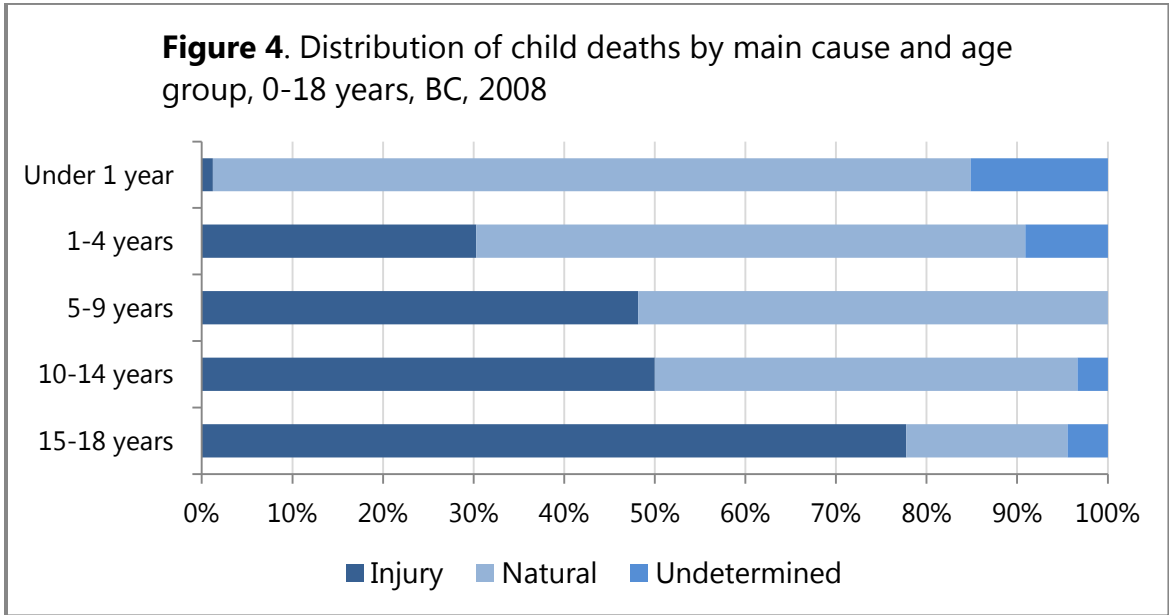
Undetermined causes include deaths that (because of insufficient evidence or inability to otherwise determine) cannot be reasonably categorized as natural or injury deaths. This includes cases of sudden infant deaths and fatalities due to other unknown or undetermined causes.

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, 2008				
Age Group	Injury	Natural	Undetermined	Total
Under 1 year	2	138	26	166
1-4 years	10	20	2	32
5-9 years	13	13	-	26
10-14 years	15	14	1	30
15-18 years	70	16	4	90
Total	110	201	33	344



SECTION TWO

CHARACTERISTICS OF CHILD DEATHS

DEATHS UNDER 12 MONTHS OF AGE

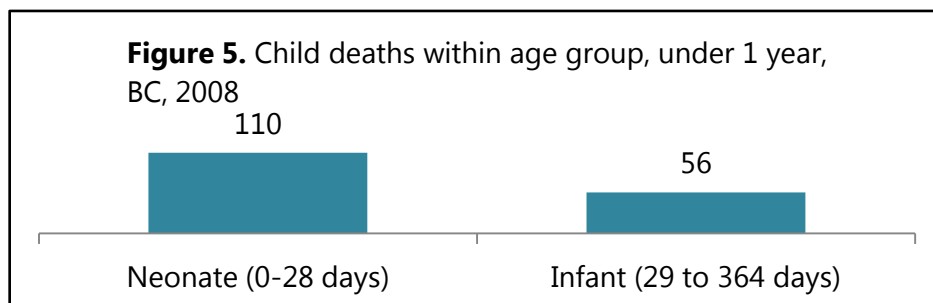
Number of deaths in 2008: 166 (71 Females and 95 Males) **Mortality Rate:** 3.65/1,000 live births

Leading Causes of Death:

Perinatal Causes	<p>Two thirds 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 account for approximately 85 percent of infant deaths in British Columbia.</p>
Congenital and chromosomal anomalies	<p>The majority of infants who died in BC in 2008 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.</p>
Undetermined causes of sudden infant death	<p>Maternal or pregnancy-related factors influence infant mortality risk, beginning with complications during pregnancy.</p>
Other	<p>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 2008.</p>

British Columbia has one of the lowest infant mortality rates in Canada (3.8 deaths vs. the Canadian average of 5.1 deaths per 1,000 live births). Males accounted for 57% of the deaths in this age group and females 43%.

Age:



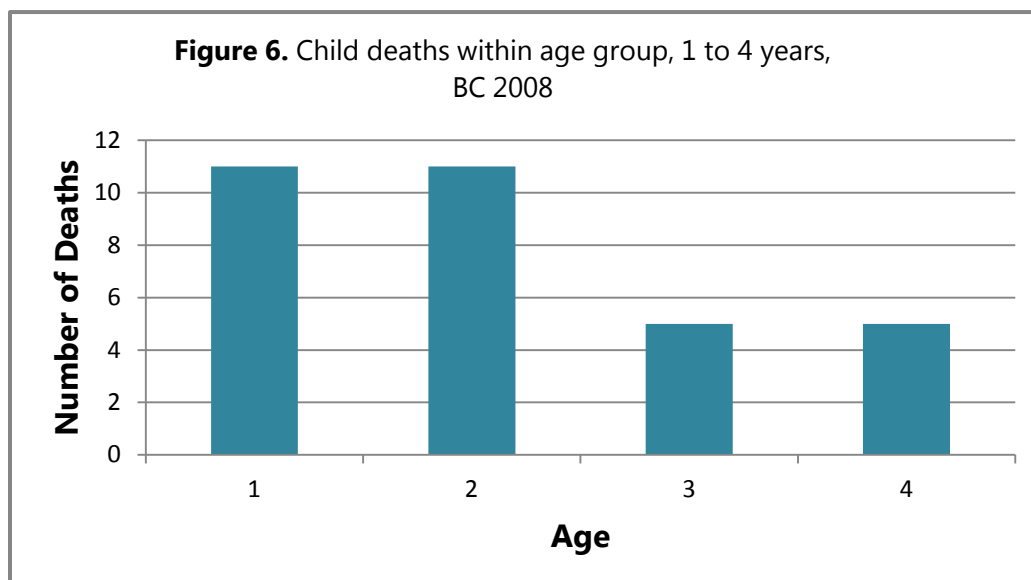
DEATHS BETWEEN 1 AND 4 YEARS OF AGE

Number of deaths in 2008: 32 (11 Females and 21 Males) **Death Rate: 18.7/100,000**

Leading Causes of Death:

<p>Unintentional Injuries</p>	<p>The three leading causes of death in this age group accounted for 60% of all the deaths.</p> <p>Unintentional injuries were the leading cause of death and accounted for 30% of the deaths for children between the ages of 1 and 4 years old. Half of these deaths (n=4) involved motor vehicles with 3 children being struck by a vehicle.</p>
<p>Diseases of the Nervous System</p>	<p>Diseases of the nervous system were the second leading cause of death in this age group and accounted for 15% of the deaths.</p>
<p>Cancers</p>	<p>The third leading cause of death for 1 to 4 year old children were various forms of cancer. These accounted for 12% of the child deaths.</p>
<p>Other</p>	<p>Congenital anomalies, pneumonia, and respiratory failure were the other major causes of death captured in the other category.</p> <p>Figure 6 shows that the number of deaths decreased with age with two thirds of the deaths occurring among the 1 and 2 year olds in 2008.</p> <p>Two thirds of the deaths in this age group were males and one third females.</p>

Age:



DEATHS BETWEEN 5 AND 9 YEARS OF AGE

Number of deaths in 2008: 26 (11 Females and 15 Males) **Death Rate:** 11.8/100,000

Leading Causes of Death:

Unintentional Injuries
Cancers
Congenital and chromosomal anomalies
Other

As children age deaths due to injuries continued to increase as a percentage of child deaths.

Unintentional injuries were the leading cause of death among 5 to 9 year old children and accounted for 48% of all deaths. Motor vehicle crashes were responsible for over half of these accidental deaths.

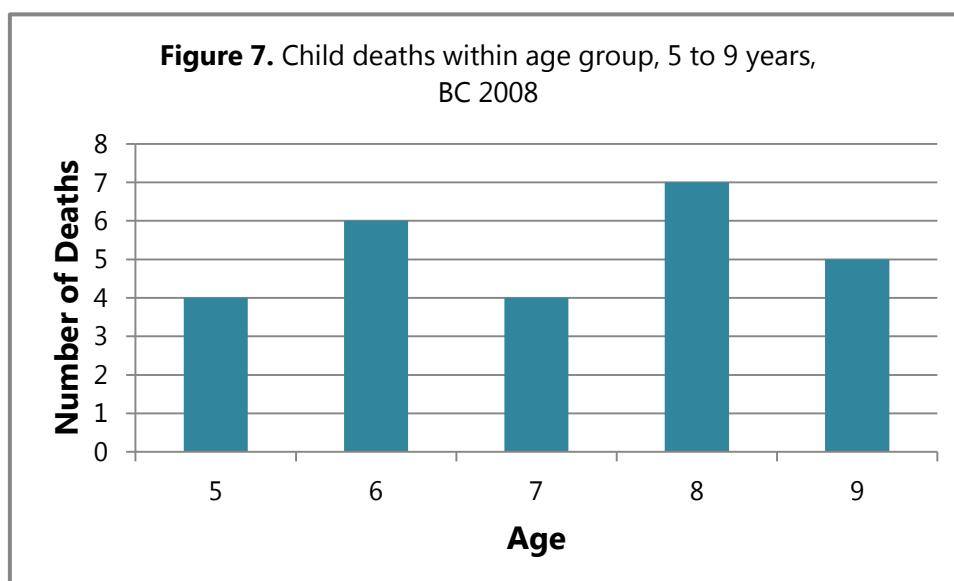
Various forms of cancer were the second leading cause of death accounting for just over 13% of deaths.

Congenital and chromosomal anomalies also accounted for approximately 13% of deaths in this age group.

Among this age group, 58% of the deaths were males and 42% of the deaths were females.

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 in 2008.

Age:



DEATHS BETWEEN 10 AND 14 YEARS OF AGE

Number of deaths in 2008: 30 (11 Females and 19 Males) **Death Rate:** 12.0/100,000

Leading Causes of Death:

Unintentional Injuries
Cancers
Circulatory system
Other

The leading cause of death in this age group was unintentional injuries which accounted for 50% of all the deaths. Motor vehicle crashes and crushing injuries were responsible for half of the accidental deaths.

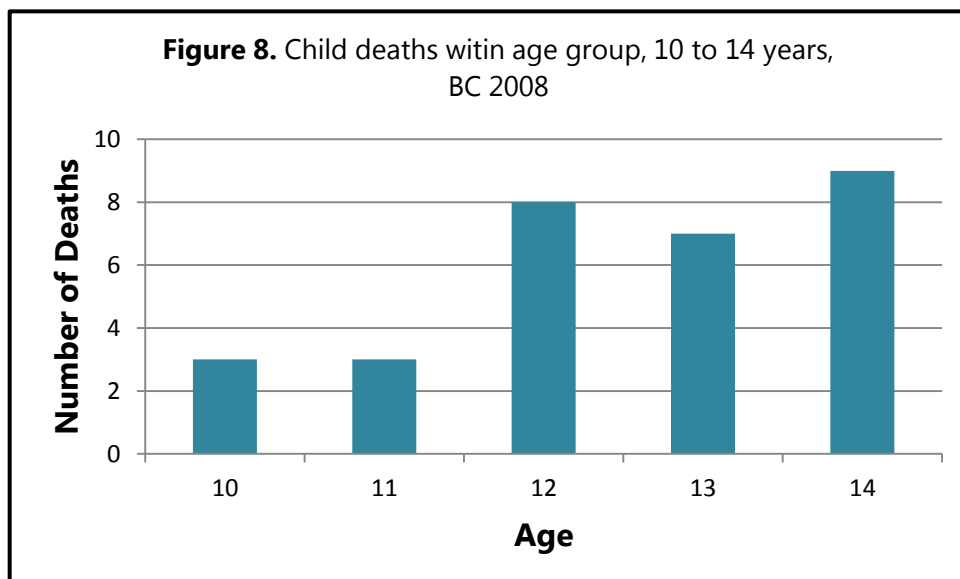
Various forms of cancers were the second leading cause of death in the 10 to 14 year old age group and they accounted for 27% of all deaths in this age group.

Deaths related to the circulatory system including hemorrhaging and heart failure were the third leading cause of death in this age group.

In this age group, 63% of the deaths were males and 37% were females.

Figure 8 shows an increase in the number of deaths as children get older with considerably more deaths among the 12-14 year olds than 10 and 11 year old children in 2008.

Age:



DEATHS BETWEEN 15 AND 18 YEARS OF AGE

Number of deaths in 2008: 90 (33 Females and 57 Males) **Death Rate: 39.7/100,000**

Leading Causes of Death:

Unintentional Injuries
Suicides
Homicides
Other

Among children aged 15 to 18 years, the three leading causes of death in 2008 included unintentional injuries, suicide and homicide. Collectively, injuries accounted for 77 per cent of all child deaths involving 15 to 18 year olds in 2008.

Of deaths due to unintentional injuries (n=52), motor vehicle crashes were responsible for the greatest number of deaths accounting for over half. An additional 19% were attributed to accidental alcohol or other drug overdoses.

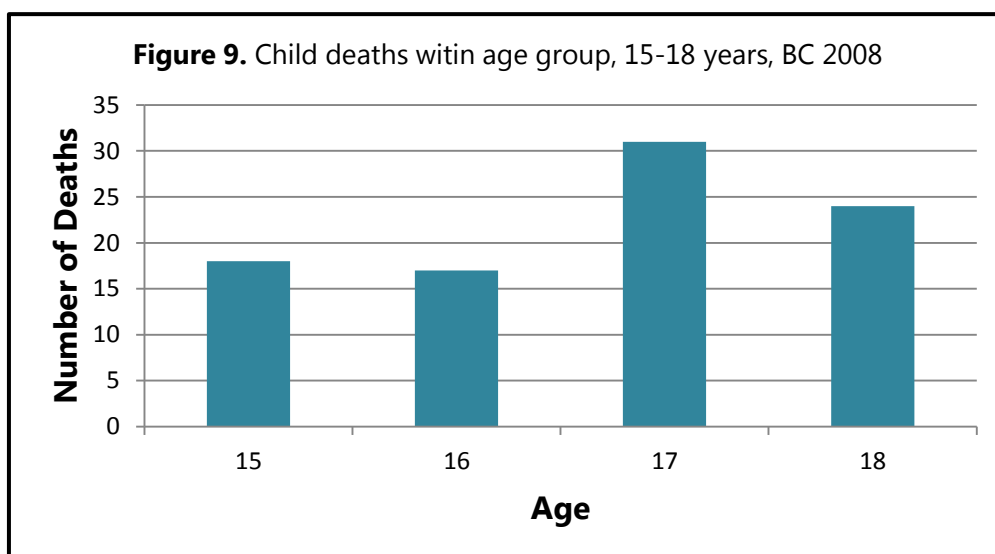
14% of deaths in this age group were due to suicides which accounted for 13 of the 14 child and youth suicides that occurred in 2008.

Homicides were the third leading cause of death accounting for 5% of the deaths among 15 to 18 year olds.

Among 15 to 18 year old youth, 63% of the deaths were males and 37% were females.

The highest number of deaths within this age group occurred at age 17 in 2008 (figure 9).

Age:



CHILD DEATHS BY CAUSE:

NATURAL DEATHS

Number of deaths in 2008: 201 (95 Females and 106 Males)

Leading Causes of Natural Death:

Perinatal Causes
Chromosomal/ Congenital Conditions
Cancers
Neurologic Conditions
Other

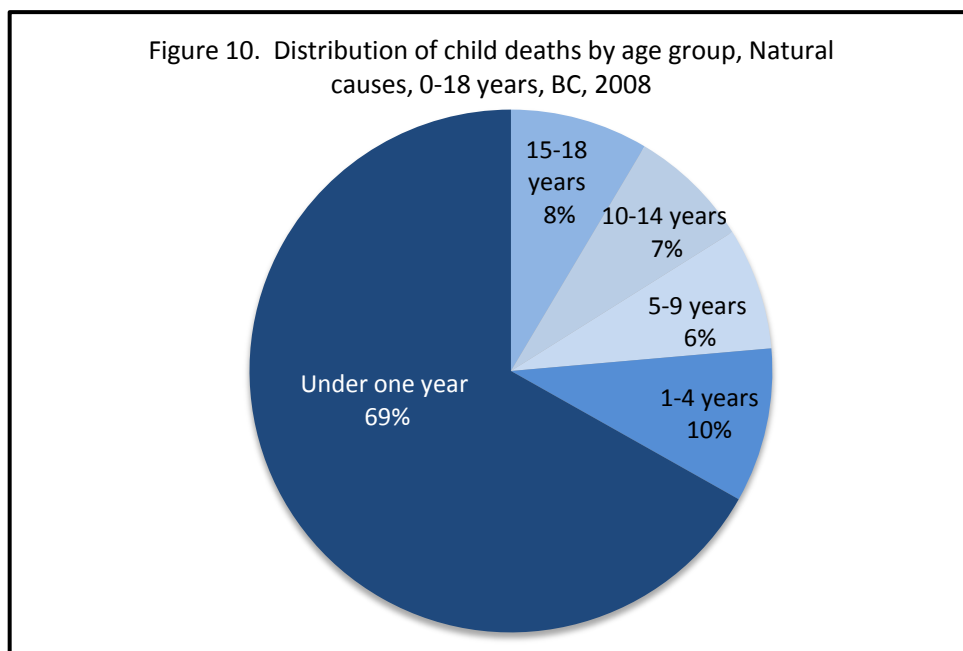
In 2008, 201 (58%) of the 344 child deaths that occurred in B.C. were due to natural causes. The majority of natural deaths in 2008 involved infants who died in the first month of life.

In 2008, leading causes of natural death include certain conditions originating in the perinatal period (n=82, 41%), followed by congenital malformations, deformations and chromosomal abnormalities (n=43, 21%), cancers (n=24, 12%) . Leading causes of natural child death in 2008 are consistent with longitudinal patterns observed in British Columbia since 2000.

Similar numbers of female and male children died of natural causes in 2008 with males accounting for 53% of the deaths and females 47%

As figure 10 demonstrates over two thirds of children who died of natural causes in 2008 were under the age of one.

Age:



INJURY RELATED DEATHS

Number of deaths in 2008: 110 (34 Females and 76 Males)

Leading Causes of Injury Related Death:

Motor Vehicle Incidents
Suicide
Homicide
Alcohol/Drug/other Poisoning
Drowning
Other

In 2008, 110 (32%) of the 344 child deaths that occurred in B.C. were injury related. Injuries were the leading cause of death for all age groups beyond infancy. The proportion of death due to injury increased with age, the highest percentage occurring among children aged 15 to 18 years old (n=70, 78%). 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, unintentional poisoning and drowning in 2008.

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% (n=43) of all injury related child deaths in 2008. Almost three quarters (n=31) 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 and was almost exclusively connected to youth age 15 to 18 where 13 of the 14 suicides occurred. Suicide accounted for 13% of all child injury related deaths in 2008. 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 2008 there were 12 deaths caused by homicide affecting all of the age groups. Just over 40% of the homicides occurred in the 15 to 18 year old age group. Overall 75% of the homicides involved males and 25% females which is similar to the overall ratio of injury-related deaths for females and males.

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

Accidental death due to poisoning, including from alcohol and other drugs, was the fourth leading cause of injury related death. In 2008, all but one of the 11 deaths due to poisoning were the result of alcohol or other drug use and occurred in youth aged 15 to 18.

In 2008, 7 young people drowned which accounted for 6% of the injury related deaths. Three of the drownings occurred in younger children and 4 of the drownings occurred in the 15 to 18 year old age group.

The remaining injury related deaths included deaths resulting from falls, airway obstructions, crushing and machinery.

Regional rates of fatal injuries in the province.

The highest injury mortality rates among children in 2008 were observed in the Northern, Interior and Vancouver Island regions, all of which were above the provincial average of 12.1 per 100,000 population (table 5). The Fraser and Vancouver Metro regions had lower than average injury mortality rates in 2008. 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}

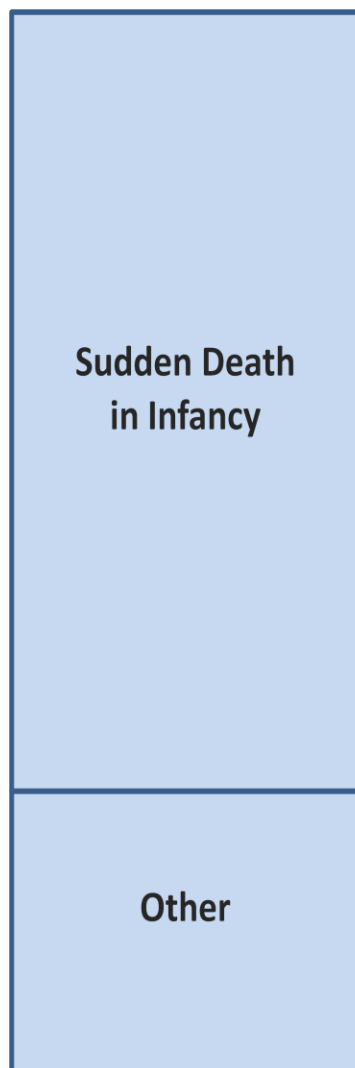
TABLE 5

Injury Deaths by Region of Residence, 0-18 Years, BC, 2008			
Region	Number	Percent	Rate per 100,000 Population
Fraser	31	28.2	8.7
Vancouver Metro	16	14.5	8.2
Vancouver Island	21	19.1	14.8
Interior	25	22.7	17.0
Northern	14	12.7	19.2
Lived outside BC	3	2.7	n/a
Total	110	100	12.1

UNDETERMINED DEATHS

Number of deaths in 2008: 33 (8 Females and 25 Males)

Leading Classification of Undetermined Death:



In 2008, 33 (10%) of the 344 child deaths occurring in British Columbia were due to undetermined causes.

The majority (24, 73%) 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 significantly higher among male infants. Of the 24 infants who died suddenly in 2008, 18 (75%) were male and six (25%) 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 2008 were in receipt of services from the Ministry of Children and Family Development (table 6). Many of these 80 children were medically fragile children supported through the province's At Home program.

Of the 80 children receiving services from MCFD 51 (64 %) died of natural causes, 23 (29%) children died of injury-related causes, and 6 (7%) 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, 2008	
Type of MCFD service	Number of Deaths*
At Home Program	36
Family services - mandated	15
Family services - voluntary	13
Child in care	13
Child and Youth Mental Health	6
Youth Services	5
Youth Justice	4
Other out of care	1

** 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

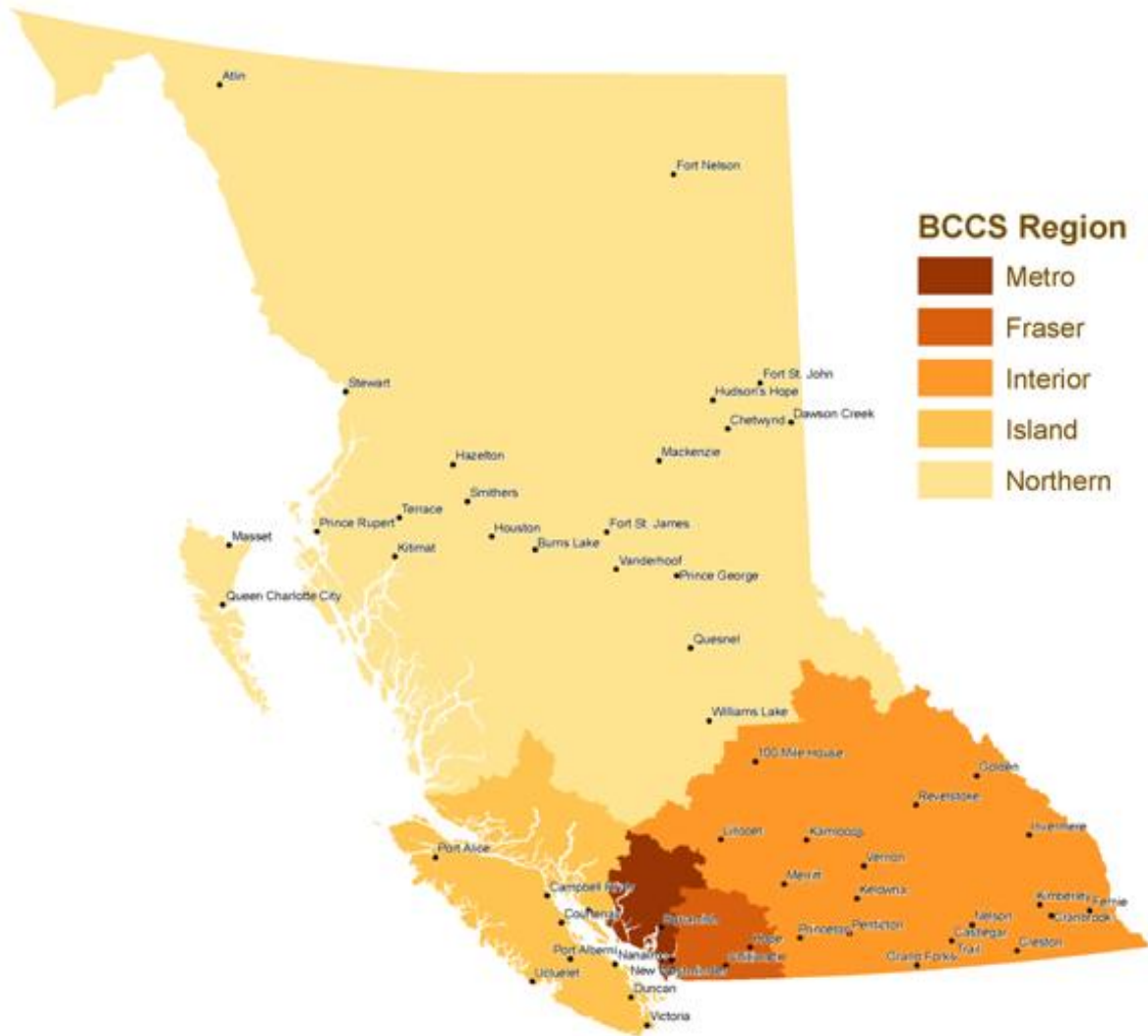
RECOMMENDATIONS MADE BY LOCAL CORONERS

A total of 11 coroners' recommendations were made with respect to four children who died in 2008:

- 2 of the recommendations were made with respect to prohibiting and blocking access to an elementary school roof.
- 3 recommendations were made with respect to multi stakeholder collaboration in identifying and minimizing the risks of home pools.
- 1 recommendation was made with respect to a safe sleeping policy for newborns in a hospital.
- 5 recommendations were made with respect to the development, implementation and sharing of audits and protocols around respite care for children in care.

APPENDIX A

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>