



# Coroners Service

## **Sleeping Safely:**

*A BC Coroners Service  
Death Review Panel report examining  
deaths among infants (2013-2018)*

**A Report to the Chief Coroner of British Columbia**



***Published Nov. 19, 2019***

## **RECOMMENDATIONS**

**#1: EXPAND LOW BARRIER AND CULTURALLY SAFE PUBLIC HEALTH SERVICES TO VULNERABLE FAMILIES FROM BIRTH TO ONE YEAR POSTPARTUM**

**#2: IMPROVE CONTINUITY OF CARE AND SERVICE COORDINATION**

**#3: DETERMINE THE NEED FOR A PROVINCIAL APPROACH FOR INFANT MORTALITY REVIEW**

## **KEY FINDINGS IN SUDDEN INFANT DEATHS (2013-2018)**

**INFANTS CONTINUE TO DIE UNDER THE SAME CIRCUMSTANCES AS IDENTIFIED BY THE 2008-2012 DEATH REVIEW PANEL ON INFANT DEATHS**

**THE DEATHS OF INFANTS WERE FOUND DISPROPORTIONALLY AMONG YOUNG FAMILIES WITH RISK FACTORS (E.G. EXPOSURE TO TOBACCO) OR VULNERABILITIES**

**SLEEP POSITION COMBINED WITH HEALTH ISSUES MAY HAVE INCREASED MORTALITY RISK FOR SOME INFANTS**

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## PREFACE

On April 17, 2019, the British Columbia Coroners Service (BCCS) convened a death review panel with the purpose of reviewing unexpected infant deaths during sleep. Each of these deaths was a profound loss. This report is dedicated to the families, friends and those affected by the death of a baby.

Panel support was provided by BCCS staff. Cara Massy provided administrative support and Carla Springinotic, Adele Lambert and Andrew Tu prepared the file-review analysis and background research which formed the basis of the panel discussions. I would also like to recognize the contributions of Ministry of Health staff Sarah Amyot, Keren Massey and Glenys Webster.

This panel was comprised of professionals with expertise in health, medicine, public health, Indigenous health, pediatrics and neonatal medicine, child welfare, income support, law enforcement and injury prevention. I am sincerely grateful to the panel for sharing their expertise, bringing the support of their respective organizations and participating in a collaborative discussion. Their dedication to the health and well-being of all infants in B.C. is apparent in the contributions each has made towards investigating unexpected infant deaths through the panel discussion.

Dave Attfield – RCMP, Chief Superintendent, Deputy Criminal Operations Officer  
Dr. Jatinder Baidwan – Chief Medical Officer, BC Coroners Service  
Robert Bruce – Executive Director, Ministry of Social Development and Poverty Reduction  
Dr. Michelle Clarke – Pediatrics, BC Children’s Hospital  
Bob Downie – Chief Constable, Saanich Police  
Dr. Charmaine Enns – Medical Health Officer, Island Health Authority  
Dr. Ellen Giesbrecht – Senior Medical Director, Maternal Newborn, BC Women’s Hospital  
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Wendy Trotter – Executive Director, Public Health Services, Ministry of Health  
Dr. Steven White – Lead Forensic Pathologist, BC Coroners Service

I am confident that the recommendations in this report will contribute to addressing deaths of infants in British Columbia. On behalf of the panel, I submit this report and recommendations to the chief coroner of B.C.



Michael Egilson, Panel Chair

## EXECUTIVE SUMMARY

Each year in B.C., approximately 23 infants<sup>1</sup> under the age of one year, die unexpectedly during sleep. For many of the infants who died, unsafe sleep conditions contributed to or resulted in the death.

Previous death review panels of unexpected infant deaths in British Columbia have identified the presence of unsafe sleep conditions among many of the infants who died during sleep. To address these factors, provincial messaging about safer sleep environments was developed and made accessible to parents and health care providers. In addition, to learn more about the specific markers, recommendations from previous death review panels resulted in changes to BCCS investigative protocols and enhancements to investigative practices. Although these previous actions have resulted in greater awareness of safer infant sleep practices, the average annual number of infant deaths occurring during sleep remains unchanged.

To continue to better understand the circumstances of sleep-related infant deaths and to identify prevention opportunities, the Chief Coroner established a death review panel under the *Coroners Act* (s.49). The circumstances of 141 infants who died between January 1, 2013, and December 31, 2018, were reviewed in aggregate. The findings were compared to those of the 2008-2012 death review panel report.

- Infants continue to die under the same circumstances as identified by the 2008-2012 panel;
- The deaths of infants were found disproportionately among young families with risk factors (e.g. exposure to tobacco) or **vulnerabilities**<sup>2</sup>; and,
- Sleep position combined with health issues may have increased mortality risk for some infants.

This panel identified the need for:

- Additional support from trained providers (e.g. public health nurses) for expectant women and families with infants;
- Continued, consistent, universally accessible messaging related to infant sleep practices;
- A provincial approach to the review of infant deaths including expanded investigative protocols.

Panel members also identified two gaps in service provision. A lack of capacity to deliver universal public health services and insufficient ability to provide enhanced services when a vulnerability is identified.

These findings are the basis for the following recommendations submitted to the chief coroner by the panel.

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<sup>1</sup> Annual average of infant deaths during sleep (January 1, 2008 to December 31, 2018)

<sup>2</sup> **Bolded** terms are defined in the glossary

**Recommendation #1: Expand low-barrier and culturally safe public health services to vulnerable families from birth to one year postpartum.**

- By November 30, 2020, the Ministry of Health in collaboration with the First Nations Health Authority and the regional health authorities will ensure all post-partum mothers are assessed, offered a home visit, and are provided support and follow up as indicated from birth to one year postpartum.
- By November 30, 2020, the Ministry of Health in collaboration with the Ministry of Children and Family Development will renew and implement the Collaborative Protocol for Vulnerable Families and include practice guidelines on assessing, supporting and engaging with vulnerable families.
- By November 30, 2020, the Ministry of Health in collaboration with Perinatal Services BC, the Ministry of Children and Family Development and the First Nations Health Authority, and public health in regional health authorities will review and evaluate infant sleep messages, including a targeted approach for vulnerable families with infants at increased risk.

**Recommendation #2: Improve continuity of care and service coordination**

- By May 31, 2021, the Ministry of Health in collaboration with Perinatal Services BC, the First Nations Health Authority, and public health in regional health authorities will review and address any issues related to service coordination or continuity of care for infants that addresses the provision of universal post-partum assessment (including a home visit) and access to enhanced services as needed.

**Recommendation #3: Determine the need for a provincial approach for Infant Mortality Review**

- By November 30, 2020, the Ministry of Health in collaboration with the First Nations Health Authority and regional health authorities will identify a broader provincial approach to review infant mortality in aggregate.
- By November 30, 2020, the BC Coroners Service in collaboration with relevant partners will determine the need for amendments to the BCCS infant death investigative protocol.

## PART 1: INTRODUCTION

When an infant dies, it is a tragic loss to parents, extended family and their community. When an infant dies unexpectedly, there is a need to determine why and, if anything, what can be done to prevent death in similar circumstances so that families never have to experience this kind of devastating loss.

Each year in B.C., approximately 44,000 infants are born<sup>3</sup>, and, on average, 161 deaths occur each year among infants in the first year after birth (see appendix: data table 1). In B.C., most infant deaths (83%) are the result of natural causes (e.g. extreme prematurity, congenital anomalies, or complications during childbirth). Some infant deaths are the result of unintentional injury (e.g. asphyxial deaths, drowning or motor vehicle crashes), and a small number of infant deaths are the result of homicide. Some infant deaths are classified as undetermined, where the cause of death cannot be or has not yet been established. Of the infant deaths, this death review panel report focuses on BCCS investigative findings of unexpected infant deaths which occurred during sleep.

For the period of this six-year review (January 1, 2013 to December 31, 2018), 141 infants in B.C. died suddenly and unexpectedly during sleep. This is similar to earlier death reviews ([2003-2007](#)) and ([2008-2012](#)) which found that an average of 23 infants died suddenly and unexpectedly each year while sleeping and the rate for both time periods was 5.3 per 10,000 births. The factors and sleep related circumstances identified during this death review are consistent with earlier review findings and the literature.

### **Overview of unexpected infant death during sleep**

Sudden, unexpected infant death during sleep is a leading cause of post-neonatal death, from one month to one year of age (Horne, Hauck & Moon, 2015; Trachtenberg, Haas, Kinney, Stanley & Krous, 2012). One theory for sudden, unexpected death in infancy is the Triple Risk Model which suggests that an infant with certain vulnerabilities or risk factors at a critical period in development, when exposed to an external stressor with which they are unable to cope, may die (Filiano & Kinney, 1994; Trachtenberg, et al., 2012) (see Figure 1).

Infants between two and six months of age appear to have a vulnerable time point when they may be less able to respond as effectively to external stressors in their sleep environment (Horne, et al., 2015; Blood-Siegfried, 2009).

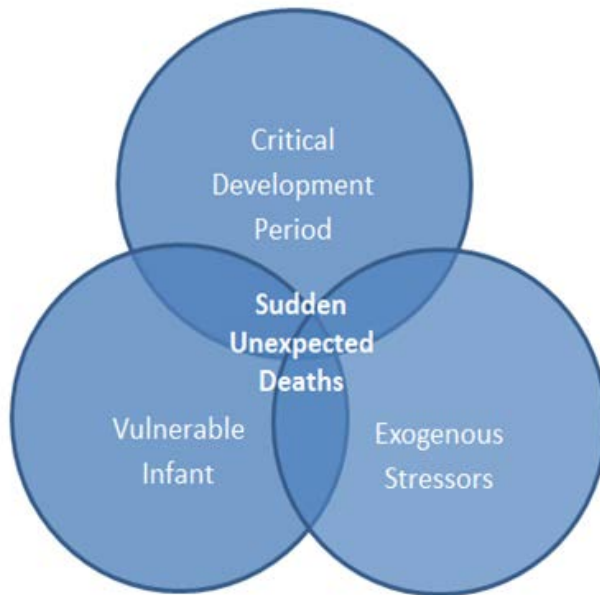
Research finds that infants who are born prematurely, exposed to maternal smoking, and/or having mild infection are at increased risk of death when exposed to external stressors (e.g. placed on their side or stomach to sleep, head covered by blankets, or facing soft surfaces that may impede breathing) (Horne, et al., 2015).

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<sup>3</sup> Births based on 2013-2017 data <https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/vital-statistics>



**Figure 1: Triple Risk Model**



**Infants at Increased Risk:**

- Male
- Born Prematurely
- Have genetic risk factors
- Have perinatal exposure to cigarettes and/or alcohol

**Exogenous Stressors:**

- On stomach or side-lying sleep position
- Soft bedding or soft mattress
- Face covered
- Bed sharing & parent incapacitation
- Upper respiratory tract infection
- Over heating
- Swaddling

(Source: Filiano & Kinney, 1994)

In Canada and the United States, the implementation of the Back-to-Sleep Campaign in the 1990s was associated with a 50% decrease in the rate of Sudden Infant Death Syndrome (SIDS) (Trachtenberg, et al., 2012). The success of the Back-to-Sleep Campaign identified additional public health interventions to address other modifiable risk factors found during infant death investigations.

Infant safe sleep information and education were expanded from recommending a supine (on back) sleep position, to include ensuring that infants were placed on a separate, flat, firm sleep surface, with no soft bedding, blankets, pillows or bumper pads. Guidelines promoted room-sharing and not bed sharing. As well, parent information recommended having a smoke-free environment before and after birth, identified breastfeeding as protective, and encouraged parents to place a baby to sleep on a separate sleep surface (crib, bassinet) after feeding.

In B.C., [infant safe sleep information](#) began including harm reduction messaging for parents about bed sharing in 2017. This includes information on parent and environmental factors that increase the risks associated with bed-sharing.

In Canada, infant deaths are classified as unknown or **undetermined; accidental; homicide; or, natural**. This classification supports public health prevention efforts to address modifiable risk factors which contribute or are associated with infant mortality. By using death classifications of undetermined, accidental or natural, we can better understand causes and where to focus prevention efforts.



## Death Investigation and Classification of Death

When an infant is found unresponsive at home or in the community, an ambulance is called, police are notified, and emergency medical responders take over resuscitation efforts. Usually, the infant is transported to hospital for further emergency treatment or care. If the infant is confirmed deceased, the hospital or police contact the coroner and an investigation into the circumstances of the death begins. This includes confirming the identity of the infant, establishing when and where the death occurred, and determining the cause and manner of death.

Improvements in death-scene investigations, including doll re-enactment, have resulted in a shift away from the use of the term SIDS as a cause of death. The reason for this change was because SIDS, by definition, is a diagnosis by exclusion. SIDS and SUDI should not be assigned as a cause of death.

The coroner completes an **investigative protocol** which includes an assessment of health, social and environmental factors. If the cause of death cannot be clearly established, the coroner orders post-mortem testing. A pathologist conducts an autopsy, reviews toxicological testing and prepares a report. Based on the examination of the body, the investigation of the scene and a review of all relevant records, including the autopsy report, the coroner makes a finding regarding the cause and manner of the infant's death. Where no known cause can be established, the coroner finds the death to be 'undetermined'. The coroner completes a report and contacts the family to inform them of the findings.

**Sudden infant death syndrome (SIDS)** and **sudden unexpected death in infancy (SUDI)** are not a cause of death. The terms essentially mean the death is unexplained.

Although some infant deaths will remain unexplained, enhanced investigations and further research may help to identify if some deaths have a genetic component or resulted from asphyxia from unsafe sleep conditions.

The Canadian Chief Coroners and Medical Examiners (CCCME) have agreed that where no cause of death for an infant can be identified (after an investigation, including post-mortem examination), the cause and classification of death will be deemed as Undetermined. These infant deaths were formerly referred to as Sudden Infant Death Syndrome (SIDS) or Sudden Unexpected Deaths in Infants (SUDI) cases.

This CCCME position was adopted as BC Coroners Service policy in 2013.

## PART 2: BC CORONERS SERVICE INVESTIGATIVE FINDINGS

Although each infant's death is unique, there are a number of common findings among infants who die suddenly and unexpectedly during sleep. These findings include health, social and sleep environment factors that place an infant at increased risk of sudden unexpected infant death during sleep.

For the period of January 1, 2013, to December 31, 2018, there were 141 deaths among infants. This review found that the annual average of unexpected infant deaths (both number and rate) was similar to earlier death reviews (2003-2007) and (2008-2012). These earlier reviews found that an annual average of 23 infants died suddenly and unexpectedly while sleeping. The factors and circumstances identified during this death review are consistent with earlier review findings. This review's findings are consistent with the Triple Risk Model and other research findings; that several markers (modifiable and non-modifiable) were present among the infants who died during sleep.

Of the 141 infants who died, the BCCS investigation found (see Table 1):

- Accidental causes (e.g. overlay, asphyxia, falls from sleep surface) resulted in 36 (25%) of deaths;
- Natural disease (pneumonia, respiratory infections, anomalies) resulted in 36 (25%) of deaths; and,
- 69 deaths remain **undetermined**.

	<b>Accidental</b>	<b>Natural</b>	<b>Undetermined</b>	<b>Total</b>
<b>Total</b>	<b>36</b>	<b>36</b>	<b>69*</b>	<b>141</b>

\*42 of the undetermined deaths are open investigations; which means that the classification of death may change as new information is received and the investigation is completed.

### A. Infant Demographics

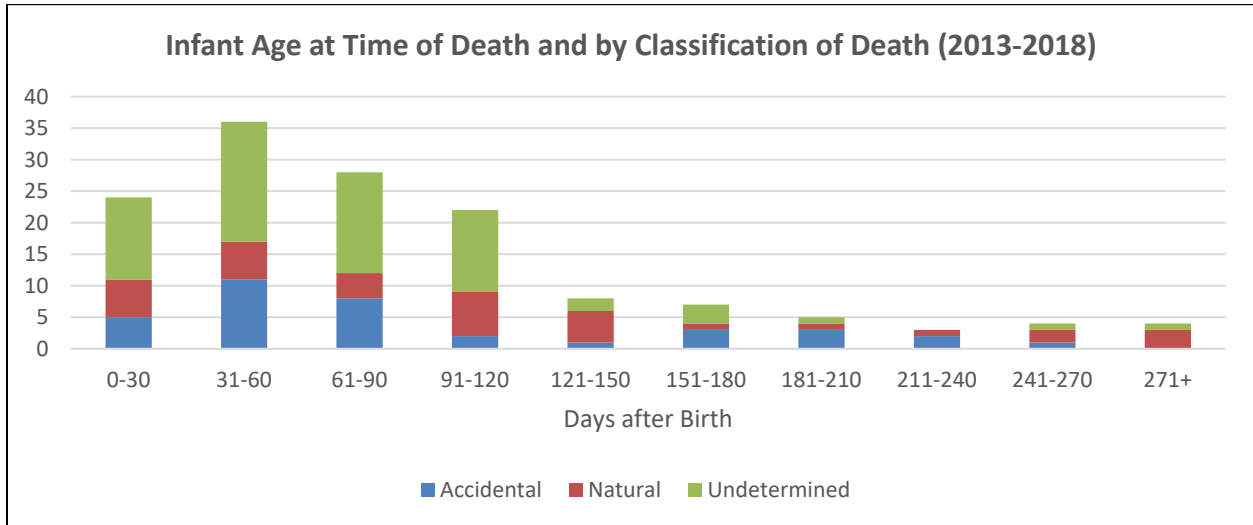
#### Age at time of death:

This review found that 89% of unexpected infant deaths during sleep occurred in the first six months after birth (see Figure 2). This is consistent with the earlier (2008-2012) review.

Studies indicate that unexpected infant deaths are less common in the first month of life, and peak between two to four months, with approximately 90% of the deaths occurring by six months of life.

(Trachtenberg, et al, 2012; Fleming, Blair & Pease, 2015)

**Figure 2:**



**Sex**

More male infants died than female infants (55% males and 45% females). The literature finds that male infants are at greater risk of sudden, unexpected death in infancy than female infants (Fleming, Blair & Pease, 2015; Athanasakis, Karavasiliadou & Styliadis, 2011). (Pongou, 2012).

**Health Authority (HA) of Residence**

In this six-year review, the rates of infant death were significantly lower in Vancouver Coastal compared to the other health authorities. The rates of infant death in Fraser health authority were significantly lower than rates in Interior, Northern or Island health authorities (see Table 2). This review did not examine health authority service delivery models or demographic variations within each health authority; therefore, this review cannot assess the reasons for the regional differences.

<b>Table 2: Sudden Unexpected Infant Deaths during Sleep (2013-2018)</b>	
<b>Health Authority</b>	<b>Estimated<sup>4</sup> Rates of Infant Deaths per 10,000 births</b>
Fraser (n=45)	4.3
Interior (n=33)	8.8
Northern (n=20)	9.8
Vancouver Coastal (n=10)	1.6
Island (n=33)	8.7
<b>Provincial</b>	<b>5.3</b>

<sup>4</sup> Estimated births based on fiscal numbers provided in Perinatal Services 2016/17 Annual Report. 2018 numbers were estimated using a linear trend. Perinatal Services BC (September 2018).

## Indigenous

In this review, 31% of infants who died suddenly and unexpectedly were identified as Indigenous (n=44). This percentage remains the same as the earlier review (2008-2012) and is an over-representation of Indigenous infants based on population proportion. In Canada, Indigenous infant mortality rates are more than twice that of their non-Indigenous peers. Rates of sudden and unexpected infant deaths among First Nations and Inuit infants were seven times higher than their non-First Nations and Inuit peers (Sheppard, Shapiro, Bushnik, Wilkins, Perry, Kaufman, Kramer & Yang, 2017).

The reasons for higher rates of sleep-related infant deaths in Indigenous communities are complex and not fully understood.

**“Aboriginal people have had multiple losses, which still have an effect on the health of our communities. The effects of these losses of land, culture, community and spirituality have been seen and felt down through the generations. The effects of these losses help us understand why Aboriginal babies may be exposed to more of the “risk factors” for sudden infant death.”**

(First Nations Health Authority, 2013, p. 2)

To acknowledge and to help address historical and existing challenges faced by Indigenous peoples, the British Columbia government has committed to renewing its relationship with Indigenous peoples, and has developed draft principles to guide this relationship. These principles are informed by the United Nations Declaration of the Rights of Indigenous Peoples and the Truth and Reconciliation Commission Calls to Action. “B.C.’s principles are about renewing the Crown-Indigenous relationship. They are an important starting point to move away from the status quo and to empower the Province to fundamentally change its relationship with Indigenous peoples,

a process that will take time and call for innovative thinking and action.” “This includes engaging with Indigenous communities when creating new policies and programs, reviewing services to make sure they are delivered in culturally intelligent ways, and renewing fiscal relationships in ways that help further Indigenous communities’ right to self-determination (B.C. Government 2018).”

To best support Indigenous communities, trauma-informed practice is essential when interacting with individuals and communities experiencing ongoing and historical trauma. Trauma-informed practice recognizes and acknowledges the impact of trauma and the need for awareness and sensitivity to its dynamics in all aspects of service delivery.

## B. Maternal Findings

Pregnancy and the postnatal period are sensitive developmental periods for the fetus and infant. A woman's health during pregnancy may be impacted by biologic, social, economic and behavioural factors. These factors may also impact fetal health and development.

### Maternal Age

In this review, significantly more unexpected infant deaths occurred among infants born to women younger than 25 years of age. Perinatal Services BC data finds that only 10.5% of births occur among women younger than 25 years. This review found that 35% of infants who died were born to women younger than 25 years of age (see Table 3). These findings appear to indicate that younger mothers may benefit from additional support and services.

<b>Maternal Age</b>	<b>Total Infant Deaths by Maternal Age</b>	<b>Percentage of All Births by Age Group, 2016/17<sup>5</sup></b>
<20 years	17 (12%)	1.4%
20-24 years	32 (23%)	9.1%
25-29 years	34 (24%)	25.4%
30-34 years	36 (26%)	38.1%
35+ years	20 (14%)	25.9%
Maternal Age Unknown	2 (1%)	
<b>Total</b>	<b>141</b>	

### Parenting (first-time parents and parents with older children)

In this review, 81 women were parenting other children and 56 women were first-time mothers. Four of the infants who died were in the care of the Ministry of Children and Family Development.

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<sup>5</sup> Source: Perinatal Services BC (September 2018)

### Prenatal tobacco, substance or alcohol use

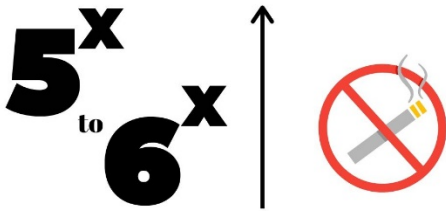
A history of maternal prenatal tobacco use, illicit substance use and/or alcohol use was found among 44% of investigations of infants who died suddenly and unexpectedly during sleep, compared to 49% who had no history of exposure and 7% for whom prenatal exposure was unknown. In this review, maternal use of tobacco during pregnancy was higher than documented maternal tobacco use during pregnancy for all births (33% versus 6% respectively) (Perinatal Services BC, September 2018). Baseline data was not available for the proportion of all births with prenatal exposure to alcohol or illicit substances.

**”Quitting smoking during pregnancy has considerable positive health impacts for both women and fetuses, and reduces health problems for children born of mothers who smoke.”**

Government of Canada, 2007

**Infants of smokers were at a five- to six-fold increase risk of sudden infant death.**

(Mitchell, Thompson, Zuccollo, MacFarlane, Taylor, Elder, Stewart & Fleming, 2017; Horne, Hauck, & Moon, 2015)



## C. Infant Health Findings

### Gestational Age

In this review, more than one quarter (26%) of infants who died unexpectedly had a history of preterm birth (<37 weeks gestational age) (see Table 4). This is similar to the earlier review which found that 23% of infants who died were preterm infants. Compared to all births in B.C., there was a significantly higher percentage of infant deaths among infants born prematurely.

Gestational Age	Total	Percentage of All Births by Gestational Age, 2016/17 <sup>6</sup>
<34 weeks	13 (9%)	2.3%
34-36 weeks	24 (17%)	8.4%
37 weeks – 40 weeks	92 (65%)	81.7%
41+ weeks	12 (9%)	7.7%
<b>Total</b>	<b>141</b>	

**Preterm infants are at four times the risk of unexpected infant death compared to term infants.**

**Rohana, Ishak, & Nurulhuda, 2018; Horne, et al., 2015)**

### Low Birth Weight

In this review, 18 infants who died were less than 2,500 grams at birth (13%), all were pre-term. This is similar to the earlier review which identified that 15% of infants who died had a low birth weight of less than 2500 grams. Low birth weight infants (<2,500 grams at birth) are at greater risk of unexpected death compared to infants born (>2,500 grams) (Athanasakis, et al., 2011).

### Congenital Anomalies

Investigative notes indicate that nine infants (6%) who died had congenital anomalies. These included cardiac conditions, renal conditions, bowel malformations, Down syndrome and cerebral palsy with multiple anomalies present.

A number of genetic variations have been identified at increased frequency in infants who died unexpectedly during sleep. The mechanism by which these genetic variations might lead to increased risk of sudden, unexpected death is not known; all are known to have potentially significant effects on brainstem neurophysiology (Fleming, et al., 2015 p 3).

<sup>6</sup> Perinatal Services BC (September 2018)



## Illness or Behaviour Change

In this review, 83 (59%) infants had a parent report of an illness, injury or change in behaviour prior to death (see Table 5).






Table 5: Infants with signs or symptoms of illness or change in behaviour within 72 hours prior to death (reported by parent)	
Illness or Behaviour Change	Total
Yes, had signs of illness or increased crying	83 (59%)
No signs of illness or change in behaviour	57 (40%)
Unknown	1 (1%)
<b>Total</b>	<b>141</b>

## D. Infant Sleep Environment Findings

Research has identified certain sleep factors that are associated with unexpected deaths in infancy. Safe infant sleep practices include: placing a baby on their back to sleep, on a separate, firm sleep surface, free of pillows, soft bedding or other hazards, having a smoke-free environment, preventing overheating and no swaddling (see Figure 3).

Figure 3

### Safe sleep principles | Safer sleep for every sleep, day or night

-  **BACK TO SLEEP.** Putting your baby to sleep on his/her back in a crib or bassinet in the same room as you is the safest way for your baby to sleep.
-  **FIRM MATTRESS FREE OF HAZARDS.** To reduce the risk of suffocation, put your baby on a firm mattress with a tight-fitting sheet and no bumper pads, pillows, heavy blankets or toys in the sleep space.
-  **CRIB OR BASSINET.** The safest place for a baby to sleep is in a Health Canada approved crib or bassinet. (If you're unsure about yours, talk to your health care provider). It is important to supervise your baby if he/she falls asleep in a car seat, stroller, or baby carrier. Once you have arrived at your destination, it is best to move your baby to a crib.
-  **SHARING YOUR ROOM.** Having your baby sleep on a separate sleep surface in the same room as you for the first six months helps keep your baby safe.
-  **SMOKE-FREE.** Avoiding smoking during pregnancy and keeping your home smoke-free before and after the birth helps prevent sleep-related infant death.
-  **BREASTFEEDING.** Breastfeeding helps prevent sleep-related infant death. Any amount of breast milk will give your baby's immune system a boost and help keep him/her healthy.
-  **AVOID OVERHEATING.** Babies like to be warm but not hot, so for sleeping it is best to keep the room temperature comfortable (around 18° C) and use a light blanket, 'sleep sack', or blanket-weight sleeper. There's no need to swaddle or put a hat on indoors.

Source: Perinatal Services BC, 2016

Throughout the past decade, there has been an extensive effort to promote safer sleep environments, including the development of harm reduction messaging intended for families who were bed sharing. In B.C., the recently revised [safe sleep resources \(2017\)](#) include a statement that sharing a bed with an infant can be risky, and the conditions that make bedsharing riskier.

This latest review (2013-2018) found that the annual average number and the rate of unexpected infant deaths during sleep is similar to earlier death reviews ([2003-2007](#)) and ([2008-2012](#)). There has been no change in the number of infant deaths while sleeping, and the circumstances that result in the deaths remain similar and constant.

The panel found that there continues to be a need for universal safe sleep messaging, including targeted messaging for families with identified risk factors or vulnerabilities. This review identified that 114 (81%) infants who died during sleep had unsafe sleep practices identified during their last sleep. Unsafe sleep practices were any of the following:

- Objects near face (e.g. pillows, blankets, duvets etc.) (n=63);
- Placed in position other than on back (if unknown sleep placement, found on stomach) (n=60);
- Bed sharing with parental incapacitation (n=30);
- Bed sharing on a couch, or sleeping with a parent in a chair (n=18)
- Overlay or risk of entrapment between objects (wedging) (n=30);
- Swaddled (n=22);
- Bedsharing with a sibling (n=6); or,
- Sleeping alone on an adult bed or sleeping in a car seat (n=5).

Research finds that it is the concurrence of multiple risk factors which increase the risk of sudden, unexpected infant death during sleep (Trachtenberg, et al., 2012).

The following sections of the report include short stories of three infants who died and the circumstances and factors found during the death investigations. These deaths are highlighted as they are representative of many of the infant deaths reviewed. The names used are fictitious to preserve the privacy of the deceased and their families.

### *Sleep surface*

In this review, investigative findings of where an infant was last known alive revealed that:

- More than half (54%) of the infants were in an adult bed;
- 18 (13%) of the infants were on a couch, sofa or chair; and,
- Fewer than one quarter (n=33, 23%) of the infants were in a crib or bassinet (see Table 6).

Of the 33 infants who died and were sleeping in a crib or bassinet:

- 20 had unsafe sleep practices present (e.g. objects near face, placed on stomach, swaddled etc.); and,
- 13 had no unsafe sleep practices identified during their last sleep.

Investigative scene findings indicated that:

- 70% of all infants who died had a crib or bassinette available in the home;
- 15% did not have a crib or bassinette available; and,
- 15% it was unknown if a crib or bassinette was available.

Among those infants who had no crib or bassinette available, eight were visiting others outside their home.

	<b>Total</b>
Adult bed (includes one bedside co-sleeper)	76 (54%)
Crib/bassinnet	33 (23%)
Couch/sofa/ or chair	18 (13%)
Play pen	5 (3.5%)
Car seat	4 (3%)
Other (sling, rocking seat, swing, floor, cushion)	5 (3.5%)
<b>Total</b>	<b>141 (100%)</b>

The adult bed presents a greater risk than cribs for infant suffocation, entrapment and strangulation (40 times greater risk than cribs) (Trifunov, 2009). Memory foam mattresses, air mattresses, and pillow top mattresses have been identified as suffocation risks, increasing the potential for infant death (Doering & Salm Ward, 2017).

### **Baby Sasha**

*Shortly before midnight, emergency personnel were dispatched to a private residence where Sasha’s family had been visiting with friends. Upon arrival, they found a three-month-old infant who was unresponsive and cardio-pulmonary resuscitation was being performed by Sasha’s parents.*

*Sasha was a previously healthy baby. He was born at term, was growing well and meeting all normal developmental milestones. The investigation revealed that on the night baby Sasha died, he had been swaddled, placed on his back and propped slightly on a large pillow, in the middle of an adult bed. As Sasha’s family was visiting friends, a crib was not available. Sasha cried for a few minutes, but settled quickly for sleep. Approximately 30 minutes later, Sasha’s parents entered the room to check on him and found their baby had rolled onto his stomach; his face was pressed into the mattress.*

*Sasha was limp, was not breathing and had no heartbeat. Despite extensive resuscitation efforts Sasha could not be saved.*

### Sleep Position

In this review, more than half (53%) of infants were placed on their back to sleep, 16% were placed on their stomachs and 19% were placed on their side (see Table 7). Sleep position was based on parent or caregiver report, and for some infants the position last placed or found was unknown.

Table 7: Infant Sleep Position			
Position Last Placed		Position Found	
On back	75	On back	56
On side	28	On side	22
On stomach	22	On stomach	44
Seated (car seat, chair or swing)	6	Seated (car seat, chair or swing)	5
Unknown	9	Unknown	11
Other (upright in sling)	1	Other (upright, on floor)	3
<b>Total Placed</b>	<b>141</b>	<b>Total Found</b>	<b>141</b>

The earlier review identified that 48% of infants (for whom the placement was known) were placed on their backs to sleep, 37% were placed on their stomach and 15% were placed on their side to sleep. Prone (on stomach) and side-lying sleep positions have been linked to increased rates of unexpected infant deaths (Byard, Bright, & Vink, 2018). Side-lying position has been shown to double the risk of sudden, unexpected infant death compared to supine positioning (Athanasakis, et al., 2011).

### Bed Sharing

In this review, 77 (55%) of the infants who died were sharing a sleep surface. Almost all bedsharing infants 92% (n=71) were sleeping with a parent; six infants were sleeping with a sibling.

Investigative notes found that bed sharing occurred for ease of breastfeeding, to settle an infant who was fussy, was unintended and occurred due to parental fatigue, or was the parent's preference to be close to their infant.

Bed sharing may increase the risk of unexpected infant deaths resulting from unintentional entrapment or asphyxiation.

(Moon, 2016)

### Of the 77 infants who died and were bed-sharing:

- 62 infants had additional unsafe sleep practices present; and,
- 15 were following other safer sleep practices (had only adult bedsharing as a factor during their last sleep).



In this review, BCCS notes indicated that for 43 infants overlay by a parent was identified in statements made by parents or through scene investigative findings (see Table 8). The autopsy findings have confirmed overlay as either the cause of death or contributing to the death for 26 of the 43 infants.

<b>Table 8: Infant Bed Sharing with Adult and Possible Overlay</b>		
	<b>Total</b>	<b>Autopsy confirmed</b>
Overlay identified (e.g. statement by witness, scene findings)	17	12
Possible overlay (identified by scene findings)	26	14

In this review, 71 parents were bed sharing, and of those, investigative protocols found that 30 parents (42%) had an identified impairment or possible impairment due to alcohol, substances or extreme non-rousable parental fatigue (see Table 9).

<b>Table 9: Infant Bed sharing with Adult and Impairment</b>	
	<b>Total</b>
Impairment	30
Unknown	13
No impairment identified	28
<b>Total Bed Sharing with Adult</b>	<b>71</b>

### **Baby Sara**

*Sara was a one-month-old baby girl who was born after a complicated pregnancy. Although she was born preterm at 35 weeks, she was gaining weight appropriately and was in good health at routine follow-up appointments with her family doctor. On the night of her death, Sara was last known alive lying on her side, facing her mother to breast feed on an adult bed. Sara’s mom was tired and fell asleep during breastfeeding. When Sara’s mom awoke, she found Sara pressed between her body and the mattress. Sara was unresponsive, not breathing and cold to the touch. Toxicology findings were negative for alcohol, prescribed medications or illicit drugs. Sara’s death was classified as an accidental death due to overlay by her parent in an adult bed.*

### ***Presence of Bedding, Pillows and Suffocation Hazards***

In this review, the following sleep environment risk factors were identified for 70 infants:

- 63 (90%) of the infants had objects in contact with or near their faces (e.g. bedding, blankets, duvets, pillows, or soft mattresses);
- 22 (31%) of the infants were swaddled;
- 19 (27%) of the infants were found unresponsive with their heads covered by bedding; and,
- Four (6%) of the infants were found wedged between two objects (e.g. pillows).

Soft bedding (duvets, quilts, pillows, sheepskin, loose bedding, bumper pads, etc.) increase the risk of head covering and infant suffocation and rebreathing; a five-fold risk regardless of sleep position and more than 20-fold if infants are prone (Horne, et al., 2015; Moon, 2016). Swaddling restricts an infant's movements and is a risk for asphyxial death or overheating. Swaddling may cause overheating due to bundling, decrease infant arousal, result in head covering or restrict movements and prevent the infant from using arms to move away from potential harms (Moon, 2016).

### **Baby Christopher**

*Christopher was a seven-month-old infant. Although he was born prematurely at 35 weeks, he was growing and developing normally for his age, was able to roll over and liked to play with toys. On the evening of his death, Christopher was placed on his back in his crib. A blanket covered him from his chest to his feet. Christopher was a bit fussy, was resettled by his parent, and given a soother. Approximately one hour later, Christopher's parent entered the room and found him with the blanket wrapped around his face and head. Christopher had no pulse and was not breathing. Although cardio-pulmonary resuscitation was performed, Christopher could not be revived, his cause of death was accidental due to entrapment in the blanket.*

### **Exposure to Tobacco Smoke**

Researchers suggest that "smoking during pregnancy is the strongest prenatal modifiable risk factor for sudden infant death in industrialized nations" (Anderson et al., 2019, p 2). Maternal and paternal smoking poses a serious risk to the health of the fetus, infant and child. Canadian guidelines strongly

advise pregnant women not to smoke, to avoid exposure to second hand smoke, and to be offered smoking cessation counselling to help them quit (Centre for Addiction and Mental Health, 2011).

Tobacco use was present in the households for a number of infants who died:

- 60 (42%) of the infants who died had caregivers who used cigarettes;
- 29 (21%) of the homes had evidence of smoking; and,
- 33 (23%) of the infants who died were exposed to second-hand smoke.

Infants of smokers were at a five to six-fold increased risk of sudden infant death (Mitchell, et al., 2017; Horne et al., 2015).

**Research finds that it is the concurrence of multiple risk factors which increase the risk of sudden, unexpected infant death during sleep.**

**(Trachtenberg, et al., 2012)**

## *Pacifier Use*

The BC Coroners Service does not routinely collect information on pacifier use. However, evidence from the literature suggests that pacifiers are protective:

- Pacifiers have been found to be associated with lowering the risk of unexpected infant death. Theories include pacifiers may favorably modify autonomic control or maintain the infant's airway patency (Moon, 2016; Bass, Gartley, Lyczkowski & Kleinman, 2017);
- Pacifiers should be introduced in the neonatal period (Bass et al., 2017), and at the beginning of sleep (Athanasakis, et al., 2011); and,
- Systematic reviews found that clinical trials do not support an adverse relationship between breastfeeding duration or exclusivity with the use of pacifiers (Moon, 2016; Bass et al., 2017).

## **E. Child and Family Services**

At various stages of life, families may experience periods of risk or need depending on the ability to cope with internal and external stressors. Some families may experience transitory stressors whereas for others, the stressors may persist. For some, the pregnancy and the postpartum period may be a time of increased need requiring additional support and services.

Public health and other care providers, including physicians and midwives, have a shared responsibility to offer services to postpartum women. "Universal services for women and their families include screening and assessment, health promotion and education, and intervention based on public health priorities identified for each of the prenatal, postpartum and family health phases. Enhanced services are provided where vulnerabilities and interventions are identified based on the level of need, risk, and strengths or protective factors. The intent of these services is to reduce inequities and promote health through a purposeful provision of enhanced services to those who may be vulnerable" (Government of B.C., 2013).

Panel members identified two gaps in service provision: a lack of capacity to deliver universal services and insufficient ability to provide enhanced services when a vulnerability is identified.

**The opportunity for B.C.,  
Canada and Indigenous  
governments, communities  
and families to work in  
partnership to recognize,  
constructively address, and  
reconcile our respective  
interests to better support the  
needs of all Indigenous  
children has never been  
greater.**

**(Grand Chief Ed John, 2016)**



## Public Health Assessment

In this review, a public health nursing assessment was known to have been completed for more than half of the infants (58%) (see Table 10). For 19 infants there was no history of public health contact however, nine of these infants had been followed by a registered midwife. In B.C., the midwifery service model provides ongoing follow up for six weeks postpartum. For families receiving midwifery care, public health typically does not have direct contact until after six weeks postpartum.

Table 10: Public Health Maternal and Infant Postpartum Follow up	
	Infant Deaths - Number (%)
Public health contact and assessment completed	82 (58%)
No public health contact	19 (13%)
Public health contact unknown	40 (28%)
<b>Total</b>	<b>141</b>

## Ministry of Children & Family Development Service Involvement

A variety of supports and services are provided to families through the Ministry of Children and Family Development (MCFD) or through Delegated Aboriginal Agencies. These may include voluntary support and prevention services that include pre-birth planning for expectant parents to care safely for their infants once born; child protection services; alternate living arrangements and care for children and youth who are not able to live with their parents; and, and services and medical benefits for children and youth with special needs.

In this review, 41% of all infants who died unexpectedly during sleep had a family history of MCFD service involvement within 12 months prior to the infant's death. For some infants, MCFD contact was for child services for other siblings or for the parent. This is a significantly higher proportion than the earlier review which found that 26% of infants who died had a family history of MCFD service involvement. Families with MCFD involvement often have contact with other agencies or health care services (e.g. primary care, public health, or community agencies<sup>7</sup>). These points of contact with MCFD provide opportunities for further assessment of need and support and coordination with other agencies.

A collaborative protocol to support at risk pregnant and parenting families was previously developed between Ministry of Health (MOH) and MCFD. This protocol outlines the roles and responsibilities of MOH and MCFD. (Government of B.C., March 2013). Weaknesses of the protocol are that it may not be in use and that it does not provide strategies on how to work with at risk families. There is a lack of guidelines for clinical practice when working with at risk families.

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<sup>7</sup> A revised Collaborative Practice Protocol for Providing Services for Families with Vulnerabilities: Roles and Responsibilities of the Director (Child, Family, and Community Services Act) and the Ministry of Health was released September 2019 to address policy changes regarding voluntary services for expectant parents experiencing vulnerabilities.

Public health nursing records indicated that of the 58 families with recent MCFD child service history:

- 21 (36%) families had received a home visit;
- Of those without a home visit (n=18), 13 were assessed at a public health clinic and/or had an assessment completed by phone (n=12); and,
- Among 19 (33%) families, public health contact was unknown, or was attempted but did not occur.

## **F. Post-Mortem Testing**

When an infant dies suddenly and unexpectedly, an autopsy is conducted and toxicology testing is completed. Findings assist in confirming the cause and classification of death and may also identify if families need further referral for genetic testing or specialized screening for parents and siblings.

### **Autopsy Findings**

#### **BCCS Completed Investigations**

Among the 84 completed investigations of infants who died suddenly or unexpectedly during sleep:

- 27 (32%) died of accidental causes;
  - Of these, 25 deaths were asphyxial related or a result of overlay or aspiration;
- 30 (36%) infants died of natural causes (e.g. found to have a condition or illness as the cause of death);
  - However, over half of the infants who died of natural causes also had unsafe sleep factors present (e.g. soft sleep surfaces, or infant sleep position (on stomach, side lying) during their last sleep; and,
- 27 (32%) infant deaths were classified as undetermined (there were no findings on autopsy, no prior injuries were present, or an asphyxial mechanism could not be excluded).

In this review, final autopsy results revealed that 26 infants had a respiratory illness or infection at the time of death (e.g. bronchopneumonia, group B streptococcus, RSV, enterovirus, rhinovirus or haemophilus influenza or para influenza).

Of the 26 infants, three were seen by a health-care provider for symptoms of illness. Although a natural disease was identified, over half of the infants who died of natural causes during sleep had unsafe sleep practices or environmental factors (e.g. sleep surface or infant sleep position) identified in investigative notes.

- 15 of the 26 infants who died due to natural causes were bed sharing with a parent;
- 15 infants were found prone (n=10) or side-lying (n=5);
- Seven infants lived in households with exposure to second hand smoke; and,
- Head covering or swaddling were noted for two infants.

## BCCS Open Investigations

Among the 57 infants with open investigations, preliminary autopsy results have identified that:

- 19 (33%) deaths had findings consistent with or suggestive of an asphyxia mechanism (e.g. overlay, airway obstruction or aspiration of formula or breastmilk);
- Two (3%) infants showed evidence of injury;
- 27 (47%) deaths had no evidence of traumatic injury and were pending further studies; and,
- Among 9 (16%) infants a physical finding was present on autopsy (e.g. congenital anomaly, error in metabolism, infection, multiple viruses).

## Toxicology Findings

In this review, 113 (83%) infants who died had negative findings on toxicology testing, meaning no alcohol, illicit drugs or medications (other than those medication administered during attempted resuscitation) were found.

Toxicology testing also revealed that 16 (11%) infants had a positive test:

- 6% of infants showed a positive result for illicit substances or cannabis;
- 5% of infants showed a positive result for prescription medications including medications transferred through breastmilk.

## Baby Lara

*In the early morning, baby Lara was found unresponsive in her father's arms in an adult bed. Baby Lara was three months old, and she was born at term following an uneventful pregnancy. There was a history of prenatal tobacco exposure, cannabis use and evidence of smoking in the home. Lara had experienced a dry cough for approximately one month prior to her death but was otherwise thought to be a healthy baby. On the night prior to her death, Lara was fed formula from a bottle and was taken to bed with her parents. She was held in her father's arms, placed between her parents. A playpen was in the room, but the parents reported that the baby regularly slept with them in the adult bed. When her father awoke in the morning, Lara was still in his arms, but she was unresponsive. Lara's family called 911 and performed cardio-pulmonary resuscitation. Lara was transported to hospital but did not survive. An autopsy found the presence of viruses and the cause of death was attributed to a systemic viral infection; the specific organism, however, could not be identified.*

## PART 3: RECOMMENDATIONS

This death review panel has developed a set of recommendations considering the current research and applying this knowledge to unexpected infant death investigative findings. The recommendations arising from the death review panel were developed in a manner that was:

- Collaborative;
- Attributable to the deaths being reviewed;
- Focused on identifying opportunities for improving public safety and prevention of future deaths;
- Targeted to specific parties;
- Realistically and reasonably implementable; and,
- Measurable.

The overall findings of this review (2013-2018) indicated:

- Infants continue to die under the same circumstances as identified in the 2013 panel;
- The deaths of infants were found disproportionately among young families with risk factors and vulnerabilities;
- Sleep position combined with health issues may have increased mortality risk for some infants; and,
- There was considerable regional variation in the rates of infant deaths.

This panel found through its deliberations that there was a need for:

- Additional public health nursing support for expectant women and families with infants;
- Continued, consistent, universally accessible messaging related to infant sleep practices; and,
- A provincial approach to review infant deaths including expanded investigative protocols.

### **Expand public health nursing services and infant safe sleep messaging**

Despite provincial efforts and messaging, the average annual number of sudden unexpected infant deaths during sleep remain unchanged. The key factors and sleep related circumstances identified were:

- Asphyxial deaths due to overlay, wedging, head covering, entanglement, swaddling, on stomach (prone) or side-lying sleep placement; and,
- Respiratory illnesses where breathing may have been compromised by the presence of unsafe sleep environment factors.

The Triple Risk Model shows that all infants are at risk at certain points in their development. Infants aged two to six months appear to have a vulnerable time point when they may be unable to respond as effectively to external stressors in their sleep environment (Horne, et al., 2015; Blood-Siegfried, 2009).

Adult mattresses, pillows, blankets, soft bedding, sleep position, and bed sharing increase the risk for asphyxial-generating conditions. Being born preterm, exposed to tobacco or substances places an infant at increased risk of death when exposed to external stressors (Horne, et al., 2015).

In B.C., public health nursing offers universal services (screening and assessment, health promotion and education and intervention) based on public health priorities identified for the prenatal and postpartum period up to two years. Enhanced services are offered where vulnerabilities and interventions are identified based on the level of need, risk and strengths or protective factors. These services are voluntary. In recent years, there has been additional focus of public health nursing resources on extremely vulnerable, younger, first-time mothers-to-be. In some areas, public health post-partum follow-up is limited to clinic visits or telephone assessments.

This review found that infant deaths during sleep occurred among families with prior parenting experience (n=81), as well as first-time parents (n=56). A public health assessment (phone assessment, clinic assessment or home visit) was known to have been completed for more than half of the infants (58%, n=82). Of the 60 families with recent MCFD child service history, 21 families received a public health home visit, 13 others had a clinic visit, and five had an assessment by phone. For 21 families contact with public health was unknown, or there was no contact.

The panel identified the need to reassess availability and access to public health services for parenting families. This should include an assessment of the family's circumstances and need, and that additional support be provided for families for whom a need is identified.

The panel also identified the need to review and evaluate existing infant safe-sleep messaging and the impact of the introduction of new harm reduction messaging in 2017. This review identified that 81% of infants who died during sleep had unsafe sleep practices identified during their last sleep:

- 44% of infants were found with soft bedding near face (e.g. pillows, blankets, duvets etc.);
- One-third of infants were placed on their stomach (16%) or side (19%) to sleep;
- 13% were bed sharing on a couch, or sleeping with a parent in a chair;
- Almost one-quarter (23%) of the infants who died were exposed to second hand smoke;
- Fewer than one quarter (23%) of the infants who died were sleeping in a crib or bassinet.

Currently, provincial messaging includes a harm reduction approach, which outlines practices for a safer sleep environment for parents who bedshare with their infant.

In this review, over half (55%) of infants who died were sharing a sleep surface:

- Of the 77 infants who died and were bed sharing, only 15 (19%) were 'considered' to be following the provincial safe sleep harm reduction practices during their last sleep.

Of the infants who were bed-sharing with a parent (n=71), investigative protocols found that 42% of parents had an identified impairment due to alcohol, substances or fatigue or possible impairment for same. Bed sharing with an infant increases the risk for infant asphyxiation or overlay by a parent/caregiver. The risk of overlay is especially increased if a parent/caregiver is impaired by fatigue, alcohol or substances. Evidence clearly supports a separate sleep surface for infants.

The panel identified the need for ongoing safe sleep messaging for all parents and caregivers; that adult beds are not designed for infants. The panel identified that exclusive breastfeeding is possible even when an infant sleeps on a separate sleep surface and in the same room, and that pacifier use is protective and does not adversely impact breastfeeding duration or exclusivity.

This panel found that infants who died during sleep disproportionately lived in households with younger parents, or in families experiencing vulnerabilities. These factors were further complicated by the presence of unsafe sleep environments. The panel recommends that additional services and support be in place to meet the needs of vulnerable families with infants.

**Recommendations #1: Expand low-barrier and culturally safe public health services to vulnerable families from birth to one year postpartum.**

- By November 30, 2020, the Ministry of Health in collaboration with the First Nations Health Authority and the regional health authorities will ensure all post-partum mothers are assessed, offered a home visit, and are provided support and follow up as indicated from birth to one year postpartum.
- By November 30, 2020, the Ministry of Health in collaboration with the Ministry of Children and Family Development will renew and implement the Collaborative Protocol for Vulnerable Families and include practice guidelines on assessing, supporting and engaging with vulnerable families.
- By November 30, 2020, the Ministry of Health in collaboration with Perinatal Services BC, the Ministry of Children and Family Development and the First Nations Health Authority, and public health in regional health authorities will review and evaluate infant sleep messages, including a targeted approach for vulnerable families with infants at increased risk.

**Engaging Vulnerable Families**

Midwives, doctors and nurses play a crucial role in supporting pregnant and parenting women and their families. Evidence indicates that stressors or “vulnerability in the mother-to-be or newly delivered woman can impact on her capacity for parenting, with long-term consequences for the child” (Barlow, J., 2015).

In B.C., a collaborative protocol to support at risk pregnant and parenting families was previously developed between the MOH and MCFD. The protocol outlines the roles and responsibilities of the two ministries<sup>8</sup> (Government of B.C., March 2013). However, panel members learned that the protocol may not be in use, and it does not provide strategies on how to work with at risk families. There is a lack of guidelines for clinical practice when working with at risk families.

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<sup>8</sup> Ibid, see page 23

In this review, 41% of families with infants who died had a history of MCFD service involvement within a year prior to the infant's date of death. For some infants, MCFD contact was for child services for other siblings or for the parent. This is a significantly higher proportion than the earlier review which found that 26% of infants who died had a family history of MCFD service involvement. During the coroners' scene attendance, photos and investigative notes identified that 41% (n=58) of the infants who died lived in conditions of concern for infant health and safety.

The panel identified that there is a need to ensure all families have the necessary supports, and/or information about infant care and parenting. There is a need to ensure that relevant information is shared across the care continuum in support of the family.

### **Recommendation #2: Improve continuity of care and service coordination**

- By May 31, 2021, the Ministry of Health in collaboration with Perinatal Services BC, the First Nations Health Authority, and public health in regional health authorities will review and address any issues related to service coordination or continuity of care for infants that addresses the provision of universal post-partum assessment (including a home visit) and access to enhanced services as needed.

### **Infant Mortality Review**

Currently in B.C., the regional health authorities receive notification about all infant deaths. This information is reviewed by regional infant mortality committees with the goal to identify regional issues, strengthen services and supports for families and enhance prevention efforts to reduce infant mortality. Some health authorities have requested that a provincial infant mortality review be considered to reduce duplication of effort, and to better aggregate findings for trend analysis while still allowing for regional health authorities to independently review local practice and services. This panel identified the need to utilize BCCS investigative findings at a provincial level so that trends could be monitored, emerging issues identified, and to support health policy and the development of provincial guidelines. The panel identified that infant deaths and near misses of infant asphyxial events need to be reviewed and that investigative protocols enhanced to include additional factors such as pacifier use, cannabis exposure, and vaping so that all parents and caregivers have information and support to enhance protective factors.

### **Recommendation #3: Determine the need for a provincial approach for Infant Mortality Review**

- By November 30, 2020, the Ministry of Health in collaboration with the First Nations Health Authority and regional health authorities will identify a broader provincial approach to review infant mortality in aggregate.
- By November 30, 2020, the BC Coroners Service (BCCS) in collaboration with relevant partners will determine the need for amendments to the BCCS infant death investigative protocol.



## APPENDICES

### A) DEATH REVIEW PANEL

The BC Coroners Service (BCCS) is a fact-finding, not fault-finding, agency that provides an independent service to the family, community, government agencies and other organizations. The Coroners Service investigates all sudden, unexpected and/or unnatural deaths in B.C. and is responsible for investigating and determining the circumstances of these deaths. One of the agency's most important responsibilities is the advancement of recommendations aimed at preventing deaths in similar circumstances. One of the ways the Coroners Service makes recommendations is through death review panels which bring together experts across disciplines to review a group of deaths in aggregate to identify opportunities for intervention to prevent death and improve public safety.

A death review panel is mandated<sup>9</sup> to review and analyze the facts and circumstances of deaths to provide the chief coroner with advice on medical, legal, social welfare and other matters concerning public health and safety and prevention of deaths.

A death review panel may review one or more deaths before, during or after a coroner's investigation, or inquest.

Panel members were appointed by the chief coroner under Section 49 of the [Coroners Act](#), including professionals with expertise in public health, health services, pediatric and neonatal medicine, Indigenous health, income assistance, child welfare, policing, pathology and injury prevention.

Regardless of their employment or other affiliations, individual panel members were asked to exercise their mandate under the *Coroners Act* and express their personal knowledge and professional expertise. The findings and recommendations contained in this report need not reflect, or be consistent with, the policies or official position of any other organization.

In the course of reviewing deaths of infants, the panel reviewed:

- BCCS investigative findings;
- Information provided by panel members;
- Environmental, social and medical factors associated with the deaths;
- Possible trends or themes;
- The current state of related public policy and strategies; and,
- Existing challenges.

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<sup>9</sup> Under the *Coroners Act*

## B) DATA LIMITATIONS AND CONFIDENTIALITY

This review identified a number of data limitations and issues, including:

- The BCCS operates in a live database environment. The data presented within this review is based on open and closed BCCS investigative files. It includes analysis of BCCS investigative notes, medical records and other documents collected or protocols completed during the course of the coroners' investigation. Some deaths were still under investigation and the information was incomplete.
- As of June 1, 2016, the BC Coroners Service adopted the Aboriginal Administrative Data Standard; this will improve data quality and completeness of Indigenous identity on BCCS investigative files. Prior to June 2016, there was the potential to under-report deaths based on Indigenous identity. Past BCCS data collection resulted in limited or absent information about Indigenous identity (i.e., First Nations, Métis, Inuit), or whether an individual lived on a reserve.
- This review presents data subsets with small numbers (n). These should be interpreted with caution. When the 'n' is low, conclusions are less certain than for larger groups.
- The numbers presented are based on factors present during a death investigation. There is no population data for many of the factors reviewed.
- Provisions under the *Coroners Act* and *Freedom of Information and Protection of Privacy Act* allow for the BCCS to disclose information to meet its legislative mandate and support the findings and recommendations generated by the review process. For the purposes of this report, information is presented in aggregate. Details that could identify the people have been omitted to respect the privacy of the person who died and their families. The BCCS is sensitive to the privacy of individuals and families that it serves and proceeds with caution when reporting review findings.

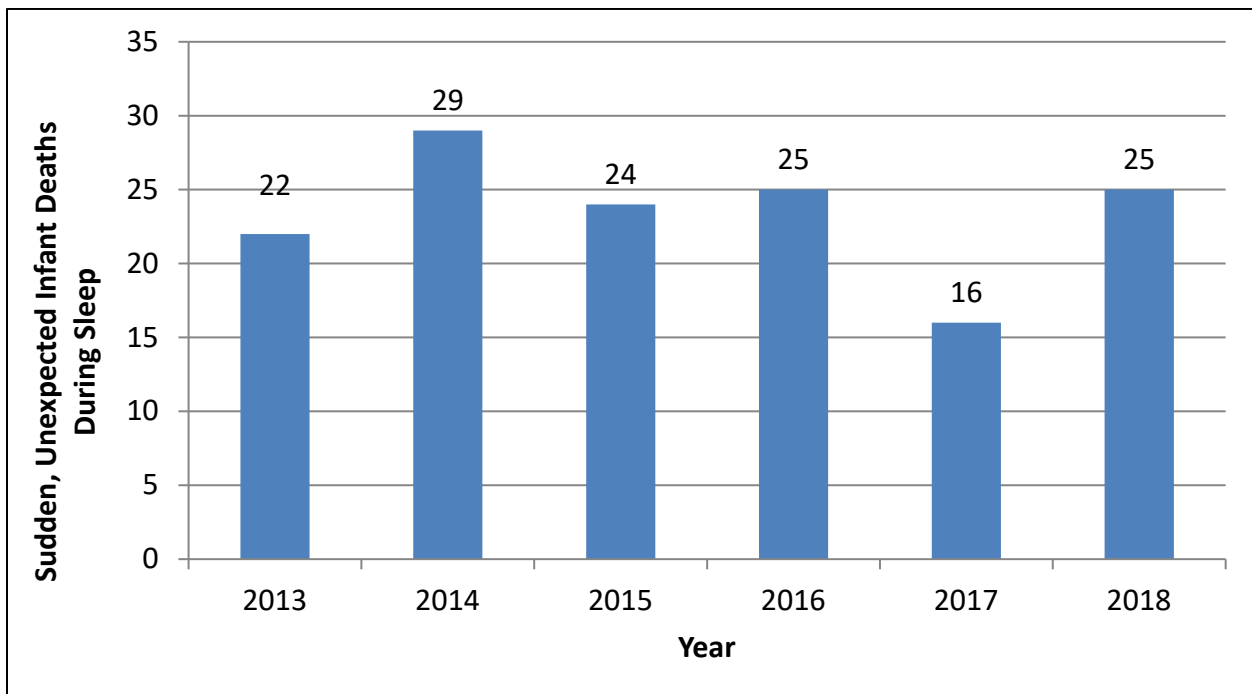
## C) DATA TABLES

Data Table 1

Table 1: Total Infant Deaths 2013-2018 (All Classifications)					
	Accidental	Homicide	Natural	Undetermined	Total
Total Deaths Among Infants	40	7	844	75	966

Most infant deaths are the result of natural causes (e.g. extreme prematurity, congenital anomalies, or result from complications during childbirth). Some infant deaths are the result of unintentional injury (e.g. asphyxial deaths, drowning or motor vehicle crashes) and a small number of deaths are the result of homicide. Some infant deaths are classified as undetermined, where the cause of death cannot be or has not yet been established.

Data Table 2: Unexpected Infant Deaths during Sleep (2013-2018)



## GLOSSARY

### **BCCS Classifications of Death**

- **Accidental:** deaths due to unintentional or unexpected injuries and includes complications reasonably attributed to the accident.
- **Homicide:** death due to an injury intentionally inflicted by action of another person. Homicide is a neutral term that does not imply fault or blame.
- **Natural:** resulting from a disease of the body and not resulting secondarily from injuries or abnormal environmental factors.
- **Undetermined:** deaths that (because of insufficient evidence or inability to otherwise determine) cannot be reasonably categorized as natural, accidental or homicide deaths. This includes some sudden infant deaths due to unknown or undetermined causes.

**BCCS Open Investigation:** circumstances of the death are still under investigation and/or awaiting additional information such as medical records, post-mortem testing results, or toxicological findings that will support the completion of a Coroners Report.

**BCCS Completed Investigation:** the investigation of the death has been completed. Post-mortem testing is complete, and results finalized. A Coroners Report is released.

**Bed sharing:** a sleeping arrangement in which the baby shares the same sleep surface as another person, sometimes also referred to as co-sleeping.

**First Nations:** the term 'First Nations' has largely become the preferred terminology for Indigenous peoples of North America in what is now Canada, and their descendants, who are neither Métis or Inuit. First Nations people may be 'Status' (registered) or 'non-Status' as defined under the Indian Act.

**Indigenous:** is most frequently used in an international or global context and is referred to by the United Nations broadly as 'peoples of long settlement and connection to specific lands who have been adversely affected by incursions by industrial economies, displacement, and settlement of their traditional territories by others'. Similarly, the term can also refer to groups of peoples or ethnic groups with historical ties a territory prior to colonization or formation of a nation state. Typically, Indigenous peoples have preserved a degree of cultural and political separation from the mainstream culture and political system of the nation state within the border of which the Indigenous group is located.

**Infant:** up to one year (birth to 364 days of age).

**Investigative Protocol:** an assessment tool used by coroners to document relevant investigative findings about a decedent's health, social and environment which assists in the classification of death or identifies prevention opportunities.

**Sudden infant death syndrome (SIDS):** a term that describes the death of an infant under one year of age which is sudden and unexpected and without a clear cause. It is not a diagnosis.

**Sudden unexpected deaths in infancy (SUDI):** a term that describes the death of an infant under one year of age which is sudden, unexpected and unexplained where external risk factors are present and may or may not contribute to the death. It is not a diagnosis

**Vulnerable families:** are those who experience a larger “burden” of illness and distress than others. A number of factors may influence vulnerability.

**Vulnerabilities:** factors may include: low income, young parent, low education status, few social support networks, use of tobacco, alcohol or other substances, experiencing problems with housing, domestic violence, or mental health. In addition, vulnerable infants include those with low birth weight, poor health, prenatal substance exposure or born preterm.

## REFERENCES AND BIBLIOGRAPHY

- Anderson, T.M., Lavista Ferres, J.M., Ren, S.Y., Moon, R.Y., Goldstein, R.D., Ramirez, J-M., & Mitchell, E.A., (2019). Maternal smoking before and during pregnancy and the risk of sudden unexpected infant death. *Pediatrics*. 2019; 143(4):e20183325
- Athanasakis, E., Karavasiliadou, S., & Styliadis, I. (2011). The factors contributing to the risk of sudden infant death syndrome. *Hippokratia*, 15(2), 127-31.
- Bass, J.L., Gartley, T., Lyczkowski, D.A., & Kleinman, R. (2017). Trends in the incidence of sudden unexpected infant death in the newborn: 1995-2014. *Journal of Pediatrics*, 196; 104-108.
- Blair, P. S., Sidebotham, P., Pease, A., & Fleming, P. J. (2014). Bed-sharing in the absence of hazardous circumstances: is there a risk of sudden infant death syndrome? An analysis from two case-control studies conducted in the UK. *PloS one*, 9(9), e107799. doi:10.1371/journal.pone.0107799
- British Columbia Coroners Service (2019). Unpublished data.
- Blood-Siegfried, J. (2009). The role of infection and inflammation in sudden infant death syndrome. *Immunopharmacology and Immunotoxicology*, 31(4), 516-23.
- Byard, R.W. (2018). The Autopsy and Pathology of Sudden Infant Death Syndrome. In: SIDS Sudden Infant and Early Childhood Death: The Past, the Present and the Future Duncan JR; Byard RW Chapter 24 Retrieved from <http://ezproxy.hlth.gov.bc.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=mnh&AN=30035966&site=ehost-live&scope=site>
- Byard, R.W., Bright, F., & Vink, R. (2018). Why is a prone sleeping position dangerous for certain infants? *Forensic Science, Medicine and Pathology* (2018), 14: 114-116.
- Carlin, R., and Moon, R.Y. (2018). Learning from national and state trends in sudden unexpected infant death. *Pediatrics*, 2018; 141(3):e20174083
- Center for Addiction and Mental Health, 2011. Canadian Smoking Cessation Clinical Practice Guideline. Toronto, Canada: Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-informed Tobacco Treatment, Centre for Addiction and Mental Health. [https://www.nicotinedependenceclinic.com/en/canadaptt/PublishingImages/Pages/CAN-ADAPTT-Guidelines/CAN-ADAPTT%20Canadian%20Smoking%20Cessation%20Guideline\\_website.pdf](https://www.nicotinedependenceclinic.com/en/canadaptt/PublishingImages/Pages/CAN-ADAPTT-Guidelines/CAN-ADAPTT%20Canadian%20Smoking%20Cessation%20Guideline_website.pdf) Accessed August 15, 2019.
- Doering, J.J., & Salm Ward, T.C. (2017). The interface among poverty, air mattress industry trends, policy and infant safety. *American Journal of Public Health*, 107(6), 945-949.

Drennan, V. (2018). Investigating the risk factors and safer sleeping practices associated with sudden infant death syndrome. *Primary Health Care*, 28(2), 12. <https://doi-org.ezproxy.hlth.gov.bc.ca/10.7748/phc.28.2.12.s10>

Eck Lambert, A.B., Parks, S.E., & Shapiro-Mendoza, C.K. (2018). National and State Trends in Sudden Unexpected Infant Death: 1990–2015. *Pediatrics*. 2018; 141(3):e20173519

Eck Lambert, A.B., Parks, S.E., Camperlengo, L., Cottengim, C., Anderson, R.L., Covington, T. M., & Shapiro-Mendoza, C. K. (2016). Death Scene Investigation and Autopsy Practices in Sudden Unexpected Infant Deaths. *The Journal of Pediatrics*, 174, 84–90.e1. <https://doi-org.ezproxy.hlth.gov.bc.ca/10.1016/j.jpeds.2016.03.057>

Esplin, J., Doust, E., & Prince, J. (2016). Literature review of sudden unexpected deaths in infants. Accessed March 13, 2019. <http://www.srgexpert.com/wp-content/uploads/2017/11/Sapere-SUDI-Literature-Review-2016-FINAL.pdf>

Filiano, J., & Kinney, H.C. (1994). A perspective on neuropathologic findings in victims of the sudden infant death syndrome: the triple risk model. *Biol Neonate* 1994; 65:194–197  
<https://doi.org/10.1159/000244052>

First Nations Health Authority, (2013). Honouring our babies: Safe Sleep Cards: Facilitator’s Guide. [http://www.fnha.ca/Documents/HOB\\_SafeSleep\\_FacilitatorsGuide.pdf](http://www.fnha.ca/Documents/HOB_SafeSleep_FacilitatorsGuide.pdf)

First Nations Health Authority & Office of the Provincial Health Officer, (2018). Indigenous health and well-being. <http://www.fnha.ca/Documents/FNHA-PHO-Indigenous-Health-and-Well-Being-Report.pdf>

Fleming, P.J., Blair, P.S., & Pease, A. (2015). Sudden unexpected death in infancy: aetiology, pathophysiology, epidemiology and prevention in 2015. *Archives of Disease in Childhood*, Published Online First: doi:10.1136/archdischild-2014-306424

Gessner, B.D., Wood, T., Johnson, M.A., Richards, C.S., & Koeller, D.M. (2016). Evidence for an association between infant mortality and homozygosity for the arctic variant of carnitine palmitoyltransferase 1A. *Genetics in Medicine: Official Journal of the American College of Medical Genetics*, 18(9), 933-9.

Government of B.C., Ministry of Health, (April 2013). Healthy Start Initiative: Provincial Perinatal, Child and Family Public Health Services (April 2013). Accessed June 6, 2019. <https://www.health.gov.bc.ca/library/publications/year/2013/healthy-start-initiative-phs.pdf>



Government of B.C., (March 2013). Collaborative Practice Protocol for Providing Services to Vulnerable Pregnant Women and Infants, March 2013. [https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/public-safety/protecting-children/collaborative\\_practice\\_relating\\_to\\_pregnant\\_women\\_protocol\\_agreement.pdf](https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/public-safety/protecting-children/collaborative_practice_relating_to_pregnant_women_protocol_agreement.pdf)

Government of Canada, 2007. Pregnancy. <https://www.canada.ca/en/health-canada/services/health-concerns/tobacco/smoking-your-body/pregnancy.html> accessed August 15, 2019.

Hauck, F.R., McEntire, B.L., Raven, L.K., et al. (2017). Research priorities in sudden unexpected infant death: an international consensus. *Pediatrics*, 2017; 140(2):e20163514

Hauck, F.R., Thompson, J.M., Tanabe, K.O., Moon, R., & Vennemann, M. (2011). Breastfeeding and Reduced Risk of Sudden Infant Death Syndrome: A Meta-analysis. *Pediatrics*, July 2011, 128 (1) 103-110; DOI: 10.1542/peds.2010-3000

Horne, R.S.C., Hauck, F.R., & Moon, R.Y. (2015). Sudden infant death syndrome and advice for safe sleeping. *British Medical Journal*, 350(8006), 29–32. <https://doi-org.ezproxy.hlth.gov.bc.ca/10.1136/bmj.h1989>

Hunt, C.E., Darnall, R.A., McEntire, B.L., & Hyma, B.A. (2015). Assigning cause for sudden unexpected infant death. *Forensic science, Medicine, and Pathology*, 11(2), 283-8.

Kautz, W.H. (2017). An intuitive approach to understanding child death. *Journal of Prenatal & Perinatal Psychology & Health*, Fall 2017, Vol. 32 Issue 1, p16-53. 38p

Mitchell, E.A., Thompson, J., Zuccollo, J., MacFarlane, M., Taylor, B., Elder, D.,...Fleming, P. (2017). The combination of bed sharing and maternal smoking leads to a greatly increased risk of sudden unexpected death in infancy: the New Zealand SUDI Nationwide case control study. *New Zealand Medical Journal*, Vol 130, No 1456 June 2017.

Monnelly, V., & Becher, J.C. (2018). Sudden unexpected postnatal collapse. *Early Human Development*, 126 (2018) 28-31.

Moon, R.Y., & AAP task force on sudden infant death syndrome, (2016). SIDS and other sleep-related infant deaths: evidence base for 2016 updated recommendations for a safe infant sleeping environment. *Pediatrics*, 2016; 138(5): e20162940

Pongou, R., (2012). Why is infant mortality higher in boys than in girls? A new hypothesis based on preconception environment and evidence from a large sample of twins. *Demography*, November 2012 DOI: 10.1007/s13524-012-0161-5

Public Health Agency of Canada, (2014). Sudden Infant Death Syndrome (SIDS) in Canada. Accessed March 6, 2019. [http://publications.gc.ca/collections/collection\\_2015/aspc-phac/HP35-51-2014-eng.pdf](http://publications.gc.ca/collections/collection_2015/aspc-phac/HP35-51-2014-eng.pdf)

Public Health Agency of Canada, (2012). [https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/hp-ps/dca-dea/stages-etapes/childhood-enfance\\_0-2/sids/pdf/bsse-essb-eng.pdf](https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/hp-ps/dca-dea/stages-etapes/childhood-enfance_0-2/sids/pdf/bsse-essb-eng.pdf)

Rohana, J., Ishak, S., Nurulhuda, W. (2018). Sudden infant death syndrome: knowledge and practise in parents of preterm infants. *Pediatrics International*, 2018, 60, p.710-713. doi: 10.1111/ped.13605

Sheppard, A.J., Shapiro, G., Bushnik, T., Wilkins, R., Perry, S., Kaufman, J., Kramer, M.S., & Yang, S. (2017). Birth Outcomes among First Nations, Inuit and Metis populations, Health Reports, Vol. 28, no. 11, pp. 11-16, November 2017 • Statistics Canada, Catalogue no. 82-003-X

Sinclair, G., Collins, S., Arbour, L., & Vallance, H. (2018). The Pr79L variant in CPT1A is associated with infectious disease in a BC First Nation. *Paediatrics and Child Health*, 2018, 1-5. Doi: 10.1093/pch/pxy106

Southall, D.P., Samuels, M.P. Reducing the Risks in Sudden Infant Death Syndrome [editorial]. *Br. Med. J.* 1992; 304: 265-266.

Straw, J., & Jones, P. (2017). Parent-infant co-sleeping and the implications for sudden infant death syndrome. *Nursing Children and Young People*, 29, 10, 24-29. Date of submission: 25 April 2017; date of acceptance: 14 September 2017. doi: 10.7748/ncyp.2017.e945

Trachtenberg, F., Haas, E., Kinney, H., Stanley, Cl., & Krous, H. (2012). Risk factor changes for sudden infant death syndrome after initiation of back-to-sleep campaign. *Pediatrics*, Volume 129, Number 4, April 2012

Trifunov, W. (2009). The practice of bed sharing: a systematic literature review and policy review. Accessed March 13, 2019, [https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/hp-ps/dca-dea/stages-etapes/childhood-enfance\\_0-2/sids/pdf/pbs-ppl-eng.pdf](https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/hp-ps/dca-dea/stages-etapes/childhood-enfance_0-2/sids/pdf/pbs-ppl-eng.pdf)

Varghese, S., Gasalberti, D., Ahern, K., & Chang, J.C. (2015). An analysis of attitude toward infant sleep safety and SIDS risk reduction behavior among caregivers of newborns and infants. *Journal of Perinatology*, 35(11), 970–973.

Ward, T., McClellan, M., Miller, T., & Brown, S. (2018). Evaluation of a crib distribution and safe sleep educational program to reduce risk of sleep-related infant death. *Journal of Community Health*, 43:848-855. <https://doi.org/10.1007/s10900-018-0493-1>.

Weber, M.A., Risdon, R.A., Ashworth, M.T., Malone, M., & Sebire, N. J. (2012). Autopsy findings of co-sleeping-associated sudden unexpected deaths in infancy: relationship between pathological features and asphyxial mode of death. *Paediatrics and Child Health*, 48(4), 335–341. <https://doi-org.ezproxy.hlth.gov.bc.ca/10.1111/j.1440-1754.2011.02228.x>

Zundo, K., & Richards, E.A., Ahmed A., & Codington, J.A. (2017). Factors associated with parental compliance with supine infant sleep: an integrative review. *Pediatric Nursing*, 43(2), 83–91.