Chief Medical Health Officer Child Health Status report Technical report

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northern health
the northern way of caring

Message from the Chief Medical Health Officer

As a public health physician, parent and resident of Northern BC, I am passionate about improving the health of children and families living in Northern BC communities. Life as a Northerner is a unique experience that comes with both challenges and opportunities for children and families. Northerners are resilient and resourceful, with an amazing capacity to thrive in remote, and sometimes harsh, settings.

Important to us all, is the richness and beauty of the Aboriginal people's cultural heritage and teachings which contribute greatly to the vibrancy of the North. Aboriginal history is valued in all aspects of Northern Health's work, whether providing health services, planning for the health system or reporting on health status. We have learned a great deal from First Nations partners around holistic health and the importance of having a wellness perspective on health.

Northerners are faced with many opportunities and challenges to maintain lifelong wellness. Transportation is a challenge with commercial centres being separated by great distances, which can impact access to a variety of amenities, including grocery stores, recreational facilities, and health services to name a few. Severe weather, remoteness and isolation are also factors. Persistent uncertainty in many of the resource sectors spurs cyclic concern and speculation on local economies. Small northern communities have limited capacity to manage the fluctuations in undiversified economies, transient populations and the resultant pressures on services. Moreover, when industry moves away, family members often follow the work. While the true impact to families and children is not well known, many in the North have stories about family members working away from home.

Amidst all these factors, people in the North, including children, tend to be less healthy than others in the province. These unique circumstances and realities of the north contribute to health and wellness of children and families, but to what extent? We want all children in Northern BC to grow up to be healthy adults. So what do we need to know, and what do we need to do to realize this ambition?

We know that most of what influences health and wellness of children and families is outside of the conventional healthcare system. Lifelong health and wellness are strongly influenced by the contexts of people's lives: their families and communities, the resources available to them, a sense of connectedness with their peers, their family, and their community. The health services provided by Northern Health cannot improve health for children and families in isolation. Support from communities, as well as local and provincial organizations, is needed to address the social determinants of health and improve health for children and families.

The goals of this report are to:

- Provide an overview of the current state of knowledge on healthy child development in Northern British Columbia,
- Make recommendations on how to improve the health of Northern BC children,
- Foster conversations and stimulate further ideas around how to improve the health of children, and
- Strengthen partnerships with key stakeholders playing a role in the health and well-being of Northern BC children and families.

This report is for the communities and families of Northern BC: parents and grandparents, caregivers and children, community leaders, decision-makers, advocates, researchers and partners. Together, we are responsible for supporting people to aspire to optimal health and well-being, to care for those who cannot care for themselves, and to provide the very best future for children. This starts with families and communities taking action to enrich health and well-being, family by family and community by community. Investing in healthy children is investing in the future. This report is just the beginning. Over the coming year we will seek to hear from our partners about their perspectives on healthy children and healthy families in healthy communities.

Thank you for reading this report and joining me in taking action to improve the health of children in Northern BC.

Dr. Sandra Allison, MPH CCFP FRCPC DABPM
Chief Medical Health Officer
Northern Health

Executive Summary

Essential to lifelong wellness for every person in Northern BC is a healthy pregnancy and a healthy childhood. Everyone deserves a good start. This report attempts to explain some of the factors that may serve to compromise or protect children's health in the North. However, it is important to point out that there are limitations to data in rural and remote settings. Statistics for small populations can be hard to access and challenging to analyze and interpret.

Many things combine to affect both individual health and the health of our communities including income, education, biology, access to health services, the physical environment, as well as social support systems and connections to culture. People living in Northern BC share challenges and experiences with other Canadians living in remote and rural settings. Social, educational, and employment opportunities can be limited. These stresses can be complicated by other risk factors, like challenges in the family home, relationships, or finances, and can have an impact on a person's health. We know that having a good start in life sets up the trajectory for a healthier life. However, we also know that it is these and other determinants of health and the context of people's lives that determines the health of individuals. Given people have little control over many of these factors, it is inappropriate to "blame" individuals for having poor health. Rather, a holistic approach involving all sectors of society must be taken. Together, we must look for solutions to address health inequities by identifying and implementing opportunities that will result in measurable, long term, and positive impacts on children living in our northern communities.

This report gives an overview of the information we have about the vital beginning of a child's life, from pregnancy to age five. It seeks to identify and explain influences on the health of pregnant women and their children and offers recommendations for how we can work together to improve the health of children in Northern BC. The greatest strength of this report is in the opportunity it brings to have conversations in communities about what matters to every family and every community in order for their children to be healthy. Partnerships and collaborations in rural and remote communities have proven to be the solution to challenges in the past, and can be in the future.

Key findings - How healthy are most pregnancies in the North?

Compared to the rest of the province, Northern BC reports higher rates of the following conditions, all of which can lead to complications later in the child's life:

- teen pregnancies;
- exposure to alcohol, tobacco, and stress related to mental health concerns;
- overweight and obesity in mothers and high birth weights of newborns.

Key findings - How healthy are children in the North?

Newborns are generally welcomed safely in Northern BC, but higher rates of infant mortality are reported in the region in the first year of life. Statistics also indicate that:

- Women in Northern BC have the lowest rates of exclusive breastfeeding to six months of age.
- About one-third of children are not emotionally, nor physically, ready for the transition to enter school.
- The region has higher rates of poor oral health in comparison to the rest of the province, including the highest rate of dental surgeries.
- The rates of injury hospitalization are among the highest in the province.
- Rates of child abuse, neglect, and children in need of protection are also among the highest in the province.
- One in five children in the North live in low income families.

The results from this report paint picture of child health in Northern BC. The findings are not unexpected. Other rural populations across Canada face similar challenges to those living in Northern BC. In 2006 the Canadian Institute of Health Information published "*How Healthy are Rural Canadians",* and distinctions were identified between rural and urban populations across Canada (Public Health Agency of Canada, 2006). It concluded, *"Rural populations experience suboptimal outcomes related to occupational, community, family, and individual characteristics that result in persistent inequities, and the unnecessary morbidity and mortality."*

But this doesn't tell the whole story of children, families, and communities in the North. The strengths and resiliencies found in the ecology of child health, in the social and physical environments, and in the family and community context are important, although difficult to measure.

Key influences in the health of children and pregnant women in Northern BC

To understand why rural children in BC are less healthy than urban children, we need to understand how "place" affects health; healthy families, healthy communities, physical and social environments. There is much to learn about the resources, strengths, and challenges in rural communities that continue to see successful growth and development of their children into successful adults with Northern children of their own. Consider the elements of a healthy childhood in your community setting. (See Appendix B and C – Community Conversations)

- "Place" is a complex concept. It not only denotes the geographic location, but also embodies the demographic, social, economic, cultural, and behavioural dimensions of a community and its residents, as well as unique features of its physical environment. (Public Health Agency of Canada, 2006).
- Healthy children are raised in healthy families and communities. The social and physical environments in which they live, learn, work, and play are important ecologies that influence child development.
- The characteristics of healthy individuals, families, and communities are explored in the ecobiodevelopmental framework.

Key recommendations for how we can work together to improve the health of our children

Communities and families can seek to strengthen protective factors for optimal child wellness and reduce or prevent risk factors. Children's health happens in families and communities, in the settings in which children live, learn and play. We want to learn from the experiences of community and share the stories.

1. Within Northern Health, develop a program focused on children, youth and families within Northern BC.
2. Encourage, promote and highlight collaboration in communities.
3. Strive to achieve high levels of collaboration across sectors.
4. Strengthen the partnership between Northern Health and the First Nations Health Authority.
5. Support communities and families to provide the foundations for early childhood development.
6. Commit to ongoing monitoring of child health data and indicators.

Acknowledgements

A sincere thank you to all those below who contributed to the collaborative effort that was this report. This following list is in no particular order, but this report would not have been possible without everyone's combined effort. If anyone was left off the list, please know that you are also appreciated.

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Introduction

Northern Health is the regional health authority in the northern two-thirds of the province of British Columbia. Within Northern Health, the **Population and Public Health** portfolio is a regional supporting program to:

- Protect the health of the population through environmental health protection, regulatory and enforcement activities as guided by the many supporting statutory elements.
- Prevent disease, chronic or communicable, through health promoting activities as well as statutory functions under the *Public Health Act*.
- Promote health and wellness of individuals, groups, families, and communities by addressing individual behaviours, through to the advocacy for healthy public policy to ensure that the healthiest choice is the easy choice.
- Understand the health of the population through special and routine **surveillance of health needs** of individuals, populations, communities and reporting on quantitative data, from health administrative databases, or qualitatively, through stories from our communities.

Health status reporting is a requirement under The *Public Health Act of BC* [S.73(6)] (Queen's Printer, 2015). Public health is tasked with reporting on health status because epidemiology is one of the cornerstones of public health, focusing on the study of the "distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems". Epidemiology was historically focused on epidemics of communicable and non-communicable diseases; however, it has expanded to include maternal-child health, birth defects, chronic diseases, injuries, occupational health, and environmental health. Epidemiology is not just the study of the health of the population; it also involves utilizing the knowledge gained through research to help develop new initiatives, policies, and programs to improve the health of the population.

In our review we primarily use **descriptive epidemiology.** Before undertaking the analysis, the risks and benefits of analyzing small populations were weighed, and a cautiously optimistic approach was taken for the results. All results in this report are meant to support conversations, to gain context to what the numbers are telling us. If additional attention is needed, then seeking information from those who know the community is the best place to start.

The primary **purpose of this health status report** is to assist Northerners to understand the important issue of child health and the risk and protective factors that make a difference, and to engage communities and guide policy makers to make decisions that positively influence children's health. The population level assessment provided in this report utilized health system data of the Local Health Areas, where possible, and is intended to inform discussions, recruit partners, and evoke actions to improve early childhood development. This report did not endeavour to evaluate any current programs or strategies. It is expected through identifying areas for improvement in perinatal health, in child health, and in support for families in Northern communities, new resolve and actions will be sparked to undertake improvements.

For this report, the health system data includes all Northern BC residents who receive health services from Northern Health, including First Nations and Aboriginal people. Furthermore, when data was not available for specific quantitative analysis, stories are used to enhance understanding, context, and community level experience. Due to a number of limitations of the available data, it was **not possible to separate the health status of First Nations and Aboriginal people** from non-Aboriginal people in this report. These challenges of Aboriginal health information are not unique to BC, but occur across Canada. (National Collaborating Centre for Aboriginal Health, 2014). There are significant gaps in health information about Aboriginal women's maternal health and maternity experiences in BC. Often, ethnicity-specific information is not gathered, and when it is gathered, it typically is not disaggregated to reveal differences among First Nations, non-Status Indian, Inuit, and Métis populations, but rather addresses these populations collectively as 'Aboriginal' or excludes one or more of these groups

Unfortunately, the data to assess and report on **chronic diseases, disabilities, congenital anomalies and other less common conditions of childhood and infancy is not readily available,** and as previously stated, poses significant challenges in small populations. During the consultation process, we seek to hear the community and family experience in their roles as caregivers to children with complex medical conditions to better the understanding of the challenges and opportunities in rural and remote settings.

We know that communities are one of the important settings for health, development of healthy behaviours, determinants of health and healthy relationships. As Northern Health seeks to design programs to meet the needs of the population, with a view to child and family health, **the need for partnerships, referral networks and resource planning** becomes extremely apparent. Strengthened partnerships, and strengthened communication, with other partners and policy makers responsible for children's health, and the needs of families.

Family settings are the most important context for child development. Experiences and exposures in the early years are extremely important for health across the lifespan. Early experience gets under the skin. Healthy childhood development is dependent upon adequate nutrition, responsive relationships, and safe environments**. An equity based approach would ensure all families had the requirements of a healthy child development.**

A child's health and development also depends upon the behaviours and knowledge they gain in their formative years in the home and in the family and community. It is important to focus on strengths that are important protective factors culture, relationships, education, physical health that promote wellbeing and health across the lifespan. Each community has strengths that have supported, and will continue to support families and children to be healthy and stay well.

As questions arise about the data and about the populations, it is important to **seek community level experience to fully understand the concerns and opportunities, the protective and predisposing factors and to seek community specific solutions.** A community consultation is planned for 2016 to connect with communities about children's health and how families, and children, are supported to be as healthy as they can be in their communities.

About the North

Figure 1. Map of Northern Health

This section provides a snapshot of growing up in Northern BC. Living in the North presents both amazing opportunities and complex challenges.

People who live in rural, remote, and Northern settings often feel strong connections to their "place" - they are connected to the land, the environment, the history. In Northern BC, from the rugged coasts of the Northwest, to the forests of the interior, to the rich lands of the Northeast and the Rocky Mountains, Northerners are very connected and resilient. It is because of this connectivity that many Northerners enjoy being outside and engaging with nature.

The Northern rural economy is significantly a resource-based economy. It has generated, and continues to generate, much of this province's revenue and wealth (Northern Health, 2013), and yet, some of the least diversified and vulnerable local economies in the province are found in the North (Northern Health, 2013).
Northern BC is generally a sparsely populated region. For some, that leads to challenges in meeting basic needs, worsening differences in disease and illness, lack of employment, training or educational opportunities. The impacts of poverty and history are more disabling for those who are vulnerable.

Technology, including cellular and digital internet access, continues to challenge or enrich many Northern communities. Opportunities for youth activities and development can be limited. Northern Health Local Health Areas rank low amongst the province for Socioeconomic Index, Education risk Index, Children at Risk and Youth at Risk index.

Northern Health's region covers nearly 620,000 square kilometres (Figure 1).

- This is approximately two-thirds of the province's land area and is close to the size of France.
- Within this region, there is a total population of approximately 300,000 people (less than 7% of the total provincial population), organized across over 30 municipalities, about 80 First Nations and Aboriginal communities, and many more settlements outside of these jurisdictions.

The large health region is divided into three distinct and unique Health Service Delivery Areas (HSDAs) in the Northwest, the Northeast, and the Northern Interior.

- Within these larger HSDAs there are 17 Local Health Areas to further delineate the larger health area.

The official population numbers of the North are stable and often dependent upon resource economies. Additionally, the shadow, or unofficial, population of the North is significant and not well understood. The trend in most regions is one of rural to urban migration, and the North is no different.

- The projected population of Northern BC was approximately 287,729 people as of 2014, accounting for roughly 6.2% (287,729 / 4,631,302) of the entire BC population.

- Within Northern BC, nearly 7.5% (21,277) of the population are children between ages 0-5 (Statistics Canada, 2014).
- The population of women in childbearing years (20-35) in Northern BC is 30,382.
- As of 2011, 83% (70,845) of all families living in Northern BC were two parent families, 12.5% were lone female families, and 4.5% were lone male families, while the remainder had another family structure.
- The projected Northern BC estimates for 2014 suggests that:
  - 3,406 children will be under the age of 1;
  - 14,284 children will be between 1-4 years of age; and
  - 17,795 children will be between 5-9 years of age.

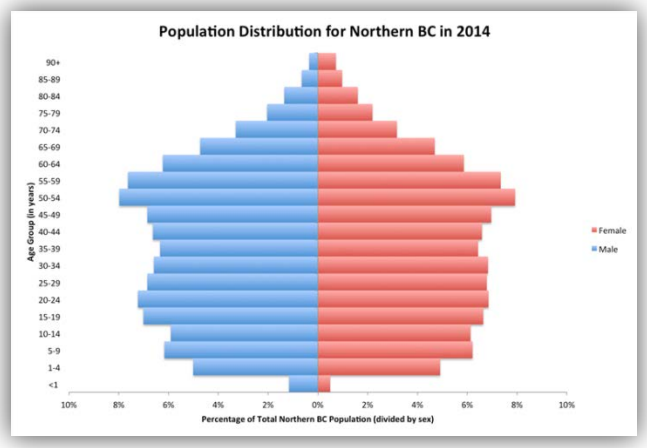


Figure 2.
Northern BC Population Projection (BC STATS, 2015)

On socioeconomic indices, as compared to more urban and southern regions of the province (FirstCall BC, 2015):

- The areas of Prince Rupert, the Upper Skeena (ranked the poorest in all of BC), and Nechako areas are among the poorest rankings, often placed towards the bottom of all areas in the province.
- Areas such as Smithers and the Peace River have better socioeconomic indices.

Figure 3. First Call BC 2015 report card
http://firstcallbc.org/publications/2015-bc-child-poverty-report-card/

The ethnic background of families in Northern BC is assumed to mirror the ethnicity of the population of Northern BC. The predominant minority ethnic groups represented in Northern BC are:

- South Asian (1.6%), Filipino (0.9%), Chinese (0.7%), and Black (0.4%).
- Recent immigrants make up about 9% of the Northern BC population, 5.6% of which immigrated between 2006-2011.
- Nearly 14% of the Northern BC immigrant population was aged 0-4 when they first came to Canada.
- Nearly 72% of the Northern BC population was a third or more generation Canadian, while the percentage was much smaller for first generation (9.6%), and second generation (16.4%) Canadians (Statistics Canada, 2011).

Of all of the regional health authorities in BC, Northern Health has the highest proportion of Aboriginal people, approximately 18% of the total population (Norton, 2008). However, in the Northwest HSDA, nearly 30% of the total population is Aboriginal, as compared to roughly 13% in the Northern Interior HSDA and 12% in the Northeast HSDA. Approximately 75% of the Aboriginal people in Northern BC are First Nations, 22% are Métis, and less than 1% are Inuit.

The largest First Nations population is in the Northwest and the largest Métis population is in the Northeast (BC Ministry of Health, 2010). Approximately 60% of the Aboriginal population in Northern BC live off-reserve in urban settings.

The population in Northern BC compares similarly with other rural and Northern populations across Canada. The health of rural and Northern populations within Canada show poorer health compared to their urban counterparts (Pong, Desmeules, & Lagacé, 2009).

- Many of the health outcomes observed among this population are likely a result of occupational hazards and personal behaviour, in addition to the rurality and lack of access to health care (Smith, Humphreys, & Wilson, 2008).
    - The health risks that are frequently associated with Northern occupations often involve exposure to biological, chemical, and mechanical hazards (Mitchell, et al., 2001).
    - Unhealthy nutrition, elevated rates of smoking, lower levels of physical activity, higher alcohol consumption, and higher rates of psychological distress are linked with lower socioeconomic status, which are characteristic of rural communities, and contribute to the disadvantaged health (Nissinen, Berrios, & Puska, 2001).
- People residing in Northern and rural communities are less likely to receive preventive screening services, exercise regularly, and more likely to engage in high-risk behaviour (e.g. not wearing seatbelts).
    - The high-risk behaviour contributes to the poor health, especially the high injury rates.
    - Some research suggests risky behaviour is prevalent in Northern communities. For example, people in rural areas have increased access to fire arms, a factor that contributes to higher suicide rates in rural areas (Smith, Humphreys, & Wilson, 2008).
- Researchers have suggested that the relationships among families, friends, individuals, organizations, and communities all influence health.
    - Fortunately, for Northern BC, individuals, families, and communities in the North are shown to have increased strength and resilience.
    - The legacy of generations in the North, the caring community atmosphere, the “can-do” attitude and fierce independence of the North; it would be in the best interest of the communities to take these characteristics into consideration when working with partners in the North.
    - Rural communities are commonly associated with good support systems.
    - Confidentiality may be difficult to maintain in remote settings resulting in people not seeking medical attention when needed (Bourke, et al., 2004).

It appears that, even within strong rural Canadian communities, the population’s health is greatly influenced by the region in which the population resides. In an effort to understand, explain, or even excuse these differences, it is noted that residents in Northern BC experience health determinants differently, in regards to child health, compared to others in the province:

- A group of social and psychological variables that have a pervasive effect on health status including mortality, morbidity, effective functioning, and quality of life are known as psychosocial determinants of health. For example, the effects of trauma within families and communities, loss of connection to the land.
- Environment plays a critical role in child development; therefore, researchers need to consider how the North affects children differently compared to the southern portions of the province. For example physical and psychosocial characteristics that affect child development are:
    - Harsher climate settings and subsequent sedentary lifestyles due to cold climate;
    - Limited diet, i.e. limited access to healthier foods, processed foods, heavier diets due to cold climate;
    - High rates of smoking, alcohol, or stress during pregnancy and in the family home;
    - Lack of access to health care services;

- Isolation of communities, lack of opportunities;
- Higher birth rates among teens;
- Varied air quality conditions throughout the region; and,
- Varied water quality conditions throughout the region.

Across the Northern sectors of each province this pattern of poor health caused by the previously mentioned characteristics is prevalent.

- The 2014 Canadian Institute for Health Information report (CIHI) conveys these trends across each of the different regions of each province.
- For example, the preterm birth rate (Figure 4):
  - Northern Interior portion of BC is 8.6%, the highest in the province;
  - Northern Manitoba also showed the highest in the province at 9.4% (Canadian Institute for Health Information, 2014).

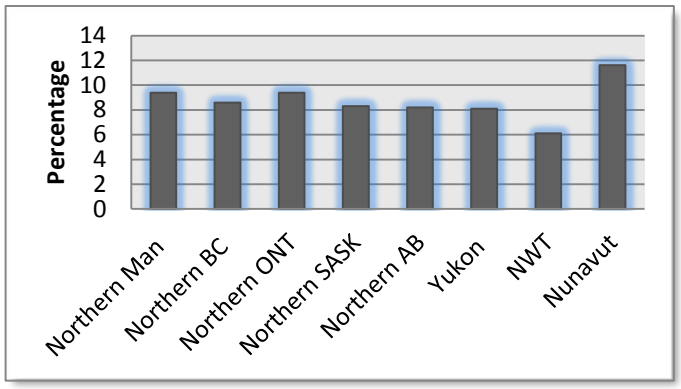
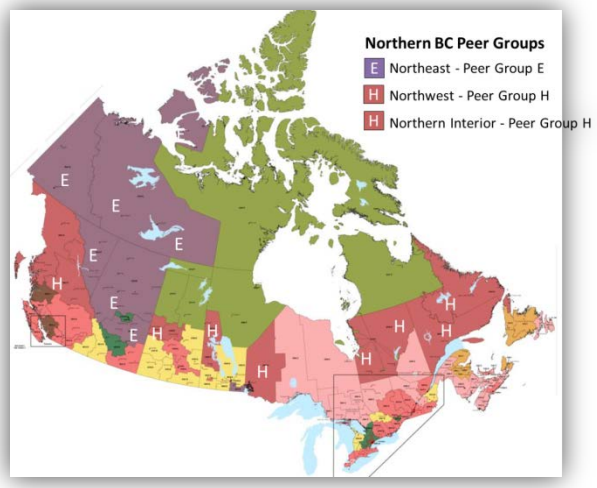


Figure 4. Percentage *of Preterm Birth Rates in Provinces with Northern Region 2013-2014* (CANADIAN INSTITUTE FOR HEALTH INFORMATION, 2014)

Vital Statistics have determined population groupings called Peer Groups. The Peer Groups for Northern Health are Peer Groups E and H. These groups represent populations across Canada that share characteristics and this allows for better comparison. Ideally, the best comparison would be amongst peer groups.



Peer Group E Members	Peer Group H Members
Northeast, B.C.	Northwest, B.C.
Yukon	Northern Interior, B.C.
Northwest Territories	Prairie North, SK
Central Zone, AL	Prince Albert, SK
North Zone, AL	Parkland, MB
South Eastman, MB	Northwestern, ON
	Region du Nord, QU
	Region de la Cote, QU
	Labrador-Grenfell

Figure 5. Map of Canada's Health Peer Groups (STATISTICS CANADA, 2011)

All of these aspects are very important to the people who live in Northern BC, and this report endeavours to set in motion further discussions about the characteristics of Northern communities in BC that support families to be as healthy as they can be.

About Child Health

In Northern communities, **a focus on early childhood, healthy brain development, and school readiness will pay off in good health** in later life. Yet, despite the best attention to these areas, without also turning our attention to racism, poverty, inadequate housing, food insecurity, and deleterious health behaviours, we will be challenged to improve child health. These are complex problems. The Public Health Agency of Canada notes the following points on the importance of Healthy Child Development; it is more important than ever to make some gains in this area (Public Health Agency of Canada, 2013).

- **Tobacco and alcohol use during pregnancy** can lead to poor birth outcomes. In the 1996-97 National Population Health Survey, about 36% of new mothers who were former or current smokers smoked during their last pregnancy (about 146,000 women). The vast majority of women reported that they did not drink alcohol during their pregnancy.
- Experiences from conception to age six have the most **important influence** of any time in the life cycle on the connecting and sculpting of the brain's neurons. **Positive stimulation early in life improves learning, behaviour, and health into adulthood.**
- Infants and **children who are neglected or abused** are at higher risk for injuries, a number of behavioural, social, and cognitive problems later in life, and death.
- A **low weight at birth links with problems not just during childhood, but also in adulthood**. Research shows a strong relationship between the income level of the mother and the baby's birth weight. The effect occurs not just for the most economically disadvantaged group. Mothers at each step up the income scale have babies with higher birth weights, on average, than those on the step below.

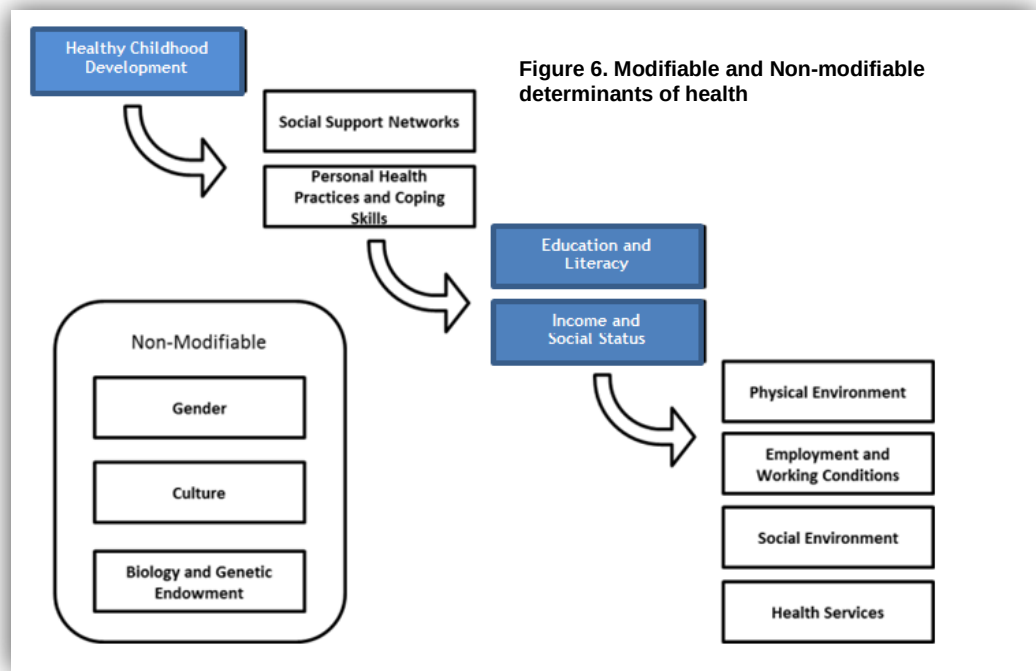


Figure 6. Modifiable and Non-modifiable determinants of health

Healthy Childhood Development is arguably one of the most important determinants of health (Figure 6.). To improve and potentially optimize the health of the population, childhood development is a sensible place to start. This report seeks to understand the current status and trends of selected aspects related to Northern child and perinatal health in the life-course trajectory. Healthy infant and early childhood development provides a strong foundation for a healthy lifetime (BC Health Authorities and BC Ministry of Healthy Living and Sport, 2009). A focus on **strengthening protective factors and preventing or reducing risk factors** for infants and young children is a good investment:

- Protective factors such as affectionate and stable relationships, social support and social connectedness are effective in supporting the development of emotional health and positive relationships (Payton, et al., 2000).

  For example, a loving, secure attachment between parents/caregivers and babies in the first 18 months of life helps children develop trust, self-esteem, emotional control, and the ability to have positive relationships with others.

- Stable family and social relationships, effective parenting skills, adequate family income, safe housing, safe neighbourhoods, and healthy supportive community environments are important predictors of healthy development (Payton, et al., 2000) (World Health Organization, 2002).

- Social and emotional health also enables children to cope with adversity and build resilience in dealing with the stresses of life. Conversely, children deprived of attentive and stable care, and safe and adequate housing, and children who experience social isolation, abuse, neglect, or violence are at risk for a number of behavioural, social, and cognitive problems later in life (Payton, et al., 2000).

- Parental challenges can be the basis for most well-documented risk factors for early childhood health including:
  - having less than a high school education;
  - being single;
  - being unemployed;
  - mental health problems (of which depression or anxiety are particularly common);
  - housing/food instability;
  - three or more children in the home;
  - limited facility with the English language;
  - limited literacy in any language; and,
  - having a problematic parenting style (e.g., not interested in teaching or conversing with their children).

While there are no widely accepted **determinants of child health**, the factors considered by a number of experts (Hertzman, et al., 2004) (Payton, et al., 2000) (World Health Organization, 2002) to be important influences in early childhood development are:

- socio-economic status (e.g., low family income and lower parent education levels are risk factors) and food security;
- parenting style (e.g., positive styles are related to positive outcomes);
- social and emotional learning and cognitive stimulation (and conversely, social isolation, neglect, abuse, and violence);
- neighbourhood safety, cohesion, and socioeconomic character;
- physical characteristics including low birth weight, genetic make-up, hearing, vision, and speech abilities;
- access to quality childcare and developmental opportunities;
- gender, race, and ethnicity; and,
- environmental conditions (e.g., living close to hazardous waste sites or smelters).

Healthy child development in the North and consequent health and wellness throughout the lifespan are **dependent upon healthy relationships, healthy families, and healthy communities**.

- Peace, shelter, education, food, income, a stable ecosystem, sustainable resources, and social justice and equity are fundamental to the health of an individual, their family, and community (World Health Organization, 1986). Social risk factors including poverty, discrimination, unemployment, unstable economies, transiency, inadequate resourcing of social and health services, lack of access to safe and appropriate housing and nutrition, and protective effects of family and community safety and stability.
- Consequent impacts on the health of an individual, a family, or community include social and family dynamic stressors, disordered coping behaviours, development of chronic diseases, mental illnesses, and associated disabilities through direct and indirect pathways that are variably understood and hard to measure.

In Canada, **inequities in early child development emerge in a systematic fashion over the first five years** of life according to well-recognized risk factors (Hertzman, et al., 2004).

- Vulnerable populations are those with a greater-than-average risk of developing health problems (Aday, 2001) by virtue of their marginalized sociocultural status, their limited access to economic resources, or personal characteristics such as age and gender (deChesnay, 2005).
- The threats to healthy early child development are found across the entire socio-economic spectrum, although at increasing intensity among lower socio-economic levels.

Another influence is the **health services that are accessible** to an individual, family or community. These services have important direct and indirect impacts to the outcomes for individuals and communities. Northern Health is a partner in the service network in the North, a safety net of health and social services. The safety net of services is necessary for ensuring safe passage to thriving development and self-actualization, for both individuals and communities. When we have weak links in the safety net, those who need services slip through. **We should be resolved to strengthen the safety net for our families in the North through partnerships.**

- Appropriate levels of services to meet each individual's needs, thoughtfully and carefully applying health equity in service delivery, to improve the "Triple Aim" improved health care outcomes for individuals, improved costs for the health system, and improved population health.
- Northern Health is transforming health services across the region to improve the alignment between community needs and service delivery models from a health care perspective; improved patient, family, and community centred care is the goal, and will require close collaboration with other partners (Appendix A - Idealized Model of Services for Primary Care in Northern Health).

Of significant note and relevance are the **evolving relationships with the Northern First Nations and Métis community and provincial partners.** With learning and partnership in mind, we will continue on our journey together at the Northern First Nations Health Partnership Committee, an opportunity set in motion with the Northern Partnership Accord (First Nations Health Council North Regional Health Caucus, 2012) among other agreements.

- It is expected that through education, partnership, and common values we will build a sustainable, quality system of services for Northern communities. Northern Health's Aboriginal Health department works closely with internal and external partners, including the National Collaborating Centre for Aboriginal Health, the First Nations Health Authority, and First Nations communities.
- The Interim Report on First Nations' Health and Well-being, released in November 2015, shows there remains significant work to meet the goals of improvements in life expectancy, infant mortality, and other indicators (Office of the Provincial Health Officer and First Nations Health Authority, 2015).
- Additionally, in December 2015, the **Truth and Reconciliation Commission** produced their final report, which outlines areas of work that arose from the commission (Truth and Reconciliation Commission of Canada, 2015). Both of these documents, as well as others, are important to guide our thinking as we plan for services for Northern Health and children and families in the North.
    - The Truth and Reconciliation report includes a comprehensive list of 94 items for call to action including child welfare, education, language and culture, health, justice, and the multiple facets of reconciliation. This body of work should guide planning going forward.

The Provincial Context and Frameworks

In development of this report, recent and important documents and policy papers/statements were reviewed for relevance and guidance. With a steady gaze on children, families, communities, and environments that are healthy, we structured the work for alignment with selected strategic priorities, initiatives, and guidance documents.

1. Northern Health's strategic work to achieve **Coordinated and Accessible Services** and **Healthy People in Healthy Communities** are priority areas for health service delivery in Northern BC. There are ongoing plans for idealized health services in Northern Health based upon the primary care home model, in partnership with Divisions of Family Practice and physicians, and in alignment with provincial policy papers (See Appendix A- Idealized Model of Services for Primary Care in Northern Health).
    - **Primary health care**, in the purist sense, where community services that span the disease spectrum, over the life-course, are designed for the community's needs.
    - **Perinatal Services BC**, which provide guidance for preventive public health measures through **prenatal care pathways** in primary care homes.
    - **Promoting healthy community settings** for families and children through partnerships.

2. The relevant **provincial policy papers for the health system**, based on work in "Setting the priorities for BC's health system" and other provincial drivers:
    - The **Guiding Framework for Public Health in BC (2013)**. It is the foundation for public health and preventive medicine in BC (BC Ministry of Health, 2013).
    - **Rural health policy paper.** It is important to acknowledge the unique challenges of Northern, rural, and remote communities. Funding for local infrastructure is less robust. Also, smaller communities have variable capacity to support families. This impacts social support programs. Service networks and communications are key factors for success in sparsely populated areas. Health status is commonly known to be worse than urban counterparts (BC Ministry of Health, 2015).
    - **Primary and community care policy paper**. Directions for system transformation to address priority areas including frail elderly, people with multiple chronic conditions, mental health and substance use, and child and perinatal health (BC Ministry of Health, 2015).

3. The **Healthy Families BC Policy Framework (2014)** and all its associated strategic plans for physical activity, healthy nutrition, healthy childhood, positive mental wellness, substance use, and injury prevention (BC Ministry of Health, 2014).
    - The physical activity strategy, **Active People, Active Places** (Healthy Families BC, 2015).
    - **Healthy Minds, Healthy People,** the provincial mental health strategy (BC Ministry of Health, 2010).
    - Other frameworks under Healthy Communities BC and a number of other supporting programs will also be important for child health.

4. **Other recent reports** on children's health that influence the thinking and the body of work here include:
    - First Call 2015 Child Poverty Report Card (FirstCall BC, 2015)
    - CPS Statement on Housing Need 2015 (Waterston, Grueger, Samson, Canadian Paediatric Society, & Community Paediatrics Committee, 2015)
    - Growing Up in BC (2011, 2015) (Office of the Provincial Health Officer & Representative for Children and Youth, Growing Up in B.C., 2015) (Office of the Provincial Health Officer R. f., 2011)
    - Priority Indicators for Health Equity in BC PHSA in print (2016) (Provincial Health Services Authority, 2016)
    - CIHI/PHO Child Health Indicators 2013 (Office of the Provincial Health Officer & Canadian Institute for Health Information, 2013)

- FNHA Regional Health Surveys (First Nations Health Authority, 2012)
- CPHO report on children's health 2009 (Chief Public Health Officer, 2009)

5. **Partnerships are highly influential** in Northern Health's planning work and connections with communities. So much of health exists outside the health system. Building partnerships is key to finding solutions and making improvements to child health. While Northern Health has important relationships with many partners it is difficult to stay connected and aware of each other's work, priorities, and resources. Routine communication and connection is needed.

    - **Highly connected partners** to strengthen the safety net:
        - Child Health BC and Northern Health programs for children and youth.
        - Provincial government partners including,
            - Ministry of Children and Family Development – Early Years Centres, Child Development Centres, Integrated Youth Services, Shared Care initiatives.
            - Ministry of Education
            - Ministry of Social Development and Social Innovation
        - Local government partners, NCLGA.
        - First Nations' Health Authority, First Nations communities.
        - Not for profit organizations.
    - **Build trusting relationships** to manage the responsibility:
        - Through appropriate and early consideration and consultation most issues can be anticipated and mitigated.
        - Shared resources in rural and remote settings.
    - **Existing networks** to respond locally:
        - Shared values and commitment.
        - Through community compacts, action coalitions, action teams.

Guided by Northern Health strategic priorities, including Healthy People in Healthy Communities, supported by provincial policy frameworks that value primary health care, rural settings, health promotion and disease prevention, we will engage with partners, within the North, within our communities, and across sectors to build an understanding and a commitment to improve children's health in Northern BC.

Together, we are responsible to support people to aspire to optimal health and, to care for those who cannot care for themselves, and to provide the very best future for children. This starts with understanding the needs of our children, our families, and our communities by committing to:

- measure things that matter to children in the community;
- partner for better approaches to understanding your community's health; and,
- create action plans to address those factors we can change.

Healthy children can be everyone's priority.

An Integrative Synthesis of Child Health and Wellness Frameworks

Child Health Definition*

> *Child health and wellness can be defined as a state of physical, mental, intellectual, social, and emotional well-being and not merely the absence of disease or infirmity, focusing on both the immediate and future lives of children.*
> *Healthy children live in families, environments, and communities that provide them with the opportunity to reach their fullest developmental potential, satisfy needs, and successfully interact with their biological, social, cultural, and physical environments.*

*Defined for the purpose of the report by the report-writing committee.

The report writing committee accepted the above definition for child health to guide the body of work. Additionally, to adequately capture a holistic picture of child and perinatal health, an indicator framework was designed.

What follows is an overview of the development of an adaptation of a pediatric contemporary framework, the Ecobiodevelopmental Framework proposed by Dr. J. Shonkoff in the recent pediatric literature (Shonkoff, et al., 2012).

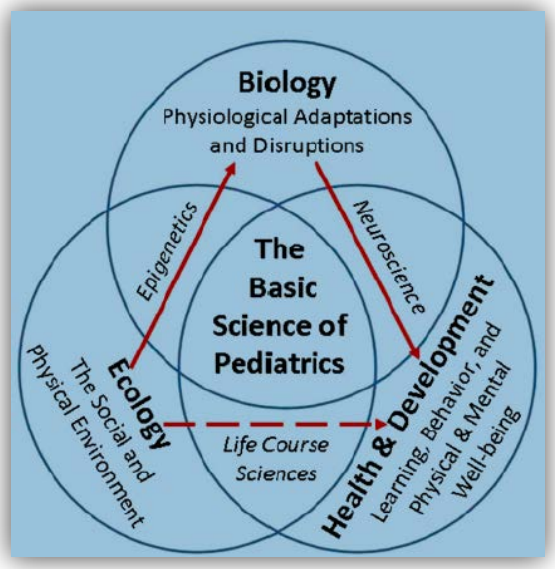


Figure 7. Ecobiodevelopmental Framework

Table 1. -

Proposed frameworks for child health

1. **Biopsychosocial Model** - highlights how children interact with their environments, looking both at internal and external factors related to child development (Canadian Institute for Health Information, 2009) (Smith R. C., 2002).
2. **Strength-Based Perspectives** - converge on lines of thinking related to developmental resilience, personal strengths, healing, and wellness (Saleebey, 1996), with its roots in the teleological theory of flourishing.
3. **Theory of Vulnerable Children/Resilience** - captures the portion of children who show adversity and resilience in spite of problematic or unhealthy environments (Sherrod, Garmezy, & Rutter, 1994).
4. **Social Structures and Determinants of Health** - suggests that health outcomes can be predicted from public health, economics, and sociology. The framework considers how the structure of a child's social network (i.e. immediate family, extended family, neighbourhood, community, school, town, region, political affiliation) affects all aspects of their development (Brunner & Marmot, 2006).
5. **NCCAH's Web of Being** – provides a holistic approach to consider multiple determinants of health that contribute to wellness for Aboriginal people (Greenwood M. , 2009).
6. **FNHA's Perspectives on Wellbeing** – shares the First Nations' Health Authority holistic vision for wellness

Comparison of the proposed frameworks

Six initial model frameworks were considered in the synthesis, Table 1, each with its own strengths. These particular models were recommended by expert opinion in the report writing group and the literature in health determinants and child psychology. The high degree of specificity of these individual frameworks was useful.

An analysis of the proposed frameworks (Table 2), organized into an integrated framework, allowed for a comprehensive accounting for all dimensions of the ecobiodevelopmental framework. No single proposed framework was found adequate to address the varied aspects of child health that warrant attention in Northern BC.

The inclusive integrated framework is a tool to prompt deep thought on how children's health is shaped by their genetic makeup, their experience, and their environment. Capitalizing on the high specificity of the aggregated frameworks, while using the broad categories of the Shonkoff's framework, has allowed for a comprehensive set of indicators that is coherent with current models. Not all aspects, nor domains, were measured in this report.

Table 2 – Ecobiodevelopmental Integrative Synthesis of Child health and well-being frameworks

EcoBio-Developmental Framework	CMHO Report's Child health definition domains	1. Biopsychosocial approach	2. Strengths Based Approach Internal and external strengths	3. Theory of Vulnerable Children Internal and external resilience	4. Social Structures and Determinants of Health	5. NCCAHs Web of Being 2009	6. FNHA's Perspectives for well-being
Biology	Biological	Genetic Vulnerability Immune Function Neurochemistry Stress reactivity Medication effects		Genetic predisposition	Biology and genetics		
Health and Development	Physical	Gender Physical Illness Disability		General health	Health across the lifespan General health	Healthy behaviours, tobacco, diet, physical activity	Physical
	Mental Intellectual	Education Learning/Memory	Commitment to Learning	Cognitive capacity Intelligence and style	Education and Literacy	Education systems	Mental
	Social, Cultural and Emotional	Attitudes/beliefs Personality Behaviour/emotion Coping skills Past Trauma	Self-concept Self-control Empowerment Social sensitivity	Personality Positive views of oneself Motivation	Personal coping skills and health behaviours	Self Determination Early Childhood Language Culture and Heritage Racism and exclusion	Emotional Spiritual Cultural Responsibility
Ecology	Healthy families	Family Background Cultural traditions SES	Family Support and expectations	Healthy home environment Parenting	SES and income	Employment and income Family violence Food security	Family Wisdom Respect Economic
	Healthy environments				Physical environments	Land Resources Environmental Stewardship	Nations Land Environment
	Healthy communities		School Culture Community cohesiveness	Opportunities	Economics	Location Poverty Community infrastructure Social services	Community
	Social environment	Social Supports	Peer Relationships Cultural Sensitivity	Siblings Grandparent Peers Connections to caring adults	Social support networks	Gender Justice Colonization Colonial interfaces Social Support networks	Relationships Social
	Physical Environment				Physical environments Work environments	Residential schools Access to services Housing	Land Environmental

1. Biopsychosocial Model theory

The biopsychosocial model highlights how children interact with their environments, looking both at internal and external factors related to child development. This model was developed in the 1970s to provide a basis for recognizing the determinants of illness and disease, arrive at realistic patterns of health care and treatment, take into account the patient and the social context in which he/she lives, and deal with the disruptive effects of poor health, something existing models of health had not incorporated (Engel, 1977).

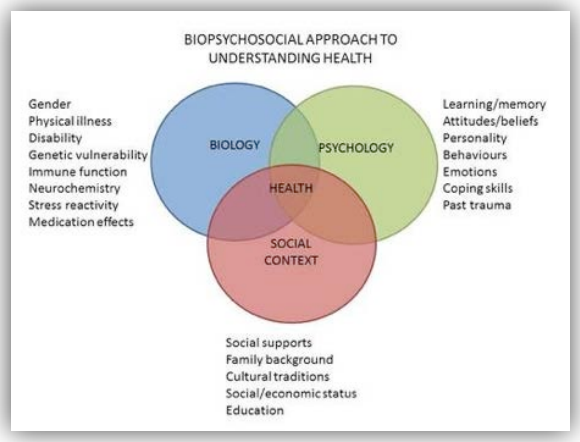


Figure 8. Biopsychosocial Approach to Understanding Health

The biopsychosocial model views child development as the ongoing capacity of children to respond to their environments, both challenges and successes, and maintain health through all stages of life (Canadian Institute for Health Information, 2009). When utilizing this model it is incumbent to consider a child's biology (genetic makeup), psychological factors (such as emotions, thoughts, and behaviours), and social factors (including economic, familial, and cultural factors), as opposed to considering solely a child's biological makeup. Child health and well-being are appraised by considering factors both proximal and distal to the individual, such that a child's immediate environment is examined, as is the broader social context. As such, an individual's surroundings are viewed as a layered set of systems, consisting of everything from social class, to attachment with parents, to government policies, all of which can affect a child's health and well-being. The integrated systems theory makes use of all resources available, taking caution not to neglect any aspect of child development. This framework is most commonly used in health psychology, occupational therapy, nursing, and other medical fields (Canadian Institute for Health Information, 2009) (Smith R. C., 2002).

Criticisms of this theoretical framework include the complexity of the model in linking so many different aspects of health together, the requirement of self-awareness to assess specific aspects of health, and the circular reasoning and relatedness of factors, which can complicate treatment regimes (Borrell-Carrió, Suchman, & Epstein, 2004). Oppositely, the Biopsychosocial Model is commended for its holistic approach to health, and its applicability in many different fields. For instance, the Biopsychosocial Model was designed to act as a blueprint for research, for patient health diagnosis, for treatment and prevention health care efforts, and for teaching purposes (Engel, 1977). This model makes it possible to explain individual health experiences, alongside why some experience "illness" conditions in situations others merely regard as "problems of living" (Engel, 1977).

2. Strength-based Perspectives

The strengths-based approach to health arose during the 1980s in the social work field, stemming from a need to offer service providers ways of working that focus on strengths, abilities, and potential, rather than deficits, pathologies, and problems (Weick, 1992) (Weick, Rapp, Sullivan, & Kisthardt, 1989). The strength-based model of child health grew over subsequent years and is now used in many different fields, focusing on and recognizing positive aspects of children and their environments, such that protective factors to child health are identified and monitored across time (Strocchia-Rivera, 2009). Basic child, family, and community-based strengths are assessed, which represent the positive approach this model takes towards health. A strength-based perspective ascertains indicators on the basis of current child development theories, pulling from various sources when determining which aspects of a child and their environment provide them with balance and keep them moving on an appropriate developmental trajectory (Canadian Institute for Health Information, 2009) (Strocchia-Rivera, 2009) (Weick, 1992) (Weick, Rapp, Sullivan, & Kisthardt, 1989). There are seven key points to this model:

- People are recognized as having numerous strengths and have the ability to continue to grow, learn, and change;
- Intervention is to be focused on the aspirations and strengths of the people we work/spend time with;
- Resources stem from communities and social environments;
- Collaboration is essential between service providers and clients;
- Interventions are based on self-determination;
- There is a commitment to empowerment; and,

- Problems are viewed as a result of interactions *between* individuals, organizations or structures rather than deficits *within* these three entities.

While most theories look at deficit areas of child health and development, a strength-based model focuses on how to strengthen or enhance the fit between an individual and their environment (Strocchia-Rivera, 2009). Strength-based perspectives converge on lines of thinking related to developmental resilience, personal strengths, healing, and wellness (Saleebey, 1996), with its roots in the teleological theory of flourishing. Advantages of this framework include empowerment through focusing on the positive, whereas cons include the lack of focus on negative health-related indicators and the self-determination nature of the model.

3. Theory of Vulnerable Children

The theoretical framework of "well-being of vulnerable children - resiliency and protective factors" captures the portion of children who show adversity and resilience in spite of problematic or unhealthy environments (Sherrod, Garmezy, & Rutter, 1994). It is well known that children thrive in environments that include a well-rounded family environment, sufficient income, and opportunities to thrive and gain knowledge. However, research has shown that children raised in more adverse environments can also thrive (Alvord & Grados, 2005). Children raised with parents living with mental health issues, high crime communities, teen parents, and poverty have shown resilience. Initially, researchers were interested in what makes the children raised in vulnerable environments unaffected by these factors. Personality characteristics such as intelligence, optimism, and internal locus of control were all found to contribute to the resiliency of these children (Haggerty, 1996). However, researchers then began to discover that the contexts in which the children were raised greatly affected the resilience factor:

- adequate housing
- nutrition
- education
- parenting
- health care

Environmental factors and protective resources can defend children against the effects of adverse care, and push them away from mental, behavioural, and health problems (Luthar, 2003). Anything that is said to jeopardize a child's adaptive processes has the greatest effect on discontinuing healthy development (Masten & Obradović, 2006). For example, unhealthy attachment and traumatic experiences are factors that could compromise a child's adaptive process. In addition, factors that are said to promote or allow healthy child development are composed of a set of global factors:

- connections to competent and caring adults in both family and community
- cognitive and self-regulation skills
- positive views on oneself
- motivation
- opportunities

Mandleco (2000) summarizes an organizational framework for resilience in children and distinguishes between internal and external factors. Internal and external factors that are thought to affect resilience can be found in Table 2 (Mandleco, 2000).

Table 3. Factors that Affect Resilience (Mandleco, 2000)

Internal Factors that affect resilience		External Factors that affect resilience	
Biological	**Psychological**	**Within the family**	**Outside the family**
General health Genetic predisposition Temperature Gender	Cognitive capacity • Intelligence • Cognitive style Coping ability Personality characteristics • Intrapersonal • Interpersonal	Home environment Parenting Parents Siblings Grandparents	Adults Peers School Church Daycare/Preschools Youth programs Health care or social service organizations

4. Social structures and determinants of health

Many factors determine whether children are healthy: prenatal and perinatal factors, genetic and epigenetic histories, living conditions, family income, education and employment, diet, and many other environmental and personal factors. These health-influencing factors are often collectively referred to as the determinants of health.

The theory of social structure and determinants of health suggests that health outcomes can be predicted from public health, economics, and sociology. The research within this area focuses mainly on the problems that arise as a result of discrepancies in these domains in adult health and well-being (Victorino & Gauthier, 2009). Focusing this approach on child health and well-being is of great value because it acts as a means of predicting the future health of Northern BC children.

Research in this area focuses on adult view points in the household, instead of focusing on the child - for example, looking at adult tobacco use in a household instead of children's exposure to tobacco use (i.e. second hand smoke). Although it is important to focus on the "future adults" of our region, children's present experiences and health outcomes across a range of domains is vital. Health outcomes, disease patterns, preventive and therapeutic health practices, and data are all different when comparing children to adults (Rigby, Kohler, Blair, & Metchler, 2003). Monitoring the social factors of child health can provide additional information in regards to healthy child development; therefore it is essential for a combined approach to child health. Aboriginal children within Northern BC face social structure impacts as a result of the generational trauma from colonization. The outcomes of child health resulting from the cultural disruption can be seen through the Northern portion of the province. Table 4 shows a list of perspectives in which social determinants have future impacts.

Table 4. Determinants of Children's Health in Regards to Social Structure

Determinants of Health Perspective	Future Impacts	Sources
Economic	• Eventual employability • Contribution to work force	(Ben-Arieh, et al., 2001)
Health Across Lifespan	• Early years play vital role in socioeconomic health in adulthood	(Hertzman & Williams, 2009)
Systems Theory	• Effects of families, communities, culture, technology, and social policies on children's healthy development	(Li, McMurray, & Stanley, 2008)
Changes in Political Viewpoints, family environments,	• Aspects of change can create instability or fluctuations in income • Promote family unfriendly work (part time shift work), • Work structure, • Single parent household, • Tensions in marriage, • Grandparents as parents, • Challenge family resources	(Li, McMurray, & Stanley, 2008)
Culture and Technological Changes	• Advances in consumerism and individual self interest • Advertising and programing promote increased individual income • Unregulated access to internet leading children being vulnerable to violence, pornography, unhealthy food ads, chaotic environments • Aboriginal children in Northern BC, face cultural change impacts affecting their overall health • Generational trauma as a result of colonization and cultural disruption still impacting aboriginal children's health today	(Wang & Barnard, 2004) (Blackstock & Trocmé, 2005)

5. **National Collaborating Centre for Aboriginal Health - Web of Being (2009)**
6. **First Nations Health Authority - Perspective on Wellness (2015)**

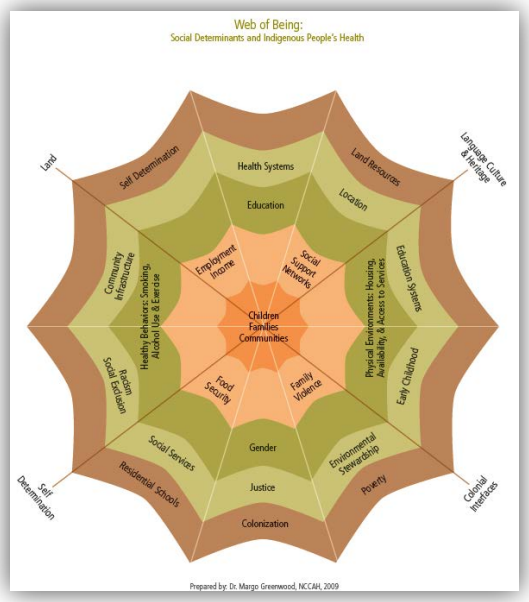


Figure 9. Web of Being http://www.nccah-ccnsa.ca/docs/1791_NCCAH_web_being.pdf (Greenwood M. , 2009)

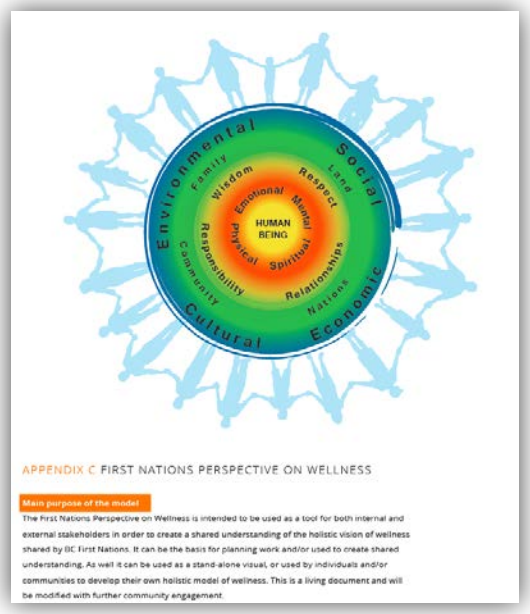


Figure 10. First Nations Perspective on Wellness

Indigenous people's well-being and health outcomes are determined by a number of factors that are similar to factors in previously mentioned frameworks. However, many other aspects should be considered in the determinants of indigenous people's health. This model demonstrates the breadth and complexity of interactions in life as depicted in the Web of Being. (Greenwood M. , 2009) Similar to the Web of Being, this holistic model seeks to encompass the breadth of influences on indigenous people's well-being. (First Nations Health Authority, 2015)

A Model for Child Health from Pediatrics and Child Psychology

Current scientific theory and evidence support investment in healthy childhood development.

With this goal in mind, interventions that strengthen the capacities of families and communities to protect young children from the disruptive effects of extreme stress are likely to promote healthier brain development and enhanced physical and mental well-being. To **derive an indicator framework** for child health in the Northern Health region, the above **definition for child health** was specifically prepared and a contemporary framework for child health was adapted from the 2012 AAP paper to **give structure to the report** (Shonkoff, et al., 2012).

Figure 11. Definition for Child Health:

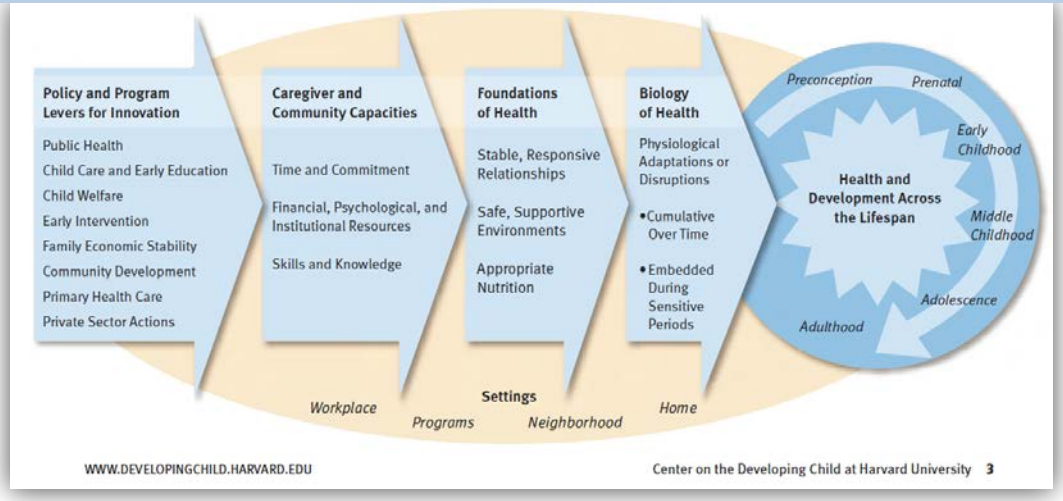
Child health and wellness can be defined as a state of physical, mental, intellectual, social, and emotional well-being and not merely the absence of disease or infirmity, focusing on both the immediate and future lives of children and families.

Healthy children live in families, environments, and communities that provide them with the opportunity to reach their fullest developmental potential, satisfy needs, and successfully interact with their biological, social, cultural and physical environments.

Selected indicators were identified by environmental scan, ranking, and consultation.

The theme for the indicator set was a life-course view of prenatal health through to age five (Appendix D – Indicator Summaries). Over 30 recent child health reports were reviewed and the most commonly reported indicators that were relevant to our demographic were identified (Appendix E – Technical). Further indicators were extracted from the child health indicator report (Office of the Provincial Health Officer & Canadian Institute for Health Information, 2013). Data sources were secured and the data was analyzed and interpreted.

Figure 12. A framework for Reconceptualizing Early Childhood Policies and Programs to Strengthen Lifelong Health [Adapted from (CENTER ON THE DEVELOPING CHILD AT HARVARD UNIVERSITY, 2010)]



The findings from the indicator analysis form the basis for this report, and inform the ecological, biological, and developmental dimensions of child health in Northern BC. The Framework for Re-conceptualizing Early Childhood Policies and Programs (Figure 12) emphasizes the layers of child health influences (Ecology, Biology, and Development),for policies, and programs in support of optimal child health and wellness. In the model, actions and outcomes are described:

- **Policy and Program Levers provide support.**
  - Policies and programs can support families, communities, workplaces, and institutions in their efforts for optimal child health. HEALTHY ECOLOGY.
- **Caregiver and Community capacity is utilized.**
  - Caregiver and community capacity requires time commitment, financial, social, psychological, and institutional resources, skills and knowledge to strengthen the foundations of child health. HEALTHY ECOLOGY.
- **Biology of Health and Development are maximized.**
  - The biology of health and development explains how environment and experiences "get under the skin" and interact with genetic predisposition. HEALTHY BIOLOGY.
- **Foundations of Healthy Development are provided.**
  - The foundations of healthy development include the three foundational areas: a stable and responsive environment of relationships, safe and supportive physical, chemical, and built environments, and sound and appropriate nutrition. HEALTHY DEVELOPMENT.
- **Health Outcomes and Lifelong Wellness are explored.**
  - The resultant health outcomes and lifelong wellness are continuously influenced by the interplay between the biology, environment, and experiences. HEALTHY DEVELOPMENT.

Table 5. The EcoBioDevelopmental Indicator Framework – Ecology Biology and Development as dimensions of child health

Dimensions	Child Health Domains and Aspects **Healthy Individuals in Healthy Families in Healthy Physical and Social Environments in Healthy Communities**	Northern Health Child Health Status Report **Prenatal and Child to Age 5 Indicator Set* What was measured (*Appendix D and E)** *Also think about: Additional aspects that matter but couldn't be measured in this report.*	Dimensions	Child Health Domains and Aspects **Healthy Individuals in Healthy Families in Healthy Physical and Social Environments in Healthy Communities**	Northern Health Child Health Status Report **Prenatal and Child to Age 5 Indicator Set* What was measured (*Appendix D and E)** *Also think about: Additional aspects that matter but couldn't be measured in this report.*
ECOLOGICAL	**Healthy Families** - food security and other basic needs - income and socioeconomic status - attachment and bonding - parenting and interpersonal skills - family support and expectations - family violence - culture and tradition - wisdom and respect	**23. Low Income families** **24. Single Parent Families** *Also think about:* *Family connectedness* *Parenting skill building* *Time and commitment* *Parental or Adult support* *Food security and income security* *Safety in the home* *Culture and tradition in the home* *Intergenerational connectedness* *Wisdom and respect.*	BIOLOGICAL	**Healthy Individuals** **Biological** - Genetic predisposition and vulnerability - Immune function and environmental influences - Neurochemistry, stress and resilience - Medication effects, physiology and pharmacogenomics	**2. Smoking in pregnancy** **3. Binge drinking in females 15-44** **4. High BMI Pregnancy** **5. Low BMI Pregnancy** **6. Mental Health concerns in pregnancy** **8. Breastfeeding at birth** **10. Low Birth weight** **11. High Birth weight** *Also think about: Triggers for genetic predispositions and vulnerabilities; Rates of congenital or acquired disabilities; Rates of stress and adverse experiences; Environmental influences on health*
	Healthy Physical Environments - relationships with land and the environment - access to outdoors, green space, nature - environmental stewardship and sustainability - housing and built environments - active transportation - healthy and safe natural and built environments	*Also think about:* *Water Quality and Watersheds* *Air Quality and Air sheds* *Green and Blue Space Access* *Healthy Built Rural Communities* *Adequate housing* *Outdoor time for 0-5 year-olds* *Cultural teachings about the land* *Connectedness to the land* *Ecological Determinants of Health*	HEALTH AND DEVELOPMENTAL	**Healthy Individuals** **Physical health** - Physical wellness and disease across the lifespan - Health behaviours, including tobacco, diet, activity - Gender and health	**12. Immunizations** **13. Vaccine Preventable diseases** **14. Leading cause of Hospitalizations** **15. Dental caries rates** **16. Dental surgeries** **19. Childhood injuries** **20. Reported Child abuse rates** **21. Children in care and protection** *Also think about: Rates of self-reported health; Rates of chronic disease in children; Rates of congenital or acquired disabilities; Rates of fruits and vegetable consumption; Rates of physical activity for under 5; Exposure to second hand smoke in the home*
	Healthy Social Environments - healthy relationships in the family, community and school - peers, family, connections to caring adults - gender, race, body shape discrimination - social justice, equity and services for those that need them, when they need them - cultural safety - colonization and colonial interfaces - social support networks	**9. Infant Mortality Rate** *Also think about:* *Life expectancy* *Peer connectedness* *Supportive adult to confide in* *Discrimination by gender, race or other* *Colonization and decolonizing actions* *Comprehensive equity indicators* *Racial and systemic discrimination* *Social connectedness and social capital* *Culture and diversity* *Involvement in Arts, Sports or Music*		**Mental, intellectual, cognitive health** - Education and literacy - Memory and learning - Cognitive capacity, intelligence and style - Education systems, mental wellness - Commitment to learning	**6. Perinatal mental health conditions** *Also think about: Self-reported rates of mental wellness; High school completion for teen moms; Accessible high school for teen parents; Early childhood interactions - reading; Early childhood interactions - talking*
	Healthy Communities - safe schools and communities - accessible services and community infrastructure - the history of 33residential schools and relationships with education systems - community cohesiveness, belonging and inclusiveness - opportunities and poverty - location and geography - transportation and social connectedness	**1. Prenatal registry and place of birth** **18. Hearing screening** **22. Licensed Childcare Spaces** *Also think about:* *School safety and Community safety* *Healthy Public Policy* *Impacts of residential school system on community* *Reconciliation* *Unemployment rates* *Poverty rates and homelessness* *Crime rates* *Civic participation* *Community connectedness* *Recreational, educational and other civic infrastructure* *Accessible transportation and* *Access to health and social services*		**Social emotional health** - Attitudes, beliefs, past trauma, bullying - Personality, behaviours, emotions, early childhood impacts - Coping skills and health behaviours - Physical, emotional, spiritual health, cultural safety and humility, racism and discrimination, exclusion and connectedness - Language, culture and heritage - Self-concept, self-control, prosocial behaviours, positive views of oneself - Empowerment, responsibility, motivation, grit, value, worth and purpose	**7. Teen birth rates** **17. EDI measures** *Also think about: Healthy Early Childhood Development; Rates of discrimination and bullying; Childhood attachment and nurturing relationships; Social Connectedness and Belonging; Empathy and Emotional Intelligence; Prosocial behaviour; Community volunteerism; Enterprise and Social capital; Conflict Resolution*

The broad and comprehensive view of factors, or aspects, that impact child health provided by the indicator framework encompasses theories from public health, child psychology, and developmental literature that include:

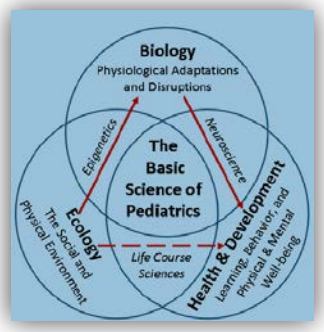
- Biopsychosocial influences
- Strengths-based approaches
- Theory of vulnerable children
- Social structures and determinants of health
- First Nations and Aboriginal perspectives on well-being

With the current scientific understanding and the balance of the literature weighing in favour of investing in children, a majority of medical organizations have advocated for a greater focus on children. To that end, the full evidentiary accounting and validation of the derived framework and indicators is beyond the scope of this review. The basis of the ecologic-neuro-bio-developmental trajectory from conception to infants to adults and the discrete effects and pathways of all influences, genetic, environmental, behavioural, developmental on the health outcomes supported in this review is consistent with the current state of the literature. This is supported by this brief listing of organizations that have weighed in recently on the importance of investing time and attention in child health:

- Human Early Learning Partnership BC (Kershaw, Anderson, Warburton, & Hertzman, 2009)
- Public Health Agency of Canada – Social Determinants of Health
    - Key Determinant – Early Childhood Development - Underlying Premise and Evidence (Public Health Agency of Canada, 2013)
- Royal College of Physicians and Surgeons of Canada , AND
    - Early Childhood Development (Royal College of Physician and Surgeons of Canada, 2014)
- Canadian Medical Association – Policy Papers on Early Childhood Development and Health Equity
    - (Canadian Medical Association, 2014), (Canadian Medical Association, 2013)
        - Childcare policy, improved resources in communities
        - Increased coordination and funding to child health programs
        - Home visiting and supports for vulnerable families, 18 month enhanced visit
        - Promote early literacy, implement better measures and data on child health
        - Improved integration of social determinants of health into medical education and practice
- American Academy of Pediatrics
    - The Lifelong Effects of Early Childhood Adversity and Toxic Stress (Shonkoff, et al., 2012)
        - Compelling evidence to support epigenetic effects, linkages between early childhood adversity and adulthood health outcomes
        - Stress can be positive, tolerable, or toxic stress. Significant toxic stress in childhood can be viewed as a risk factor for both disease in adulthood and for health threatening behaviours
    - Early Brain and Child Development (American Academy of Pediatrics, 2015)
- Canadian Pediatric Society
    - First Years First - (Canadian Paediatric Society, 2015)
    - Measuring in support of early child development - (Hertzman, Clinton, Lynk, Canadian Paediatric Society, & Early Years Task Force, 2011)

The composite framework (Table 5.) aligned along the **Ecological, Biological, and Developmental** dimensions provides a global view of children in their community and a number of aspects that can provide information on how children, families, and communities are doing. Unfortunately, many of these aspects are not easily measured and reported on, and are often taken for granted by many. For every aspect we could measure, there were several other aspects that we could not. Nevertheless, these aspects are important to consider for children and families in communities, and we should continue to think and talk about them. It is noteworthy that some of these aspects have been measured in other recent provincial reports and complement the information reported here. For ease of reporting, the measured indicators were aligned with dimensions of the framework, yet it was recognized that indicators may align with multiple dimensions.

The Ecology of Child Health



This report considers the ecology of pregnant women and children to five years of age in Northern communities, in support of the strategic priority of Healthy People in Healthy Communities. Community contexts are vital to ensuring healthy children, and it is vital for communities to understand the importance of healthy environments for the health of the population.

There are many contexts within an individual child's experience that include their own individual ecology, and that of their family and peer network, their school, the society and culture, and the community, and they all present different opportunities and challenges, protective and risk factors.

To make significant change, education and awareness materials are commonly used; demonstrating performance through measurement and data is another effective tool, while encouragement, advocacy, and influence are also useful. Arguably, one of the most important avenues to improvement is through policy and legislation levers. Opportunities to improve the health of children in communities should be considered through any or all of these means.

Partnerships, shared values and goals are also important in making gains. The ecology of child health is well beyond the scope of health systems and acute care. But the cost of inattention to the ecology and development of child health are felt in all sectors including health, education, justice, and social services for generations.

A. Healthy Families

What we measured:

Low Income Families – Northern BC has rates of children living in low income families on par with the province, at some of the highest rates in Canada. Across most of Northern BC, one in five children are living in low income families. In the Northeast, one in eight children live in low income families.

Single Parent Families - Northern single parent families range from one in five to one in seven. The majority of lone parent families are single-female parent families. The provincial rate of single parent families is similar.

Figure 13. Healthy Families:

- food security and other basic needs
- income and socioeconomic status
- attachment and bonding
- parenting and interpersonal skills
- family support and expectations
- family violence
- culture and tradition
- wisdom and respect

What matters?

Meeting Basic Needs

For most residents of the North, the home and family are the providers of many basic needs - physical, emotional, and social. Whether considering the Ottawa Charter for Health Promotion's prerequisites for health or Maslow's Hierarchy of Needs, the basics are the essentially the same.

- Peace, shelter, education, food, income, a stable eco-system, sustainable resources, and social justice and equity are fundamental to the health of an individual, their family and community wherein is found a sense of belonging and kinship. (See Figure 13.)
- In BC, one of every two single parent families lives in low income situations (FirstCall BC, 2015).
- Children raised in poverty are more likely to have negative outcomes in health, education, cognitive, social and emotional development, and negative adult socioeconomic outcomes (Moore, Redd, Burkhauser, Mbwana, & Collins, 2009).

Interpersonal Relationships and Belonging

Family functioning is an important and complex contributor to healthy children and healthy communities. In the presence of loving and supportive relationships, children flourish.

- Some families function as single parent families when working away from home leaving one parent at home. The impact of functional single parent families is significant to Northern families and is not well understood. The use of single parent families as an indicator is a measure of vulnerability for families in this report.
- Parents must have the competence and commitment to be the gentle guiding parent the child needs through supports, education, coaching, and knowledge sharing.
- Interpersonal relationships, physical, spiritual, emotional, and financial require appropriate insight, training and skills to ensure that each interaction is successful and productive.
- Children need the confidence, and protection of trusted adults (McCreary Centre Society, 2015). Children and youth who have one or more caring adults in their lives are more likely to thrive and become productive adults (Murphey, Bandy, Schmitz, & Moore, 2013). Children and youth who find themselves in difficult circumstances are more likely to have positive outcomes if they have a close bond with at least one adult (Figure 14.) (Mitchell F. , 2011).

Figure 14. SUPPORTIVE ADULTS IN YOUR LIFE:
http://www.mcs.bc.ca/pdf/Talking_about_youth_health.pdf
How to be a supportive adult to someone…

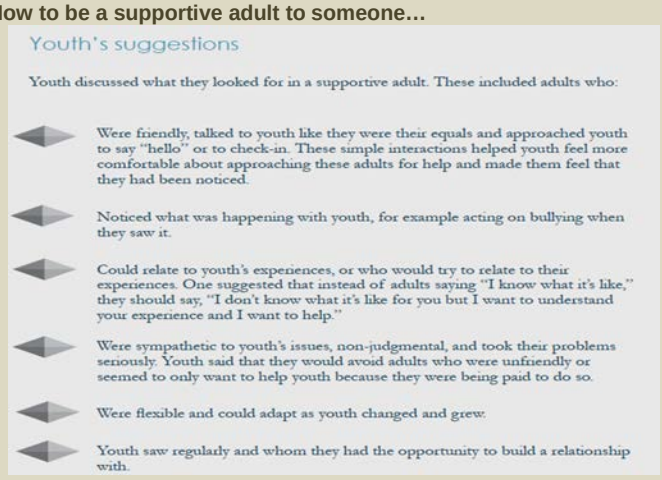


Figure 16. Supportive adults

- Through respect, wisdom, tradition, and intergenerational connectedness healthy intergenerational relationships are built, and the maintenance of culture and language is ensured. Tradition happens in the home and community and fosters connectedness, empathy, respect and pro-social behaviours.
- Research has found that family interactions characterized by a set of negative qualities (unsupportive, neglectful, cold relationships, anger, conflict, etc.) contribute to a child having difficulties developing social competence (Repetti, Taylor, & Seeman, 2002).
- Parental substance use is associated with a host of negative consequences to children and families (Office of the Provincial Health Officer; Canadian Institute of Health Information, 2011, p. 129).

FIGURE 15. SCREENING IN PRIMARY CARE
Basic Needs Screening in Primary Care:

Screening questions by topic (HOME):	
Harm	*Is your home in need of major repairs?*
Occupancy	*How many people live in your home, in how many rooms?*
Moves	*How many times has your child or youth moved? Have you used a shelter or informal, temporary housing such as staying with friends or family?*
Enough/Income	*Do you have enough money for housing, food and utilities?*

Adapted from reference 39

B. Healthy Physical Environment

What matters?

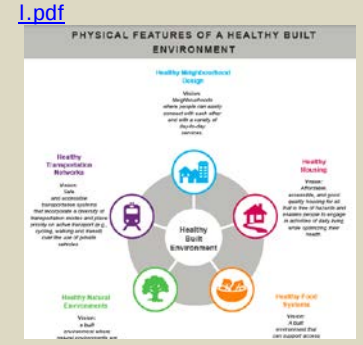
Healthy physical environments, both natural and built, are important for health (Jennings, Larson, & LR, 2015). The **natural environment** in Northern BC is vast and impressive. The natural environment is the source of natural resource economic development and supports the ongoing success of the province economically. The natural environment provides the ecological determinants of health, including breathable air, drinkable water, and appropriate and safe food sources (Canadian Public Health Association, 2015).

Figure 16. Healthy Physical Environments

- relationships with land and the environment
- access to outdoors, green space, nature
- environmental stewardship and sustainability
- housing and built environments
- active transportation
- healthy and safe natural and built environments
- air and water quality and the ecological determinants of health

- **Air quality** is a concern in many major centres in Northern BC, where it is often impacted by vehicle emissions, wood burning, and other emission sources, including industries (BC Air Quality, 2015).
- **Water quality** is an ongoing concern to many communities. Safe and sustainable water sources are to be protected.
- **Food security** and access to safe and affordable nutrition, including healthy fruits and vegetables grown close to home, is an important factor. Agriculture and small scale community gardens are sources for both nutrition and social connectedness.
- **Healthy outdoor activity** is close at hand in Northern BC, and should be encouraged.
    - In a review of neighbourhood safety on children's physical activity levels, Carver, Timperio, and Crawford (2008) found that the reason parents most often restrict their children's outdoor activity is their fear of 'stranger danger' and road safety (Office of the Provincial Health Officer; Canadian Institute of Health Information, 2011, p. 157) (Carver, Timperio, & Crawford, 2008).
    - Active outdoor play is important to health across the lifespan (Tremblay, et al., Position Statement on Active Outdoor Play, 2015).
    - Off-road vehicle safety is an important consideration in Northern communities.
- **Stewardship,** connectedness to the land, and traditional ecological knowledge are important in ensuring a sustainable future of healthy physical environments for future generations.

Figure 17. Healthy Built Environment
http://www.phsa.ca/Documents/linkagestoolkitrevisedoct16_2014_full.pdf



The **built environments of rural communities** have distinct challenges related to capital and infrastructure and remain important determinants of health (Provincial Health Services Authority, 2014).

- Building safer roadways to encourage more mixed mode and active transportation where possible.
    - Pedestrian safety interventions introduced in the Netherlands such as speed humps, added vegetation, reduced vehicle speed, and restricted parking has shown to lower child pedestrian injury rates and increase outdoor physical activity (Tremblay, et al., Position Statement on Active Outdoor Play, 2015).
- Housing that is both affordable and accessible is a necessity for everyone. Yet the Canadian Pediatric Society recently reported on housing need in Canada, a problem that continues to challenge many communities (Waterston, Grueger, Samson, Canadian Paediatric Society, & Community Paediatrics Committee, 2015).

C. Healthy Social Environments

What we measured:

Infant Mortality Rate – Northern Health has a higher infant mortality rate at 4.6-4.8 infant deaths per 1,000 live births (about 20% higher than provincial rate of 4.2). The peer group comparator for Northern BC is higher with more than 6 infant deaths per 1,000 live births.

Figure 18. Healthy Social Environments

- healthy relationships in the family, community and school
- peers, family, connections to caring adults
- gender, race, body shape discrimination
- social justice, equity and services for those that need them, when they need them
- cultural sensitivity
- colonization and colonial interfaces
- social support networks

What matters?

Healthy social environments are found in families, groups, and communities where feelings of social connectedness are prominent. People feel valued and value others; they build relationships based on mutual respect. As a result, they experience **health equity.**

- Individual differences and experiences are valued and respected.
- Cultural safety and cultural humility are promoted.
- Social support networks are available and with ongoing supportive peer connectedness.
- Communities systematically and comprehensively address discrimination and promote healthy relationships between all peoples in the North.

Figure 19. Health Equity

The World Health Organization defines Health Equity as "the absence of unfair and avoidable or remediable differences in health interventions and outcomes among groups of people that are unfair". This means that "all people can reach their full health potential and should not be disadvantaged from attaining it because of their race, ethnicity, religion, gender, age, social class, socioeconomic status or other socially determined circumstance." Health equity also means that we must pay attention to the context of people's lives and how that context can impact, positively or negatively, their capacity to achieve optimum health. For example, in Canada, life expectancy rates vary greatly at the health region level from a low of 71 years to a high of 85 years. These rates can be explained by context. Health regions with lower life expectancy have higher levels of long term unemployment, rural and remote locations, larger populations of Aboriginal peoples and lower educational attainment rates. These differences can also be observed at neighbourhood levels, with some people living decades longer than others. Equity ensures that everyone has the means to achieve their potential.

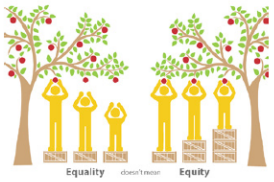


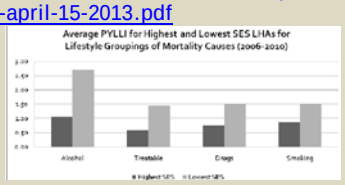
Image source: https://publichealthatpenn.files.wordpress.com/2015/03/picture.png

Health inequities for individuals and communities often arise when there is an unhealthy social environment. Income inequality, imbalances in power relationships, discrimination, marginalization, and the generational impacts of trauma are prominent.

- Health equity indicators are important to consider when planning for health services.
  - Infant mortality rate, life expectancy, premature mortality rate, rates of tobacco use, physical activity, nutrition, rates of mental health concerns are all measures that relate to equity.
- Infant mortality rates for First Nations populations are significantly higher than non-First Nations populations (Smylie, 2011).
- Northern Health reports a persistently lower life expectancy than others in the province (The Health Officers Council of BC, 2013).
- For Local Health Areas that report low socioeconomic status, the potential years of life lost (PYLLI) related to alcohol can be up to 2.5 times higher than higher socioeconomic status Local Health Areas (The Health Officers Council of BC, 2013).
  - PYLLIs related to treatable causes, smoking, or drugs were 50% higher.
  - Inequities carry a high price and have persisted over time.

Figure 20. Potential Years of Life Lost

https://healthofficerscouncil.files.wordpress.com/2012/12/health-inequities-in-bc-april-15-2013.pdf



Communities that haven't addressed inequities may suffer ongoing conflict, mistrust, and impact to health outcomes. Health equity matters to everyone.

- The BC Health Officer's Council reported on the persistent association between areas of low socioeconomic status and lowered life expectancy (The Health Officers Council of BC, 2013).

- Additionally, the more unequal a society, including income inequity, the lower the life expectancy of the population (Institute for Policy Studies, 2015).

Health inequities have a substantial impact on society, particularly on the health system. The Canadian Institute of Health Information analysis revealed that reducing income-related health inequities could represent considerable health system savings (Canadian Institute for Health Information, 2015).

- Social justice and outreach, including equity-based services, matter to people who cannot access services and to the health of the population as a whole.

D. Healthy Communities

What we measured:

Prenatal registry and place of birth –

Northern Health implemented a prenatal registry system in 2012 to connect women early in their pregnancy with public health. This has been a very successful program in areas where we have been able to integrate public health nursing with a primary care team. Some communities are registering 100% of their pregnancies and the review shows nearly 50% registration of all pregnancies in 2014/15.

It is anticipated to reach 75% registration and beyond as implementation of teams continues. Additionally, a review of community of birth and community of residence reveals that women in more remote communities are least likely to deliver in their home communities.

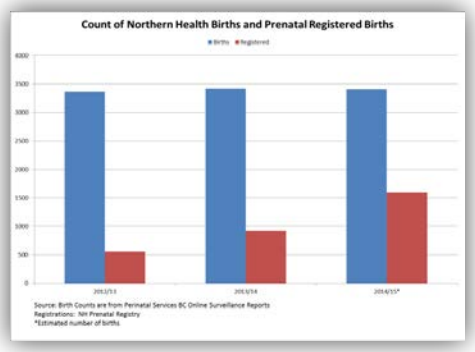
Figure 21. Healthy Communities

- healthy relationships in the family, community and school
- accessible services and community infrastructure - safe schools and communities
- the history of residential schools and relationships with education systems
- community cohesiveness, belonging and inclusiveness
- opportunities and poverty
- location and geography
- transportation and social connectedness

Hearing screening –

Northern Health screened 89% of the newborns for hearing, slightly below the mark of 90% set by PHSA and a considerably lower than the provincial 97% average. Geographic challenges are a factor in delivering a comprehensive screening program.

Figure 22. Births and Prenatal Registered Births



Licensed Childcare Spaces –

Northern Health Licensing Officers license over 7,000 child care spaces within more than 400 child care facilities across Northern Health. Of these childcare spaces, the vast majority are considered low risk. Unlicensed childcare facilities are not tracked by Northern Health.

What matters?

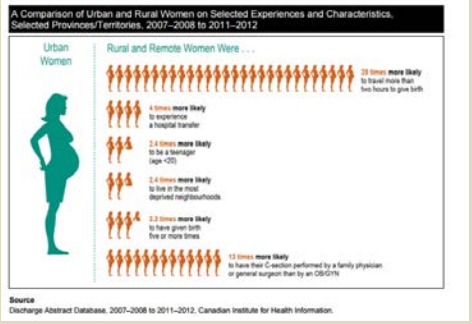
For many people community means a physical place with infrastructure, but a healthy community is so much more than that. BC Healthy Communities supports community development across BC.

> *Healthy lifestyles. A vibrant economy. Affordable housing. Protected parks & green space. Accessible community services. Thriving neighbourhoods. Clean air and water. A sustainable environment. Ethnic and cultural diversity. Healthy public policy. Engaged citizens. A healthy community is all of this, and more.* (BC Healthy Communities)

Health services are an integral part of a community. Integrated primary care services will position interprofessional teams to support primary care homes in communities that will provide appropriate levels of services close to home (Appendix F – Northern Health Services).

- Access to primary care services was found to be a protective factor for adverse experiences in childhood (Balistreri, 2015).
- Wraparound services for prenatal care are sure to improve the health outcomes, and hopefully improvements in the infant mortality rate; we work toward full implementation of prenatal registration.
- Hearing, vision, and dental screenings occur across Northern BC in a number of different manners and mechanisms. Standardized and improved access to screening, and to better understand access to visual screening in other contexts, such as optometrist clinics would be beneficial.

Figure 23. Hospital Births in Canada: Women Living in Rural and Remote Areas
https://www.cihi.ca/en/birth2013_summary_en.pdf



- For communities in which women must travel to deliver their babies, structured processes can support the family with their needs and expectations, to welcome them safely back with their baby (Canadian Institute for Health Information, 2013). Innovative obstetrical policies and programs are encouraged to meet service needs and are scrutinized for safety in the specific community context.

Community infrastructure around families to support development, personally and professionally

- Training and education and employment opportunities.
  - Consider unemployment and educational achievement rates.
- Safe and appropriate childcare spaces.
  - There is no objective data measure to determine if supply is meeting need currently.
- Income and social security for the family.
- Access to social support program when required.
- Parenting support groups, other networking opportunities to build social support networks.
- Recreational and leisure opportunities need to be adequate for the population that is served.
- Transportation infrastructure should support citizens to move freely between communities without undue financial or physical compromise.

Community connectedness, belonging, and safety are characteristics of healthy communities

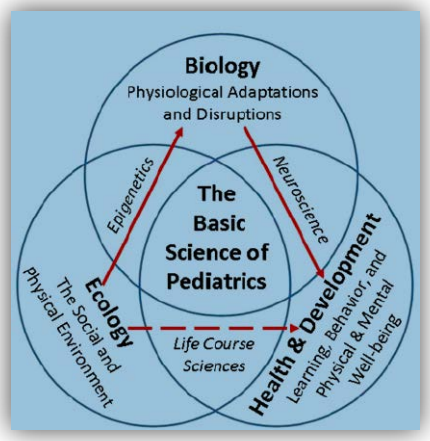
- Address homelessness, lack of opportunity, transportation, and other realities of living in rural communities with limited social supports and services. High levels of transient and shadow populations can challenge communities to remain connected and engaged.
- Safety in communities and safety in schools.
  - Including virtual and cyber-bullying
- Community identity and connection. Empowerment and ownership. Engagement and employment.

The legacy of residential schools continues today in the form of health disparities experienced firsthand by First Nations and Aboriginal Peoples.

- The release of the Truth and Reconciliation report on December 15, 2015 highlights important next steps toward efforts of reconciliation that will improve relationships in our communities and benefit everyone.

The Biology of Child Health

A society that is invested in its human capital, in the children, will realize benefits. The construction of sturdy brain architecture and the achievement of learning capacities results from nurturing during development. These successes are built upon a foundation of positive early experiences. Recent advances in neuroscience, molecular biology, and genomics have converged on three compelling conclusions (Shonkoff, et al., 2012):



- Early experiences are built into our bodies – "*they get under our skin*";
- Significant adversity can produce physiologic disruptions, or biologic memories that undermine the development of the body's stress response systems, and affect the developing brain; cardiovascular system, immune system, and metabolic regulatory controls; and,
- These physiologic disruptions can persist far into adulthood and lead to lifelong impairments in both physical and mental health.

This presents a new way to think about the underlying biological mechanisms that explain this robust link between early life adversities (i.e., the new morbidities of childhood) and important adult outcomes (Shonkoff, et al., 2012).

- The innovation of this approach lies in its mobilization of dramatic scientific advances in the service of rethinking basic notions of health promotion and disease prevention within a fully integrated, life span perspective from conception to old age.
- In this context, significant stress in the lives of young children is viewed as a risk factor for the genesis of health-threatening behaviours as well as a catalyst for physiologic responses that can lay the groundwork for chronic, stress-related diseases later in life. This suggests that many adult diseases are, in fact, developmental disorders that begin early in life.
- Toxic stress and other adverse experiences can impact learning, behaviour, and health and effective early childhood interventions are critical to prevent undesirable outcomes.

A. Healthy Individuals - Biology

What we measured:

Smoking in Pregnancy – Rates of perinatal smoking are significantly higher in Northern BC than in other areas in the province. One in seven pregnant women smoke during their pregnancy, which is double the provincial rate of 1 in 14 women who smoke in pregnancy. Aboriginal populations are disproportionately impacted by prenatal tobacco use.

Figure 24. Healthy Individuals

Biological

- Genetic predisposition and vulnerability
- Immune function and environmental influences
- Neurochemistry, stress and resilience
- Medication effects, physiology and pharmacogenomics
- Exposures and experiences

Alcohol use reported in pregnancy – Northern Health collects data on prenatal interviews and the data is self-reported from prenatal clients during their visit. Over the past years, despite pitfalls in the databases themselves and the issues with self-reported alcohol usage patterns, Northern Health is consistently higher, with 5 in 100 women reporting they consumed alcohol in pregnancy,
five times more than provincial rates (1%).

High BMI and Low BMI Pregnancy – Women in rural regions have higher rates of overweight and obesity than the provincial average. Northern Health has higher rates of pregnancies with High BMI (50%), twice as high as provincial rates (25%). Low BMI pregnancies are a concern in certain areas in Northern Health.

Breastfeeding at birth – At discharge from hospital, 7 out of 10 babies are breastfeeding exclusively. Rates of initiation for Aboriginal mothers are comparable to non-Aboriginal mothers. On average in Canada, at six months of age, only 1 in 4 babies is still breastfeeding exclusively, this is lower than the BC provincial average of 4 out of 10 babies who breastfed exclusively to six months of age.

Low birth weight – Northern Health has lower rates (5 per 1,000 births) of low birth weight infants when compared to the province (just under 6 per 1,000) and comparison peer groups (just above 5 per 1,000 births).

High birth weight – Northern Health has significantly more high birth weight babies. The provincial trend of 12 per 1,000 births has been on a downward trend. In the North, the rates appear to be stable and persistently exceeding the provincial trend by 25%, with 15 of 100 newborns being of high birth weight.

What matters?

The new scientific basis urges us to confront the challenging issues around the lifelong consequences of childhood adversity, extreme stress, and other environmental influences.
Healthy and nurturing pregnancies and childhood are the foundation to lifelong health (Center on the Developing Child at Harvard University, 2010).

- Healthy pregnancies are free of exposures to any toxins including alcohol, tobacco, and recreational drugs. A healthy pregnancy also requires adequate nutrition, and social, emotional and financial supports.
    - Significant numbers of families are likely exposed to unnecessary risk, and toxic stress, as rural rates of tobacco and alcohol exposure are so much higher than other regions in the province.
    - High and low body weight in pregnancy can complicate the pregnancy; maintaining a healthy body weight throughout the lifespan is important to decrease chronic disease.
- Breastfeeding provides the best start for an infant, with important immunologic benefits as well as the nutritive components. Yet across Canada, only 1 in 4 babies is exclusively breastfed until 6 months.

Cumulative exposures to adverse experiences matter. Biologic embedding happens during sensitive periods of development. Genetic predisposition and vulnerability are not well understood.

- The triggers are not known for genetic impacts, including extrinsic exposures and intrinsic factors such as stress and neuro-biochemistry. It is not known if there is a threshold.
- Physiologic adaptations and disruptions happen with early experiences in early development.
- The physiologic consequences of social and economic disadvantage are carried disproportionately by those who already carry epigenetic messages from across the generations.
- Genetic technology and research is evolving very rapidly. Personalized approaches to pharmacology and oncology are available.

Trauma in childhood, disordered attachment, and other experiences can lead to maladaptive personal behaviours including substance use disorders and relationship challenges. Trauma and adversity should be considered in all clinical presentations across the lifespan. The true prevalence of a history of childhood adversity is not known. Trauma has been associated with:

- Mental health and substance use disorders
- Chronic Disease
- Communicable Diseases

Congenital anomaly surveillance was historically a function of the Health Status Registry. Further work to ensure that a comprehensive approach to surveillance is underway within the region and within the province.

- Fetal alcohol exposure and fetal alcohol effects are a concern for many in Northern BC. (Figure 27.)
- 9 births per 1,000 are estimated to have fetal alcohol spectrum disorder (FASD) and 3.5 per 1,000 to have fetal alcohol syndrome (FAS) (BC Health Authorities and BC Ministry of Healthy Living and Sport, 2009).
- The economic impacts, direct and indirect, from Fetal Alcohol Syndrome Disorder (FASD) are significant (Popova, Lange, Burd, & Rehm, 2015).
- Substance use issues are prominent in Northern BC.
- Youth with FASD need supports to be successful. A disproportionate number of people in the corrections system are living with FASD (Peled, Smith, & McCreary Centre Society, 2014).
- Many hypotheses exist regarding autism rates, diagnosis, and causes. Data is limited and beyond the scope of this review.
- A full review of congenital or other disorders is beyond the scope of this review.

Figure 25. Fetal Alcohol Spectrum Disorder

Research has consistently shown the brain is the organ most sensitive to pre-natal drinking, and can be affected at any point during pregnancy (Malin, 2002)

https://www.youtube.com/watch?v=x9cvEa5qFQc&feature=youtu.be

During childhood, pre-natal alcohol exposure becomes apparent through behavioral disruptions, attention problems, and speech and language difficulties (Green et al., 2009; Streissguth et al., 2004; Church & Kaltenbach, 1997). Most often, the cognitive effects of pre-natal alcohol exposure do not come apparent until the child is of school age (Streissguth, 1997).

The effect of prenatal alcohol exposure manifests in different ways across the lifespan. Alcohol exposure may result in psychosocial problems such as learning disabilities, attention deficit disorder, mental retardation, and disruptive behavior (Burd et al., 2003; O'Conner et al., 2006; O'Leary, 2004).

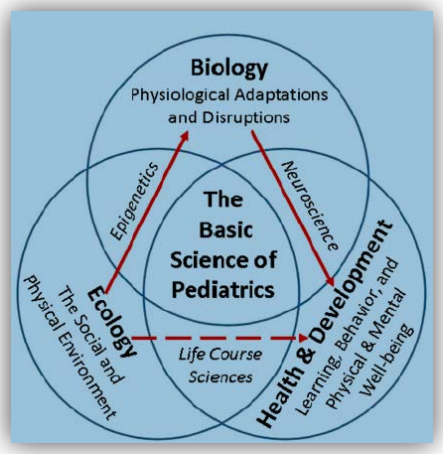
Children with FASD age's 0-5 face adverse environmental circumstances including placement in foster care. BC data on foster care placement for children with FASD is extremely limited; however researchers in Washington state found that the prevalence of children with FASD in foster care is 10-15/1000, or 10 to 15 times greater than the general population (Astley, Stachowiak, Clarren, & Clausen, 2002).

Being in foster care may place children with FASD at a greater risk for behavioural and psychological issue because of trauma caused by removal from their home and adverse environments.

(Streissguth A. , 1997) (Church, 1997) (Green, et al., 2009) (Streissguth A. P., 2004) (Burd, Martsolf, Klug, & Kerbeshia 2003) (O'Connor, et al., 2006) (O'Leary, et al., 2010) (Astley, Stachowiak, Clarren, & Clausen, 2002)

Health and Development

The foundations of healthy development refer to three domains that establish a context within which the early roots of physical and mental well-being are nourished.
These include:



1. A stable and responsive environment of relationships, which provides young children with consistent, nurturing, and protective interactions with adults to enhance their learning and help them develop adaptive capacities that promote well-regulated stress-response systems, including:
   - Secure attachment
   - Effective self-regulation and sleep cycles
   - Healthy stress response systems
   - Immunologic responsiveness
   - Learned health-promoting behaviours
2. Safe and supportive physical, chemical, and built environments, which provide physical and emotional spaces that are free from toxins and fear, allow active exploration without significant risk of harm, and offer support for families raising young children, including:
   - Environments free of chemical exposures
   - Physical and built environments that are safe and health promoting
3. Sound and appropriate nutrition, which includes health-promoting food intake and eating habits, beginning with the future mother's preconception nutritional status. Adequate, safe, and accessible nutrition to support growth and development is a key to success.

Complex interactions between genes, environment, and experiences lead to adaptations or negative disruptions in basic biological systems, with lifelong consequences for both physical and mental health. There is much that society can do to ensure children's environments provide the conditions that their biological systems need to produce positive health outcomes.

A. Healthy Individuals – Physical Health

What we measured:

Immunizations – Northern BC coverage rates for two year old immunizations are among the highest rates in the province. The rates may have trended slightly downward over the past few years, however, the trend is not clear, nor are the causes.

Figure 26. Healthy Individuals

Physical Health

- Physical wellness and disease across the lifespan
- Health behaviours, including tobacco, diet, activity
- Gender and health
- Disabilities

Vaccine preventable diseases – Northern BC reports sporadic communicable disease cases that are imported. Ongoing transmission of pertussis in the community, together with inadequate vaccination coverage rates, and imperfect vaccines assures us that pertussis will be circulating in the communities for the foreseeable future. Protection of the most vulnerable, specifically infants under one year, is of particular importance during clusters and outbreaks.

Leading cause of hospitalizations – Infants and children to age five are most commonly hospitalized related to respiratory and viral/unspecified pneumonias, newborn jaundice and other newborn concerns, and seizures, not related to epilepsy. No ranking for severity of presentations was available. For the province of BC, 45 of 1,000 0-4 year olds were hospitalized annually, compared to 70 of 1,000 0-4 year olds in Northern BC, 50% more than the provincial rate.

Dental caries rates – One in five children screened at Kindergarten in Northern Health have visible dental caries, a concerning number when compared with the one in seven BC children that have visible caries.

Dental surgeries – The Northern Health rates of Early Childhood Caries that require dental surgery in a day surgery setting is significant. The provincial rate of almost 14 surgeries per 1,000 1-5 year olds is exceeded by children in Northern BC persistently. The highest rate is in the Northwest where over 40 children 0-4 undergo dental surgery, three times the provincial rate. The Peer Group Comparison for the Northwest reports similar rates of near 50 surgeries per 1,000 1-5 year olds.

Childhood injury hospitalizations – Injury mortality rates, primarily transport related deaths, in Northern BC are among some of the highest rates in the province, and while the provincial rates are declining, Northern BC rates are not decreasing. The primary causes for unintentional injury hospitalization include falls, drowning, burns, and being struck by an object. The Northwest HSDA has the highest rates of injury hospitalizations at 104 hospitalizations for every 100,000 children 0-19, more than 50% higher than the BC rate of 65 hospitalizations.

Reported child abuse rates – Northern BC has the highest incidence rates of physical and sexual abuse, as much as twice the provincial rate in some areas, is reported in The McCreary Adolescent Health Survey Results, and the Raven's Children IV report. These reports highlight the high rates of reported physical and sexual abuse by youth in Northern BC. Small populations are very challenging to report on, and variability in rates year to year must be interpreted carefully, but more information is needed and attention is warranted.

Children in care and protection – Like other more rural and remote areas in BC and other provinces, such as Interior BC and Vancouver Island, Northern BC reports higher rates of children in care, double the rates seen in other parts of the province.

What matters?

Physical health and wellness are generally thought of as the absence of disease and injury, yet social, mental, spiritual aspects of health are also important. Personal health, wellness, and resilience are important for maintenance of health.

- Uptake of vaccinations can be improved upon with evidence-based interventions.
- Pertussis is an endemic infection in BC and will continue to circulate in the population intermittently reaching concerning numbers.
- Dental caries rates are high, as are rates of dental surgeries.
- Children are hospitalized more frequently in Northern Health, commonly for respiratory or neonatal concerns.
- Physically active children have better health throughout the lifespan; active outdoor play contributes to many opportunities to promote health and healthy behaviours. Yet less than 1 in 10 children ages 5-17 get adequate daily physical activity (Participaction, 2015).

Considering that administrative data-focused indicators are generally illness-focused, an enhanced view of wellness could include self-reported health.

- Physical activity and healthy nutrition are key components to optimal health and wellness. Many residents in Northern BC do not get adequate exercise or nutrition.
- Mental wellness is another aspect to consider assessing with self-rated measures.

The burden of chronic disease on the health care system continues to grow, compounded with an aging population, and significant inequities in health determinants and outcomes. It is essential to prevent chronic disease and promote both physical and mental wellness from early childhood. However, to complicate further the persistent stigma around mental health, substance use continues to contribute to a significant burden of morbidity, and mortality, for our families and communities.

B. Healthy Individuals – Social, Mental and Cognitive Health

Figure 27. Healthy Individuals
Social, Mental and Cognitive Health

- Education and literacy
- Memory and learning
- Cognitive capacity, intelligence and style
- Education systems, mental wellness
- Commitment to learning
- Attitudes, beliefs, past trauma, bullying
- Personality, behaviours, emotions, early childhood impacts
- Coping skills and health behaviours
- Physical, emotional, spiritual health, cultural safety and humility, racism and discrimination, exclusion and connectedness
- Language, culture and heritage
- Self-concept, self-control, prosocial behaviours, positive views of oneself
- Empowerment, responsibility, motivation, value, worth, purpose, mindset, grit

What we measured:

Perinatal mental health conditions – Northern Health perinatal databases for the past five years from 2009 indicate that across all inquiries for pregnant women there is a steady increase in self-reported mental health concerns, including anxiety or depression in pregnancy, previous postpartum depression, and past experience of mental health concern.

Teen birth rates – The Northwest HSDA has the highest rate of teenage births at 16 births per 1,000 15-19 year old females, twice the provincial rate of 8 births per 1,000 15-19 years old. In other areas, the rate of teenage births in Northern Health ranges from 10 to 13 births per 1,000 15-19 year olds.

Early Developmental Instrument measures – Rates of vulnerability in Northern BC tend to be higher than provincial rates. The majority of communities in Northern BC demonstrate vulnerability on one or more of the scales.

What matters?

Mental wellness and ability to deal with stress is key to reducing health risks related to stress in life.

- Women in Northern BC have higher rates of mental health concerns and this seems to be an upward trend.
- This may be a concern for bonding and attachment, social and family connectedness as well as personal health impacts related to mental health on its own or in combination with substances.

Healthy social and emotional, intellectual and cognitive development is reliant upon safe, stimulating environments - specifically, a stable and responsive environment of relationships, which provides young children with consistent, nurturing, and protective interactions with adults to enhance their learning and help them develop adaptive capacities that promote well-regulated stress-response systems.

Adolescence, in particular, is a high risk time for a number of reasons:

- Teenage girls in the Northwest have the highest rates of teen births.
- The ongoing challenges related to youth parents, resources, and deprivation suggest that choosing to be a teen parent may be the right choice for very few.

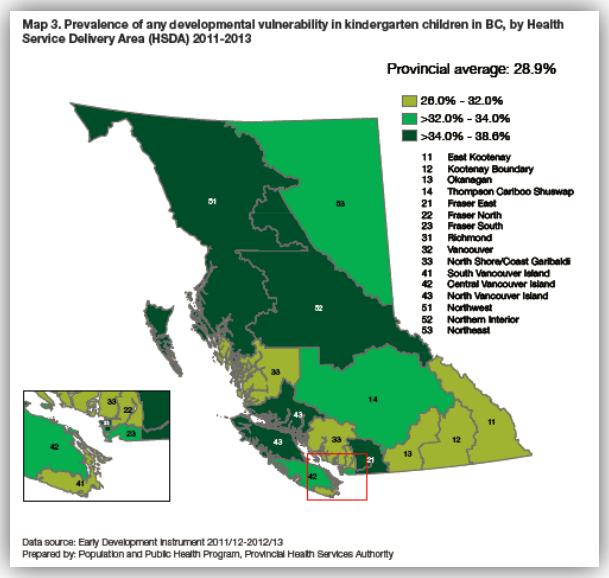


Figure 28. Prevalence of any developmental vulnerability in kindergarten children in BC by HSDA, 2011-13

Much has already been said about the importance of supportive environments, healthy communities, and healthy social and physical environments, reinforcing work by PHSA has shown increased Early Development Instrument vulnerability across Northern BC, an association between increased vulnerability and lower income, a surprising finding of disproportional impact on boys, and a relatively balanced standing between rural and urban populations at around 31-32% vulnerability.

- Effective interventions for acting on Early Developmental Instrument vulnerabilities are critical.
- Supportive childhood environments are also protective factors against bullying and discrimination.

Summary and Recommendations

The Northern Health CMHO Child Health report focuses on the health and wellness of children living in Northern BC. By comparing statistics of children living in the North to the provincial averages, research has shown a large discrepancy in the health and well-being of those children in the North. This discrepancy is observed in higher infant mortality rates, decreased life-span, and lower overall health – both mentally and physically.

This report asks two questions: "*How healthy are most pregnancies in the North?*" and "*How healthy are children in the North?*" by highlighting 24 areas of health and wellness, from pregnancy and childhood, that require improvement, the report documents the key factors that affect the mother and child's health, and puts forward considerations for future actions.

By assessing and reporting on the issues that affect the well-being of pregnant mothers and their young children, and by focussing on the specific and unique conditions and challenges of Northern living, Northern Health aims to improve the overall health and wellness of families and children in the North.

- Data in rural and remote settings can challenge program planning. One tool to assist with informing planning in rural settings could be derive an index.
- Consider the Child Health Index when determining where to invest first, to make the most important impact.
- Consult with the communities, families, and their experiences, their strengths, voices and stories when planning services.

Why invest in child health?

Early investments have greatest return on investment.
Invest early, bigger gains!

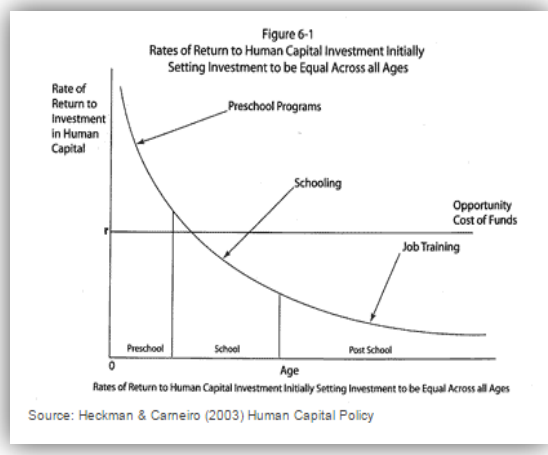


Figure 29. Return on Human Capital Investment
(Heckman & Carneiro, 2003)
(The World Bank, 2013)

Northern Health Child Health Index

When considering plans for improving child health, equity is a priority. We will need to focus our efforts on areas that most need attention Universal programs are needed to support all children and families in the north, as well as programs to help families that need a little extra help. It is difficult to understand where to focus efforts for the targeted programs addressing a broad issue such as Child Health across a large geography.

To assist with prioritizing areas of effort, the performance on the selected indicators was ranked for each Local Health Area, and as could be anticipated some Local Health Areas are doing better than others. In Table 6, Local Health Areas are ranked by Child Health Index from doing better to worse. While this is helpful, there are limitations to the use of this index and some caution is advised.

- The index was prepared as an aggregate performance measure that is not weighted for the importance of any indicator over others, not all indicators could be ranked.
- As stated previously, it is important to connect with the community to understand the pressures for families and children, and how we can work together to improve child health in the north.

Table 6. Northern Health Child Health Index

Child Health Index ↑
Kitimat
Peace River South
Smithers
Fort Nelson
Peace River North
Quesnel
Prince George
Terrace
Snow Country
Nisga'a
Nechako
Queen Charlotte
Burns Lake
Prince Rupert
Stikine
Telegraph Creek
Upper Skeena
Child Health Index ↓

Recommendations:

1. Within Northern Health, develop a program focused on children, youth and families within Northern BC based on the following principles:
   - Built on the primary health care model,
   - Including a spectrum of services from prevention of disease and injury to tertiary care, based on the Child Health BC Tiers of Service, and
   - Integrating electronic health records, Telehealth, outreach and transportation solutions into services to address the challenges of rural and remote settings.

2. Encourage, promote and highlight collaboration in communities:
   - Utilizing community partnerships and community development,
   - Building on community strengths, resiliencies and successes, and
   - Using data for communities to prompt action.

3. Strive to achieve high levels of collaboration across sectors including:
   - Development of cross sector partnerships,
   - Working toward a common vision, and
   - Encouraging open lines of communication.

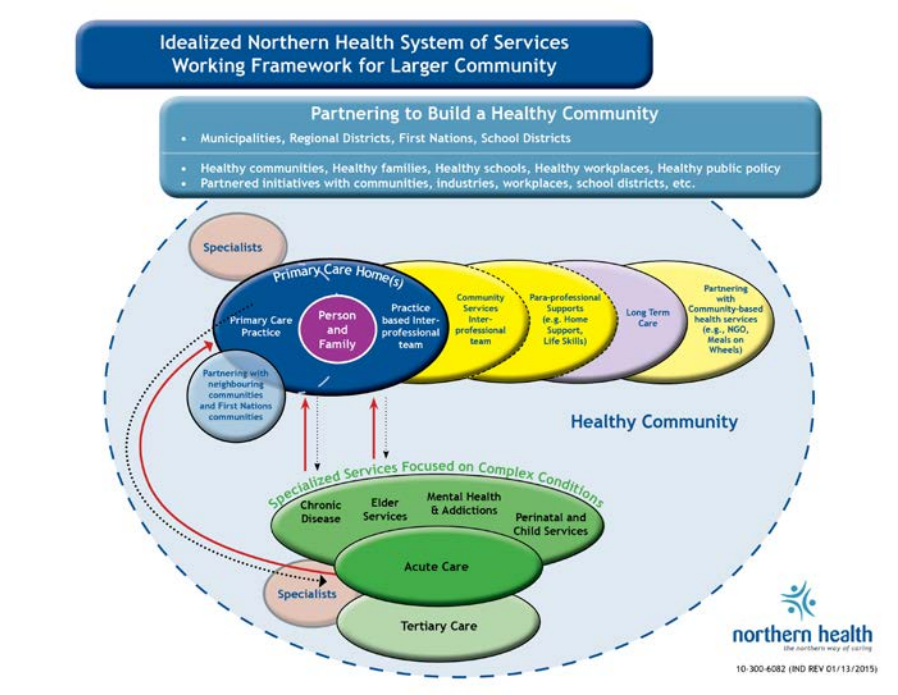
4. Strengthen the partnership between Northern Health and the First Nations Health Authority:
   - Informed by community based health service planning and supported by evidence,
   - Through promotion of cultural safety and cultural humility training, and
   - Based on a foundation of individual, family and community wellness.

5. Support communities and families to provide the foundations for early childhood development by educating about and advocating for:
   - Access to appropriate and sound nutrition for infants and children,
   - Provision of safe and supportive environments in families and in the home, and
   - Fostering stable and responsive family relationships.

6. Commit to ongoing monitoring of child health data and indicators through:
   - Surveillance and ongoing data collection, analysis and reporting, and
   - Design of regional child health indicators.

Appendices

Appendix A: Idealized Model of Services for Primary Care in Northern Health



Embedded within the context of healthy communities, supported by a population health approach, and working in partnership with the First Nations Health Authority, First Nations, and a range of community stakeholders, Primary Care Homes are supported by interprofessional teams and serve as the foundation of a system of services where the person and their family are the center of care.

A longitudinal relationship between the person and the primary care provider is established in the Primary Care Home where care plans which include the person's own goals for their care, provide guidance to all care providers who may become involved in the person's health care journey across time and across the continuum of services.

Interprofessional teams are comprised of primary care nurses, mental health clinicians, social workers, physiotherapy and occupational therapy professionals, as well as other paraprofessional supports such as home support and life skills workers.

Collectively, the team plays an important role in preventive health and health promotion. As a whole, the team's activities aim to enable the conditions that keep people healthy. As part of this, the interprofessional team works in support of the whole person with focused care for target populations that include:

- The frail elderly;
- The perinatal population and young families;
- Those with mental health and problematic substance use issues;
- People with one or more complex chronic diseases; and
- Children with complex health issues.

Interprofessional teams may be co-located within the Primary Care Home or may be connected virtually. Linked Electronic Medical Records, as well as processes such as the collaborative review of the Primary Care Provider's patient panel (case finding), and practices such as Primary Care 'huddles' all serve to connect and promote the collaborative working relationship between Primary Care Homes and interprofessional teams as well as with specialists, specialized community services, and acute care.

Specialists (consultation and care) and specialized community services work closely with Primary Care Homes, interprofessional teams, and higher levels of care (e.g. Acute Care) to support people whose health care needs are more complex.

Interprofessional teams often care for people in their homes. For some, Long Term Care is the person's "home". With this in mind, and principally when a relationship between the person and the interprofessional team has been established prior to admission into Long Term Care, the interprofessional team may reach into the Long Term Care environment to provide support and care, particularly for short stays such as convalescent and respite care.

Long Term Care facilities can also provide higher levels of medical and nursing care to prevent or minimize unnecessary transfers to acute care. Long Term Care infrastructure can be used to offer additional supports and services such as day programs for seniors. Taken together, these things ensure care continuity and minimize the number of potential transitions for seniors.

There may be times in a person's health care journey where admission to a hospital is required. Admission to acute care will be supported by the *Care Plan* developed in the Primary Care Home. *Plans of Care* developed in the hospital will include proactive and supportive guidance for discharge planning through the communication of the Plans of Care back to the Primary Care Home, the interprofessional team, and/or any of the community services involved in the person's care.

The Value Proposition of an idealized system of integrated services includes, but is not limited to:

- Improved health and well-being of people and their families
- Continuous, coordinated, and comprehensive care for the whole person guided by Care Plans
- Improved person and family experience of care
- Reduced wait lists (timely services)
- Reduced pressure on emergency rooms, unnecessary admission to hospital, and Length of Stay through Plans of Care that include supported discharge planning
- A more sustainable health care system

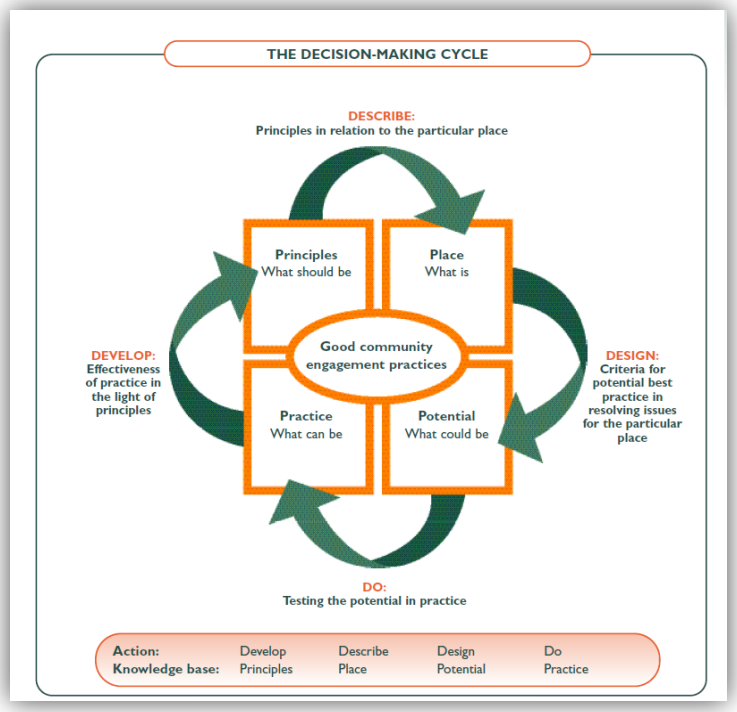
As the First Nations Health Authority (FNHA) continues to build health services for First Nation's people and communities, partnerships and strong linkages will be built between Northern Health and FNHA to ensure collaboration and continuity of care for persons and their families.

Appendix B: Community Conversations - Toward a Whole of Community Engagement Process

Motivated by the goals of widespread awareness and engagement on perinatal and child health in Northern BC, and acknowledging that Northern Health is but a partner in the network of services, this report is structured as an engagement tool or a conversation starter. A community engagement plan will be in place to connect with communities across the North.

This community engagement and consultation process will be undertaken in the spring and summer of 2016. The purpose will be to secure common resolve to improve the conditions and outcomes for children and youth in Northern BC. This starts with understanding the health of our children, our families, as well as our communities, and committing to make a plan for wellness community-by-community and family-by-family.

Communities should engage in conversations about children, families, and how communities can be as healthy as possible. To get the conversation started, consider using the method of collective learning and engagement as described by Aslin and Brown. Partners in Northern BC should engage to raise awareness, build relationships, identify common goals, and trigger action (Aslin & Brown, 2004).



An approach using proven building blocks for collective learning and intersectoral engagement will be applied (Aslin & Brown, 2004, p. 11). In developing collective learning for transformational change, it is essential to follow the four stages in a definite order:

What should be?

Starting with the first question is essential. It ensures the collective learning is driven by a desire for change and a vision of what that change might be.

- Directional and theoretical perspectives are considered.

What is?

The next question establishes the range of facts that allow for the opportunities and blocks to change in light of the ideals, rather than being fixed in the present problems.

- Overview of the current basic developmental science and health status measures.

What could be?

For the third question we come together to build on this understanding, creating what is called "learning from difference, not more of the same".

- An aspirational narrative of ideal responses to what we know.

What can be?

For the final question, it is essential that collaboration is built on all the learning that went before, rather than reverting to the old divisions.

- Realistic recommendations to plot the course to improvements.

Appendix C: Community Conversations - Community Considerations for Children's Health

Improving children's health starts with gaining an understanding of the contexts of where children and their families live, work, learn and play. Achieving improved child health is possible by committing to and planning for improved conditions community by community and family by family. It is important for community members to explore the elements of a healthy childhood in their community, and to find the local partners to work with to plan for and improve child health.

Ecological

- *What is the environment of the community? Of the home? Of the school?*
- *Is there access to primary health care, dental care? Is transportation a barrier?*
- *Are there training opportunities for healthcare providers to provide culturally safe, person and family-centred care? Are there inequities in health outcomes?*
- *Is there safe and adequate housing? Are there housing standards? Is housing over-crowded?*
- *Is there access to safe and adequate food? What needs to be done about food security? Is emergency food available?*
- *Are licensed daycare spaces available for working families?*
- *What is known about the natural and built environment?*
- *What ecological services do we rely on? Watersheds and airsheds?*
- *Is there clean water? Is the water supply from a Community Water System?*
- *Is there clean air?*
- *Is there opportunity to be outdoors? Are there areas where children can play safely (playgrounds, parks, school yards)? Is the community built to support active transportation through biking or walking design?*
- *Is the community a safe place – are there some areas with more crime?*
- *Is there space in your community for safe socialization for both children and parents?*
- *What is the social environment in the community? In the home? In the school?*
- *Are there appropriate supports and encouragement for curiosity, expression, and individuality?*
- *Is it a culturally safe place? Do people feel accepted, connected, like they belong?*
- *How do people spend time? Are there cultural and leisure opportunities available?*
- *Are parental training and employment opportunities close to home?*
- *Do people have access to the technology, data, information they need?*

Biological

- *What are the personal behaviours commonly found in the family, home and community?*
- *Is there exposure to second-hand or third-hand smoke in the home? In the community? In vehicles?*
- *Is there a high rate of tobacco use or other substances in the community?*
- *Are pregnant women using tobacco or alcohol during their pregnancy? Are pregnant women and parents supported to not use tobacco or alcohol? What supports are needed?*
- *Is mental wellness being nurtured? What are the common health concerns?*
- *Are there disease outbreaks? What are the vaccination coverage rates in the community?*
- *Are there appropriate building blocks available for growth and development, such as adequate nutrition, safe environments, and responsive relationships?*
- *Are children exposed to extreme stress, such as interpersonal violence, in the home or community?*

Developmental

- *What are we doing to support the growth and development of infants?*
- *Are parenting skills, and conflict resolution skills, taught to families?*
- *Do children have one or more stable adults for secure attachments?*
- *What are we doing to support the growth and development of children and adolescents?*
- *Do adolescents have a reliable adult they can confide in?*
- *What personal health practices are children learning, what is being modelled for them?*
- *Are children being taught life skills necessary to make healthy choices?*
- *Are children being taught refusal skills regarding tobacco, alcohol and other substances?*
- *What else can be done to prevent the initiation of tobacco, alcohol, and other substances?*
- *Individually, within the family, within the community?*
- *Are there things we could do now to decrease the mental health concerns of teenagers?*
- *Is screen time limited? Monitored? Are kids getting enough sleep?*

Appendix D: Indicator Summaries

The indicator set as derived by the working group is organized by life stage.

A. Healthy Pregnancies

1. Prenatal registration and place of birth
2. Tobacco use during pregnancy (self-reported)
3. Alcohol use in pregnancy (self-reported)
4. Healthy Weight in Pregnancy - High BMI
5. Healthy Weight in Pregnancy - Low BMI
6. Prenatal and Postpartum mental health concerns
7. Teenage mothers

B. Healthy Babies

8. Breastfeeding at birth
9. Infant mortality
10. Low birth weight infants
11. High birth weight infants

C. Healthy Children

12. Immunization coverage for two year olds
13. Vaccine preventable diseases
14. Leading causes of hospitalization
15. Dental caries rate
16. Pediatric dental surgeries
17. Early Developmental Instrument measures
18. Hearing screening

D. Children at Risk

19. Childhood injuries
20. Reported physical and sexual abuse rates
21. Children in care and protection

E. Healthy Families

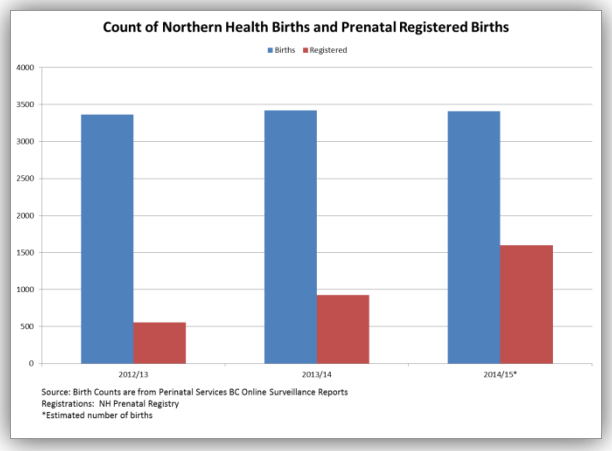
22. Licensed childcare spaces
23. Children living in low income families
24. Single parent families

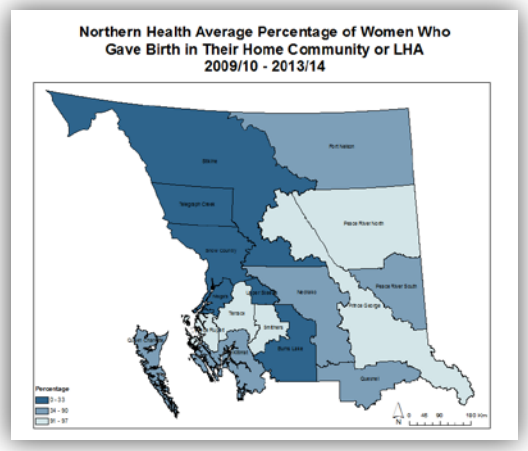
In each summary, find:

- *Rates over time and/or*
- *Rates mapped by local health area*
- *Interpretation in the context of BC and Northern communities – what does the data tell us?*
- *Importance and relevance – Why is it important?*
- *Bottom Line*
- *Considerations for Future Actions*

A. Healthy Pregnancies

1. Prenatal registration and place of birth





What does the data tell us?

- Registration in the prenatal registry continues to increase over the past three years.
  - Approximately 50% of births in Northern Health have been registered.
- Several communities have integrated early prenatal services with primary care in the primary care model. Early engagement with nursing care is planned to improve maternal, fetal and infant health outcomes.
  - Fort St. John, Prince Rupert, Fort St. James, Mackenzie, Fraser Lake, Vanderhoof, and Valemount are registering 100% or near 100% of all pregnancies.
  - In McBride, Burns Lake, Quesnel, Dawson Creek, and Prince George, nearly 50% of pregnancies are registered.
  - As further integrated health services are implemented across Northern Health, we anticipate 75% or more pregnancies will be registered in the future.
- Analysis of where women deliver their babies indicates that pregnant women in the more remote areas of Northern Health are the least likely to deliver in their home communities.
- Data limitations include discrepancies between pregnancies registered and the number of births in the region, which are not equivalent, but used as surrogates in this situation. Additionally, the community health record requires upgrades to improve data collection.

Why is this important?

- Early identification of at risk or vulnerable women and referral to support programs early is intended to improve pregnancy and birth outcomes through identification of unmet health and social needs.
  - In the assessment process, public health nurses employ an equity lens to focus interventions toward vulnerable women (women who may be at risk for poor outcomes associated with physical, psychological, or social inequities)
  - (Perinatal Services BC, 2014) (BC Ministry of Health & Ministry of Children and Family Development, 2010) (BC Ministry of Health, 2013).
- The rates of poor maternal and newborn outcomes and rates of vulnerability are higher in Northern communities (Human Early Learning Partnership, 2013) (Perinatal Services BC, 2015). Improving services and connections with women and families within the prenatal period will support improved maternal and newborn outcomes and improved vulnerability rates.

- Public health nursing connections to primary care have enhanced early prenatal services to pregnant women. Standardized screening, health promotion education, intervention, and referrals are provided through a collaborative and integrated process.
- Aboriginal women living in First Nations communities access prenatal care from primary care providers in larger centres. There are challenges in access and support for those in more rural and remote communities for timely care and support.
    - The prenatal registry provides another opportunity for early access to care.
    - First Nations community providers (community health nurses and community health representatives) may inform and encourage women to connect with a public health nurse early in pregnancy.
    - Deliveries away from home are a strain on the family and community.

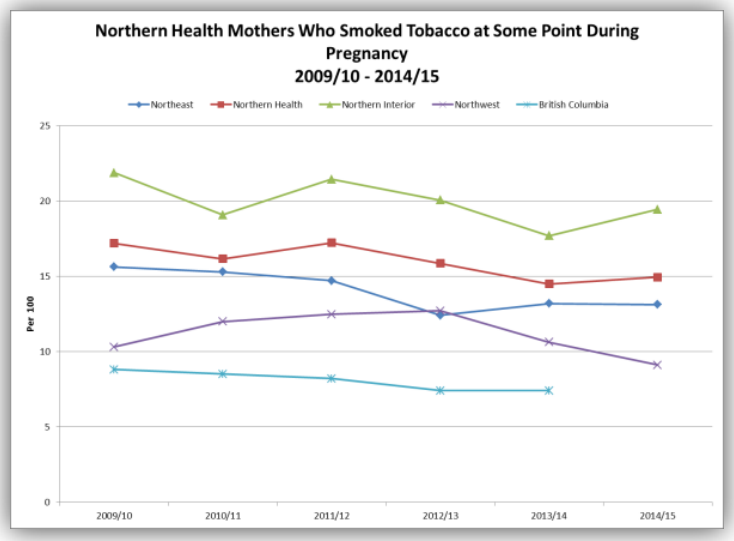
Bottom Line

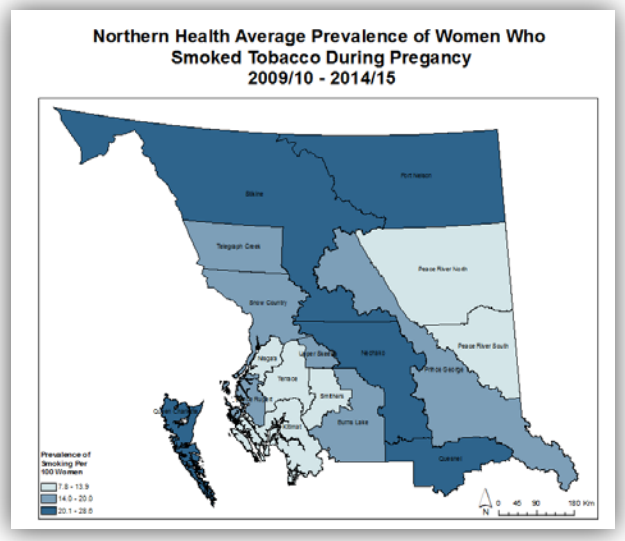
1. Rural challenges should be anticipated and mitigated. Predictable rural and urban distinctions are fairly well described by CIHI in How Healthy are Rural Canadians? (Public Health Agency of Canada, 2006). Special challenges in rural and remote settings must be considered when planning for rural health and social services.
2. Integrated Prenatal Services, including prenatal registration, focuses attention to the social determinants of health. Standardized service pathways decrease variation in prenatal care and can improve quality of services and outcomes.
3. Prenatal registration allows for the identification of vulnerable pregnant women who may benefit from enhanced prenatal services to reduce inequities and promote health and wellness.
4. Interprofessional, person, and family centred trauma informed practice is important to fully address the social, emotional, mental, and physical health needs of all women's and families' needs, especially vulnerable women in pregnancy.
    - A variety of support should be available for families. Services should be flexible and equity based.
5. Meeting the basic needs of mothers, infants, and families, including the prerequisites for health is a cornerstone to a healthy family and community. Prenatal registration and early connection with health and social programs can improve outcomes.

Considerations for future action

- Continue to expand upon an integrated approach for prenatal services in Northern BC.
    - Northern Health staff linked with primary care homes and interprofessional teams to support pregnant women and families throughout all stages of their family development beyond the prenatal period.
- Promote Northern Health staff education to utilize the Integrated Prenatal Services Clinical Practice Standard and Public Health Prenatal Care Pathway.
    - Design primary and community care integration models that support the delivery of prenatal care as close to home as possible.
- Create coordinated resources for families to simplify access to programs that accommodate great distances and transportation challenges.
    - Locally organized and supported programs designed with the appropriate cultural input to support families within the community are likely to be more sustainable.
    - Utilizing current technology to support tele-health and care as close to home as possible.
    - Collaboration with local health providers is key to fully supporting families in rural and remote settings.
- Work in partnership to support women and their families when planning their baby's birth away from home.

2. Tobacco use during pregnancy





What does the data tell us?

- Rates of perinatal smoking are disproportionately high in Northern BC and the geographical area serviced by Northern Health (BC Perinatal Health Program, 2008) (Perinatal Services BC, 2014) when compared with provincial rates.
- In Northern Health, 17% of pregnant women identified as smoking in the perinatal period in the 2009/2010 reporting year. By 2014/2015, this proportion of perinatal smokers had dropped to 15%, a rate double the provincial average for the same fiscal year.
- Significant variation in perinatal smoking incidence exists between the three HSDAs in Northern Health with the Northeast HSDA reporting the highest proportion of perinatal smokers in the region.
- Data limitations are related to the nature of self-reported indicators. Stigma related to smoking during pregnancy may limit frank disclosure.

Why is this important?

- Perinatal smoking is linked to poor reproductive, pregnancy, and postnatal health outcomes (Castles, Adams, Melvin, Kelsch, & Boulton, 1999) (Cnattingius, 2004) (Salihu & Wilson, 2007) (U.S. Department of Health and Human Services, 2010).
- Evidence suggests multiple impacts, including an increased risk of maternal, fetal, infant, and child morbidity and mortality, and the associated health costs of perinatal smoking (Canadian Institute for Health Information (Canadian Institute for Health Information, 2009) (Castles, Adams, Melvin, Kelsch, & Boulton, 1999) (Erickson & Arbour, 2012) (Mehaffey, Higginson, Cowan, Osbourne, & Arbour, 2010) (Public Health Agency of Canada, 2008) (U.S. Department of Health and Human Services., 1990) (U.S. Department of Health and Human Services, 2004). The multiple and profound threats to the health of the expecting mother and her child have prompted the United States Surgeon General to assert that perinatal smoking is the leading preventable cause of poor pregnancy outcomes among women in Western developed countries (U.S. Department of Health and Human Services., 1990) (U.S. Department of Health and Human Services, 2010).
- There is strong evidence supporting a relationship between the social determinants of health and perinatal smoking with women vulnerable to disparities in these factors demonstrating higher rates of smoking in pregnancy (Al-Sahab, Saqib, Hauser, & Tamim, 2010) (Bailey, 2006) (Connor & McIntyre, 1999) (Heaman & Chalmers, 2005) (Graham, Francis, Inskip, Harman, & SWS Study Team, 2006) (Higgins, et al., 2009) (Homish, Eiden, Leonard, & Kozlowski, 2012) (Schneider & Schutz, 2008). Furthermore, these disadvantaged women comprise an increasing proportion of the decreasing population of perinatal smokers (Graham, Francis, Inskip, Harman, & SWS Study Team, 2006).

- Research demonstrates that Aboriginal women are significantly more likely to smoke during pregnancy than non-Aboriginal women, with prevalence rates in one Manitoba study as high as 61.2%, and cessation rates during pregnancy almost half that of the non-Aboriginal sample (Heaman & Chalmers, 2005) (Li, Zeki, Hilder, & Sullivan, 2012) (Wenman, Joffres, Tataryn, & The Edmonton Perinatal Infections Group, 2004).
- The implications of a higher perinatal smoking rate as outlined in the research literature, coupled with a high birth rate, suggest that the Aboriginal population in Northern Health may be disproportionately burdened by the ramifications of smoking during pregnancy (Smylie, Fell, Ohlsson, & Joint Working Group on First Nations Indian Inuit, 2010).
    - The Regional Health Survey reports that among the women surveyed, 46.9% of women used tobacco while pregnant and 32.7% used tobacco throughout pregnancy.
        - Of those that used tobacco, 9.2% quit smoking in the first trimester, 3.6% quit smoking in the second trimester, and 1.4% quit in the third trimester.
        - Of the tobacco use noted, 51.0% of women smoked daily during their pregnancy and 49.0% smoked only occasionally.
        - Exposure to second-hand smoke was also surveyed and it was found that 40.0% of pregnant women were living in a house where someone was using tobacco.
        - Among those who used tobacco during pregnancy, the majority by a slight margin were those under 20 years of age with the least amount of tobacco use observed in the over 35 year old group.

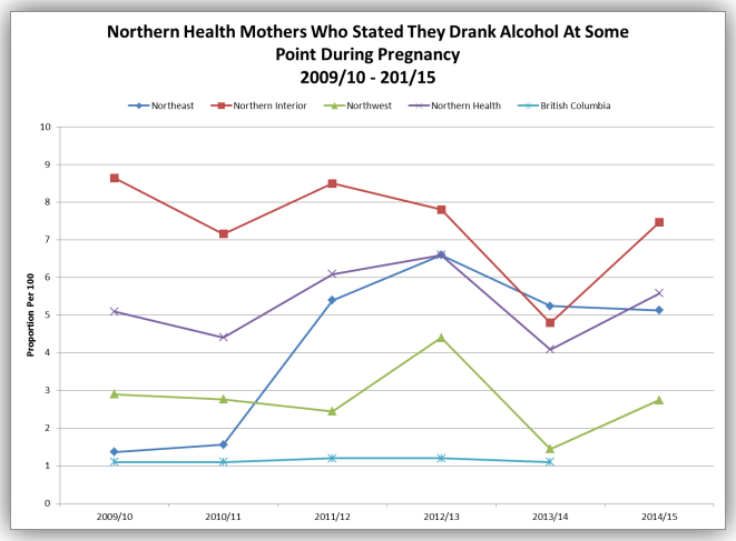
Bottom Line

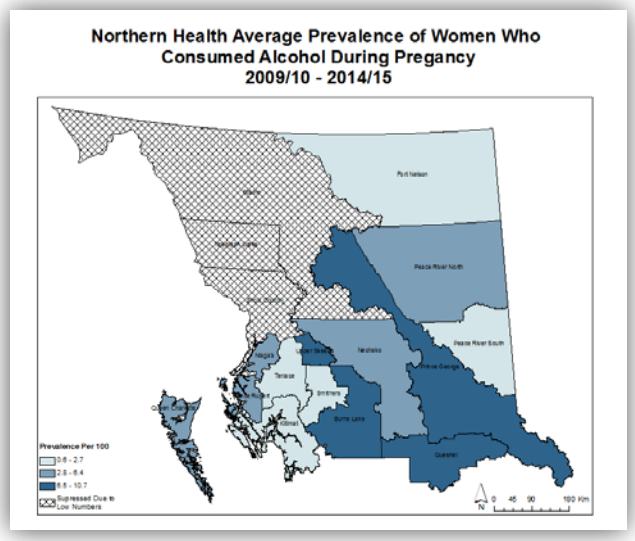
1. Perinatal smoking is highly correlated with a number of poor health outcomes for women and their fetuses, infants, and children, leading to increased risk of morbidity and mortality. All of this is preventable.
2. Northern BC has significantly higher rates of perinatal smoking in pregnancy with poor and inequitable health outcomes for our women and their children.
3. Prevalence and patterns of perinatal smoking are influenced by factors such as age and the social determinants of health, leading to health inequities between population groups.
4. Aboriginal populations are disproportionately impacted by prenatal tobacco use.

Considerations for future action

- Promote tobacco cessation as a measure to improve the overall health and well-being of all mothers and families.
- With at least half of all pregnancies in North America unplanned, health care providers should incorporate prevention and cessation messaging in the care of all women with potential for pregnancy and prior to conception.
- Ensure appropriate cessation interventions are available to support women and their families in tobacco cessation when they are ready.
- Nurses should implement, whenever possible, intensive intervention with women who are pregnant or postpartum, and at any other opportunity, as a standard of care (RNAO, 2007).
- Provide training to health care providers to ensure sensitive and non-judgemental approaches to addressing tobacco use to improve acceptance of messaging and truthful disclosure in a culturally safe manner.
- Employ a harm reduction approach. Encouraging decreases in tobacco usage if outright cessation is not possible during pregnancy.
- Work with teachers, coaches, and other community partners through education and support to prevent children from starting to use tobacco.
- Work with municipalities to create supportive environments for the population to live smoke free.
- Improve surveillance and screening for tobacco use in women of childbearing age to promote cessation at all interactions. Current systems and processes contribute to likely under-reporting.

3. Alcohol use in pregnancy and women of childbearing age





What does the data tell us?

At the outset it is important to state there are significant limitations when interpreting self-reported rates of alcohol use in pregnancy. Stigma and shame related to disclosure likely inhibits frank reporting. Additionally, changes to systems and databases, such as the introduction of the prenatal registry in 2012, challenge the usefulness of the data. Nevertheless, accepting the weaknesses in the data, the general trends over time provide some data to inform our understanding:

- The data collected by Northern Health, between 2009 and 2015, shows a slight increase in alcohol use in pregnancy from 5.1 to 5.5%, which is significantly and persistently higher than the provincial average at just over one percent.
- The health service delivery area (HSDA) with the highest rate of alcohol use in pregnancy is the Northern Interior with a consistently higher rate (from 8.6% in 2009/2010 to 7.5% in 2014/2015) than the other HSDAs.
- During the time period from 2009 to 2015, the Northeast HSDA rates of alcohol use in pregnancy have risen from a rate of just over the provincial average to just over 5% use in pregnancy.
- The Northwest HSDA has stayed within the two to three percent rate, except in 2012/2013 when the rate rose to just over four percent.
- There have been significant variations in rates from 2009 to 2015, with a significant decrease in all three health service delivery areas (HSDA) in 2013/14 and a rise in 2014/15 close to 2012/2013 levels (co-incident with introduction of prenatal registry).

While the 2013 Youth Health survey results demonstrate better awareness and improved knowledge and attitudes, the findings are still concerning. Further information from McCreary Centre has shown youth trends in alcohol use are overall concerning and should warrant attention (Smith, et al., 2015) (Poon, Smith, Saewyc, & McCreary Centre Society, 2015) (Smith, et al., From Hastings Street to Haida Gwaii: Provincial results of the 2013 BC Adolescent Health Survey, 2014).

- Youth in rural areas initiated alcohol use earlier.
- Youth reported patterns of use that were overall heavier and more frequent than other regions.
- The complexities of sexuality, alcohol, and substance use and relationships are confronted earlier and in greater frequency and intensity by youth in the North.

Why is this important?

There is no safe amount of alcohol in pregnancy. Prior to a woman learning of her pregnancy, many vital developmental stages have already occurred. Prenatal exposure to alcohol leads to fetal effects known as Fetal Alcohol Spectrum Disorder (FASD), which is entirely preventable (Public Health Agency of Canada, 2012).

Fetal alcohol effects include mild to severe cognitive, behavioural, facial dysmorphism, and growth restriction. FASD is the leading cause of developmental disabilities in Canada (Public Health Agency of Canada, 2012). The Public Health Agency of Canada (2012) estimates 9 babies in every 1,000 born in Canada have FASD. A recent study in Alberta puts the number higher, with a rate of FASD of 1.42-4.38%, with the diagnosis in the first year and with later diagnosis, a higher rate of 4.31% (2003 cohort) (Thanh, Jonsson, Salmon, & Sebastianski, 2014).

- Each individual fetus can be affected differently depending on the timing of exposure, peak of alcohol levels, genetics, nutrition, stress, age of parent, and other variables (Chudley, et al., 2005) (Ungerer, Knezovich, & Ramsay, 2013).

Population level alcohol use patterns can assist in understanding the domestic and social alcohol environment for pregnant mothers in the North. Overall, provincial per capita usage rates have risen 8% in only 5 years (Martens, et al., 2008). More worrisome, for youth in the North early and heavy alcohol usage are signs that should be heeded to prevent disease and disability in the population. The highest rates of unintended pregnancies occur in the age group with the highest risk of binge drinking (ages 15-19) (BC Centre of Excellence for Women's Health). Binge drinking appears to play an important role in FASD. Binge drinking is reported by 11% of mothers before pregnancy is recognized (BC Centre of Excellence for Women's Health).

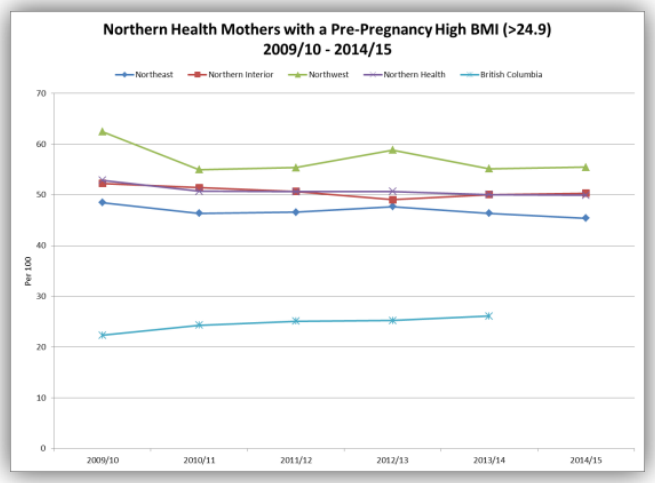
Bottom Line

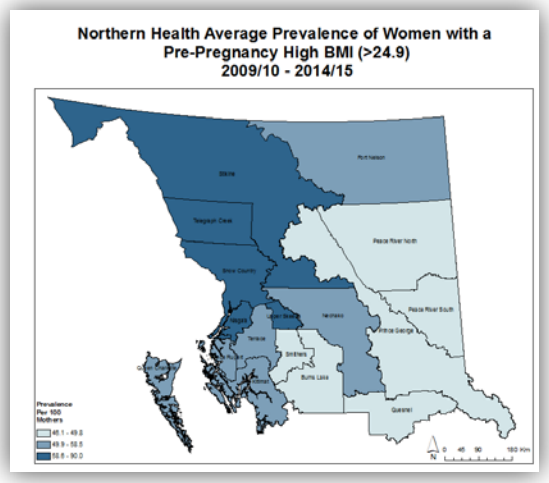
1. Despite its weaknesses, available data for Northern Health shows it is likely that significantly more pregnancies are impacted by alcohol use in Northern Health (2-8%) than in the rest of the province (1%). Canadian rates of binge drinking in women of childbearing age continue to trend upwards over the past decade. A trend that is safe to generalize to women of childbearing age in Northern BC.
2. There is increasing evidence that the roots of addiction are found in childhood attachment, trauma, personal coping mechanisms, relationships, and connectedness. Substance use interferes with attachment processes.
3. Responsible parental alcohol use is being recognized as an increasingly important factor for genetic, developmental, physical, social, and emotional health and well-being for themselves as parents and for the health of their families and communities.
4. Widespread accessibility of alcohol and unhealthy alcohol use patterns can influence an individual's choices, and making the healthiest choice the easiest choice is good policy. Policy makers should be aware of trends in alcohol usage patterns and understand the health outcomes related to increased alcohol consumption for individuals, families, and communities. Improvements can be achieved through municipal and provincial alcohol policies.

Considerations for future action

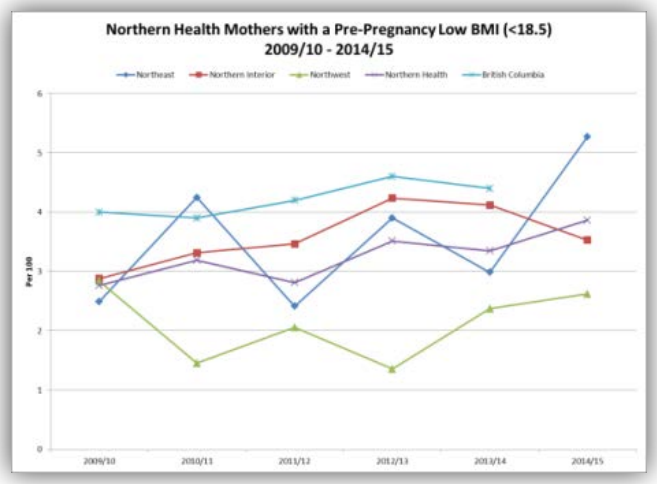
- Improve data collection and surveillance for health and social impacts related to alcohol use policies and practices, including alcohol exposure in pregnancy.
- Advocate and use collaborative partnerships and action plans to address youth alcohol usage and improve opportunities for engagement and connectedness for teens in communities.
- Support mothers to stop using alcohol early in their pregnancy and support individuals to build healthy relationships to mitigate the effects and pressures of an unhealthy culture of substances.
- Encourage policymakers to create supportive environments for a culture of moderation of alcohol use for individuals, families, and communities. Increase awareness in the public about alcohol use and the effects on individuals and families including pregnancies and children.
- Support health care providers to screen, identify, support, and nurture families throughout their lifespan for alcohol use disorders.
    - Provide additional training supports for providers to provide services in a non-judgemental and trauma informed manner.
    - Supports should consider cultural contexts.

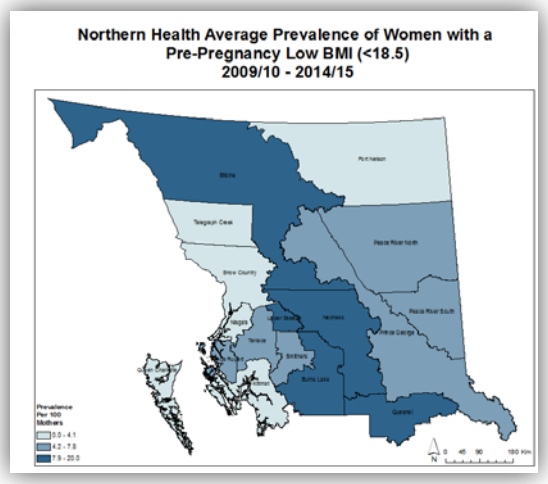
4. Healthy Weight in Pregnancy – High BMI pre-pregnancy





5. Healthy Weight in Pregnancy – Low BMI pre-pregnancy





Background to the Body Mass Index (BMI) as a Health Indicator

The Body Mass Index (BMI) was developed as a *population measure.* At the individual level BMI is a proxy measure of fatness, but its use has limitations and research has questioned its use as a means to assess health. Many of the risk factors associated with high and low BMI are also associated with both biological and social determinants of health, such as income, education, and food security (Association of Ontario Midwives, 2010). Consider also that individuals with a normal BMI may not necessarily be healthy, while an estimated 1/3 to 1/2 of people classified as obese under the BMI are metabolically healthy. BMI is also not intended to be used for pregnant or lactating women. Overweight is defined as a BMI of 25.0 – 29.99 and obese as a BMI >30.0 (Northern Health, 2012). Nevertheless, many historical indicators do continue to report on BMI and therefore BMI will be considered in the context of this report, while acknowledging the aforementioned shortcomings.

What does the data tell us?

- Data limitations related to data collection, consistency, and quality are acknowledged. Between 2009/2010 and 2013/14, 34 - 53% of Northern Health pregnancy BMI data was missing, compared to 24 - 34% for BC (Perinatal Services BC, 2015) (Perinatal Services BC, 2015). This missing information may affect how we can interpret the data and, with that in mind, some of the findings should be interpreted with reservation. Yet there are important trends to acknowledge.

- Generally, Northern, rural, or remote communities have higher rates of overweight and obesity (Northern Health, 2012) and rates of High BMI pre-pregnancy are higher in Northern Health (45-60%) than the provincial average (25%). Rates of Low BMI pre-pregnancy are lower in Northern Health (2-4%) than the provincial average (just over 4%).
    - Low BMI pre-pregnancy rates are slightly lower for women in the Northwest HSDA and are higher in the Northeast and Northern Interior
    - High BMI pre-pregnancy rates are higher in the Northwest HSDA
- Aboriginal peoples face unique challenges regarding obesity trends. As much as 55% of adults in First Nations communities in BC are overweight or obese compared to 45% of the general population (Statistics Canada, 2014) (First Nations Food Nutrition and Environment Study). This is consistent with the high rates of overweight and obesity in the Northwest HSDA, where the majority of Northern Health's Aboriginal population resides, and where 30.8% of the population identifies as being Aboriginal, as opposed to 14.3% in the Northeast, 14.8% in the Northern Interior, and 5.4% in BC (Northern Health, 2012) (Statistics Canada, 2014) (Statistics Canada, 2014) (Statistics Canada, 2014) (Statistics Canada, 2014). Data from 1998-2004 indicate that 45.9 to 53.2% of Aboriginal women in BC had a pre-pregnancy BMI > 25 (Office of the Provincial Health Officer, 2009). Health promotion approaches need to be culturally safe and consider the realities and contexts of Aboriginal people and communities.
- Older data from 1998-2004 demonstrated that at the time, 3-4.1% of BC status First Nations pregnant women were considered underweight using the criteria of BMI < 18.5. Of note, the rates of pre-term births to these women was double that of other underweight BC residents (15.1 versus 7.7 per 100 live births). However, status First Nations women had greater rates of pre-term births than their peers in all weight categories (10.4 versus 6.8 per 100 live births) (Office of the Provincial Health Officer, 2009).

While many determinants of health are at play, there are also specific rural and remote geographic challenges such as access to healthy food and opportunities for physical activity. These include food security challenges such as limited access to grocery stores, higher food costs, limited variety of foods, few opportunities for organized recreation, cold weather, wildlife, limited community capacity, and resources (Northern Health, 2012). The rates of high pre-pregnancy BMI in Northern Health (50%) are higher than BC and Canadian averages (~33% and 35% respectively) (Perinatal Services BC, 2015) (Health Canada, 2014). Further, rates of household food insecurity and the more worrisome rates of teens that go to bed hungry (YHS data) are alarming indicators of the reality for many families in Northern BC. Research conducted in BC demonstrated that 41% of individuals living in First Nations communities are food insecure, compared to 9% for BC and 10% for Canada (First Nations Food Nutrition and Environment Study).

Why is this important?

Body weight is linked to the social and physical determinants of health. Overweight and obesity are caused by "the interplay of multiple biological, environmental, social and cultural factors," including energy imbalance, genetics, obesogenic environments, chemicals and hormones, addictions and mental health, and sleep (Northern Health, 2012). The rates of pre-pregnancy BMI > 25 in Northern Health are reflective of trends of adult overweight and obesity. Based on self-reported data, almost 60% of all women (not only those bearing children) in the Northwest HSDA are overweight or obese, compared to 52% in the Northeast and 50.8% in the Northern Interior (Statistics Canada, 2014) (Statistics Canada, 2014) (Statistics Canada, 2014). Northern Health rates of overweight or obesity are higher than the Canadian average (45%) but are comparable to our peer groups in other areas of Canada (Peer group E: 54% and Peer group H: 56%) (Statistics Canada, 2014) (Statistics Canada, 2014).

Persons who are overweight or obese are at risk of weight bias (Atlantic Centre of Excellence for Women's Health, 2011). PHSA's report, "From Weight to " (2013), emphasizes the obesity epidemic's "shadow epidemic" of weight bias, the negative weight-related attitudes, beliefs, assumptions, and judgements towards individuals who are overweight and obese. "As obesity rates have increased, so have rates of weight bias, stigmatization and discrimination" (Provincial Health Services Authority, 2013). The authors argue that this poses a significant threat to population health, as consequences of weight bias include depression, impaired mood, anxiety, lower self-esteem, and body image dissatisfaction, as well as increased binge-eating behaviours, reduced participation in physical activity, and avoidance of preventive and medical care (Provincial Health Services Authority, 2013).

- Of further concern, pre-pregnancy BMI > 25 has been linked to various outcomes for pregnancy and child birth:
    - There is more risk for gestational diabetes and caesarean delivery.
    - Infants being born pre-term, being large-for-gestational age, and/or having a birth-weight of more than 4000-4500g (Health Canada, 2014).
    - These infants are also less likely to be breastfed and are more likely to be considered overweight in childhood (Health Canada, 2014).
    - However, most women with a high pre-pregnancy BMI are anticipated to have good labour and delivery outcomes. For example, in terms of levels of service for labour and delivery, PSBC categorizes women with pre-pregnancy BMI > 18.5 and < 30 in the "Normal" category ("no maternal/fetal concerns") and pre-pregnancy BMI of 30-38 is classified at a "Level 1" ("not anticipated to impact ") (Perinatal Services BC, 2012).
- When malnutrition is the cause of a low pre-pregnancy BMI, risks to women include micronutrient deficiency, iron-deficiency anemia, and infections (Association of Ontario Midwives, 2010). In general, low pre-pregnancy BMI is associated with a greater risk of pre-term birth, intra-uterine growth restriction, small-for-gestational age (SGA) infants, and low birth weight infants (< 2500 g) (Association of Ontario Midwives, 2010) (Health Canada, 2014).
- In terms of breastfeeding, BC data indicates that women with a pre-pregnancy BMI < 18.5 are slightly less likely to exclusively breastfeed in their hospital stay after birth compared to BC averages (68.2% versus 72.2% respectively) (Perinatal Services BC, 2014). With the exception of severe cases of malnutrition, maternal under nutrition has little impact on the volume or composition of breast milk (Association of Ontario Midwives, 2010).

Bottom Line

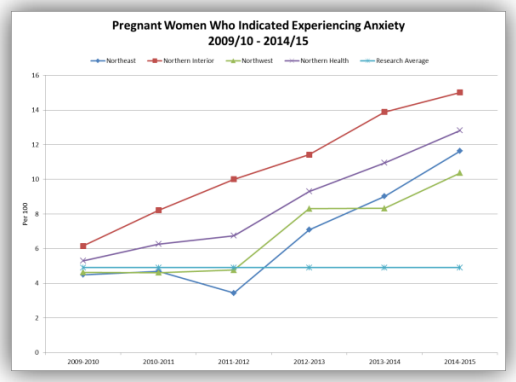
1. High pre-pregnancy BMI is linked with risks to maternal and infant health.
2. Low pre-pregnancy BMI is linked with risks to maternal and infant health.
3. Individuals with high BMIs are at risk of weight bias, which is associated with poorer psychological outcomes and poorer health-related behaviours.
4. Sustained weight loss is difficult to achieve. Weight loss attempts carry psychological and physical health risks and few women gain within the guidelines for gestational weight gain.
5. A health-focused and do no harm approach is needed to support healthy pregnancies including support to obtain adequate nutrition and calories to support maternal health and fetal growth and development.
6. Data and surveillance considerations are paramount to understanding the burden, the areas for added emphasis, and the evaluation of interventions. Strengthening surveillance and reporting is a priority.

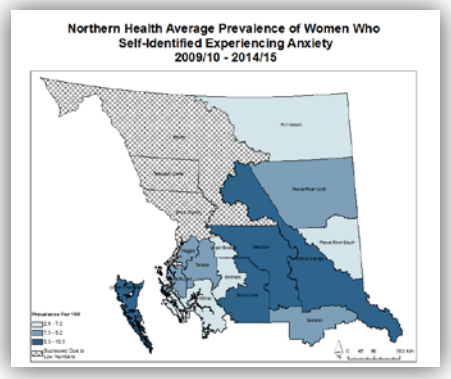
Considerations for future action

- Food security and healthy nutrition for families and communities is a complex issue that requires intersectoral collaboration particularly in rural and remote areas
- Support initiatives to build food security and food skills
- Focus on improving health (as opposed to focusing primarily on weight)
- Focus on prevention – "Obesity prevention is easier than management" (Northern Health, 2012)
- Employ a do no harm approach - Address weight bias in health care settings
    - Adapt the Canadian Obesity Network's 5As of gestational weight gain to align with Northern Health Position on Health, Weight, and Obesity
    - Implement a standardized prenatal assessment that is inclusive of a Health at Every Size approach
- Continue to identify, support, and implement programs and partners that:
    - support access to healthy food for all
    - create healthy food environments (i.e. in schools and other settings)
    - increase personal and community food security
    - increase access to safe and enjoyable physical activity
    - provide education/training to do no harm, to decrease dieting behaviours

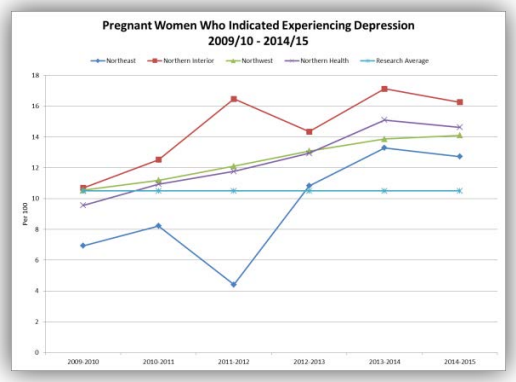
6. Prenatal and Postpartum mental health concerns

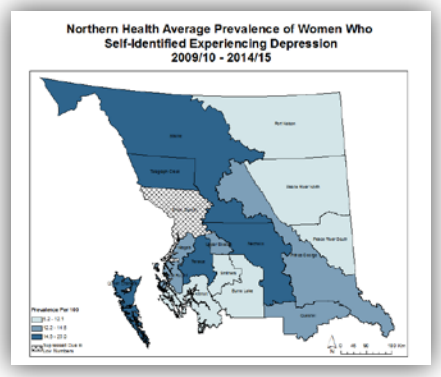
Anxiety in Pregnanacy



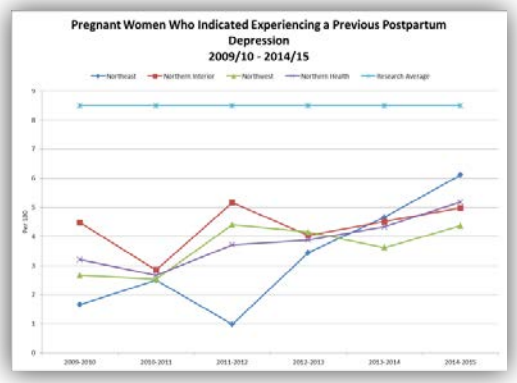


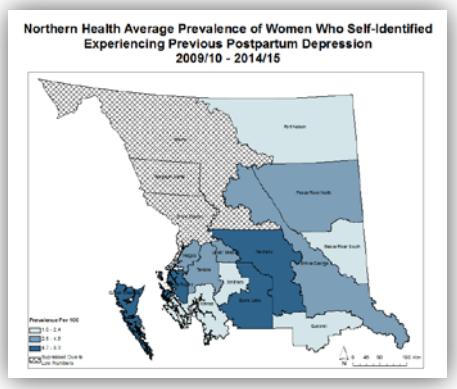
Depression in Pregnanacy



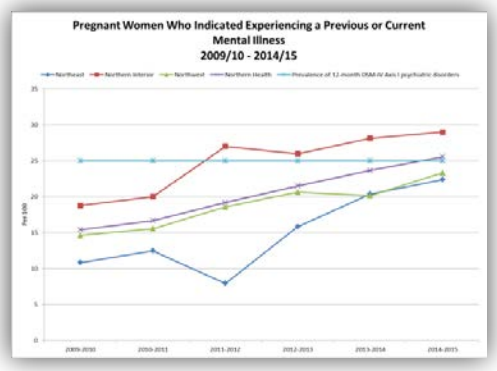


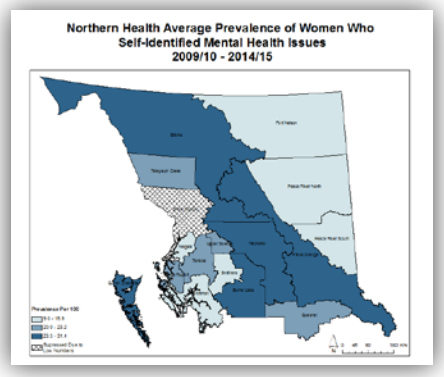
Previous Postpartum Depression





Any Previous Mental Health concern





What does the data tell us?

- For the time period of 2009 to 2015, perinatal data collected in Northern Health indicated a rate of 4.5 to 17.0 out of every 100 women self-identified depression as a concern.
- Postpartum depression has rates between 1.0 and 8.0 per 100 women across the health authority, with the highest in the North Peace Local Health Area. Data reported for anxiety has steadily risen across all HSDA. There has been a steady incline over the last 5 years in rates of mental health concerns. The Northeast HSDA has experienced a significant increase in overall mental health concerns since 2011/12 – doubling from 10% up to 22%.
- Northern Health has a rate of 16.5 (2014/15), comparable to other areas of BC. All HSDAs in the North have shown steady increases in rates since 2009/10. BC data indicates that 12% of women between nine months prenatal and nine months postnatal receive physician services for depression.
- Data shows a steady increase in incidences of perinatal depression and anxiety for women in pregnancy.
- Data limitations include previously mentioned pitfalls of using self-reported data. Given the stigma and shame that surround mental health issues, it is possible the rates underestimate the actual burden.

Why is this important?

- Mental health issues prior to, during pregnancy, and in the postpartum period are important to the overall health and well-being of the mother and the infant. Stress in pregnancy contributes to long-term health outcomes of the offspring.
    - Perinatal depression may be a significantly larger problem than indicated from the data. In one study it was estimated that only a third of all women with perinatal depression sought help from a health professional and only 15% of these women obtained help from a mental health professional (Small, S, J, & J, 1994).
    - Women with perinatal depression often experience intense feelings of guilt and failure, as well as worries about being perceived as unfit to care for their child.
- Depression is the leading cause of disability for women in their childbearing years (BC Reproductive Mental Health Program and Perinatal Services BC, 2006). Within BC an estimated one in five women will experience depression in relation to pregnancy and childbirth (BC Reproductive Mental Health Program and Perinatal Services BC, 2006).
- Perinatal depression can occur from the time of conception to one year after birth.
    - Perinatal depression affects about ten to twenty percent of women. Within BC twelve percent of women between nine months prenatal and nine months postnatal receive services for depression from a physician (Evans, Heron, Francomb, Oke, & Golding, 2001) (Gaynes, et al., 2005) (BC Reproductive Mental Health Program and Perinatal Services BC, 2006) (O'Hara & Swain, 1996).
- Furthermore, optimal infant and child wellness is dependent upon attachment in early developmental stages. Maternal mental health issues increase risks for substance use and other maladaptive coping mechanisms that may render a caregiver unavailable for attachment.
    - Impediments to attachment should be identified and addressed early to ensure optimal conditions for growth and development of the infant and optimal wellness for the mother and the family.
- Ongoing concern exists related to the sometimes isolating nature of rural and remote communities of Northern BC and the subsequent barriers to supports and services, including individual factors (transportation, social, household) and systemic challenges (health human resources, service planning). Capacity in families is further impacted when many families are separated by working away from home in industrial camps for oil, gas, mining, and forestry sectors.
- The adverse impacts of historic and current colonial policies and the ongoing social, economic, and political marginalization of Aboriginal communities in Canada have resulted in disparities in underlying social determinants of health, including levels of poverty and education, unemployment, poor housing, homelessness, and food insecurity.

- Not surprisingly, given these adverse social and economic conditions, Aboriginal women experience a disproportionate burden of adverse maternity experiences compared to non-Aboriginal women, including post-partum depression (National Collaborating Centre for Aboriginal Health, 2014).
    - "*The Canadian Maternity Experiences survey found that Aboriginal women were twice as likely to be depressed compared to non-Aboriginal women. This disproportionate burden of postpartum depression for Aboriginal compared to non-Aboriginal women has also been documented in another study of inner city women. Further research is currently underway to better understand the causes of postpartum depression among Aboriginal women. Data for Aboriginal women in BC specifically is currently unavailable*" (National Collaborating Centre for Aboriginal Health, 2014).

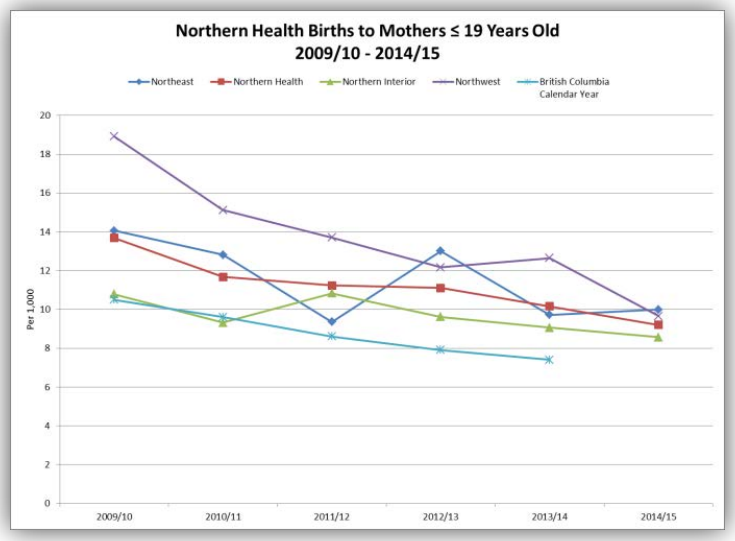
Bottom Line

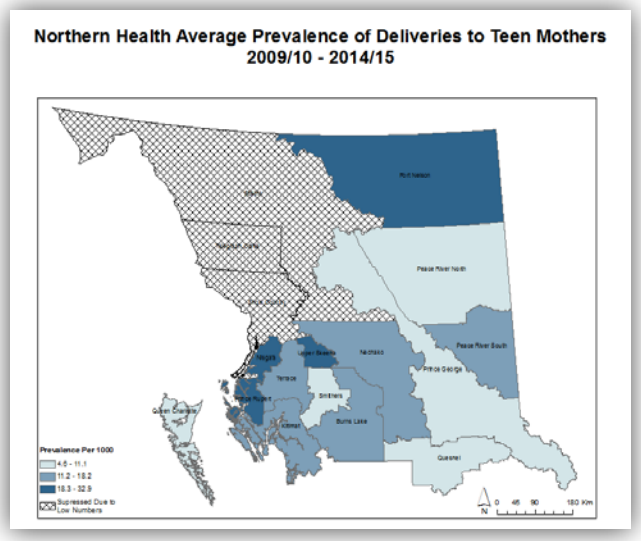
1. Perinatal depression occurs in up to 16% of pregnant women in Northern Health exceeding the provincial rates of 12%.
2. The risks of untreated perinatal depression and anxiety can include compromised prenatal care, increased risk of obstetrical complications, self-medication or substance use, compromised mother/infant interactions, cognitive, emotional and behavioural impairments in the developing child, and impaired family relationships.
3. Postpartum depression and anxiety are treatable conditions. Education of mothers, partners, families, and providers is critical to prevention, early identification, treatment, and support for perinatal depression and anxiety.
    - A variety of communication modes should be available to address rural and remote access challenges
    - Novel technology supports could be explored to improve connectedness, and
    - Ideally using a patient and family centred, trauma informed practices with consideration for the unique cultural circumstances of each encounter.
4. Improving the resilience of a family by addressing maternal or other mental health issue or substance use in the household will lead to improvement in the quality of life for the individual and the family.
5. Improved attachment can result from early interventions to address mental health concerns.
6. Aboriginal women, families, and communities are disproportionately impacted.

Considerations for future action

- Northern Health Perinatal Depression Strategy: Develop a regional strategy spanning acute care, community, primary care, public health, aboriginal health, mental health, and addictions services (via Perinatal Program) exploring the 4 pillars of support.
- Integrated Prenatal and Postpartum Services including the Perinatal Depression Clinical Practice Standard (Northern Health, 2015). Continue to provide and expand upon an integrated approach for interprofessional teams to support women with identified concerns.
- Education and promotion to raise awareness and remove stigma related to mental wellness.
- Encourage capacity building in communities to support young parents and families.
- Improve data collection, analysis, and dissemination to improve outcomes and appropriate use of resources.

7. Teenage mothers





What does the data tell us?

- For the time period of 2009 to 2015, perinatal data collected in Northern Health indicated a rate of 10 - 16 births out of 1,000 teenagers (15-19 years of age), as much as double the provincial rate of 8 births per 1,000 females 15-19 years of age.
- Overall, Northern Health rates have steadily decreased in the previous 5 years, but still persistently exceed the provincial rate. The provincial rate has trended downward steadily for the past 25 years.
- Weaknesses in data including challenges with denominators and data quality.

Why is this important?

- Teen pregnancy, especially before the age of 18, is a health and social concern in the general population. Mothers in their early teens face higher risks during pregnancy and early childbearing often begins a cycle of poverty and dependence (Office of The Provincial Health Officer, 2014).
- Research has shown that teen mothers encounter more difficulties when raising their children compared to non-teen mothers and that poorer health outcomes are observed in their children (Hoffman & Maynard, 2008).
- Since the year 2000, around 1.5% of Canadian females between the ages of 15 and 19 years have given birth each year, suggesting nearly 10% of girls will give birth at some point during their teens (Saewyc, Poon, Homma, & Skay, 2008). The McCreary Center society (2015) configured a report on youth sexual health and found that 1% of youth across the province had been pregnant or involved in a pregnancy (Poon, Smith, Saewyc, & McCreary Centre Society, 2015).
- The reports found that youth who reported they did not make any efforts to prevent pregnancy from occurring, were more than 5 times as likely, compared to those who used some method of contraception, to report a history of pregnancy (Poon, Smith, Saewyc, & McCreary Centre Society, 2015).
- Teen mothers were reported to have greater risk for social and economic disadvantages across their lifespan compared to mothers who delay having children (Hoffman & Maynard, 2008). Researchers suggest there are a variety of personal and financial costs for both the teen mother and the child. Isolation from the community, discontinued education, emotional distress, decreased employment opportunities, lower incomes, unstable relationships/marriages, and the frustration of sustained poverty are all potential impacts that teen mothers and their children may encounter (Hoffman & Maynard, 2008).

Bottom Line

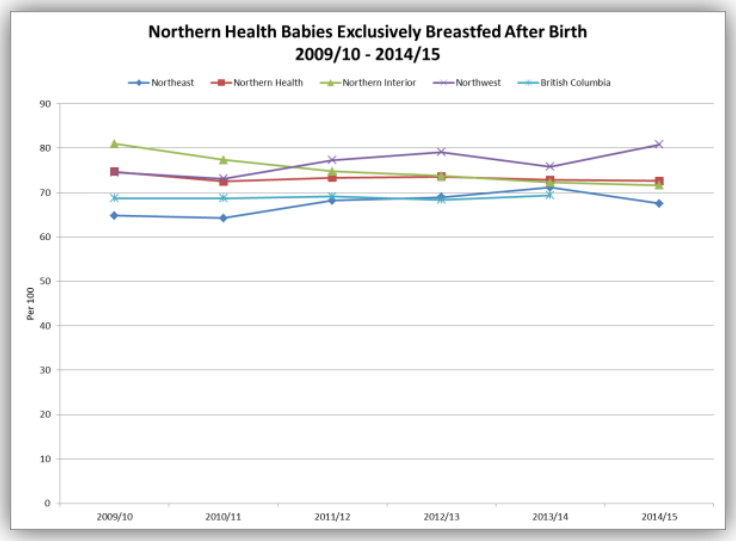
1. Northern Health reports rates of teen births that are as much as double the provincial rates.
2. Mothers in their early teens face higher risks during pregnancy.
3. Teen mothers are frequently single parents and encounter socio-economic disadvantages.
4. Children of teen mothers face higher rates of adverse effects on their health (i.e. lower BW, increased prematurity, illness, and developmental delays).

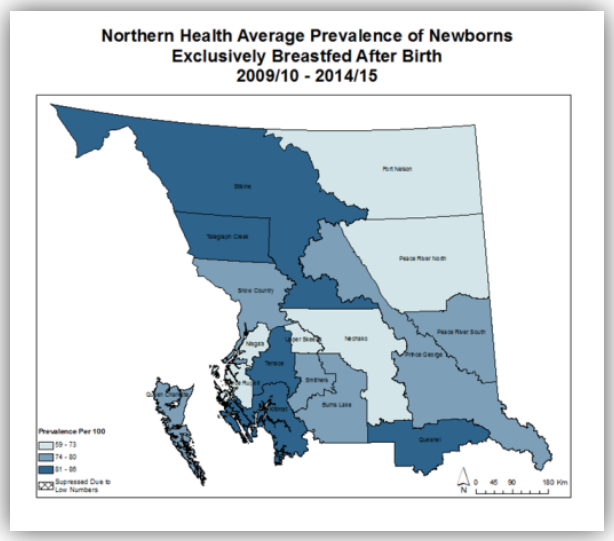
Considerations for future action

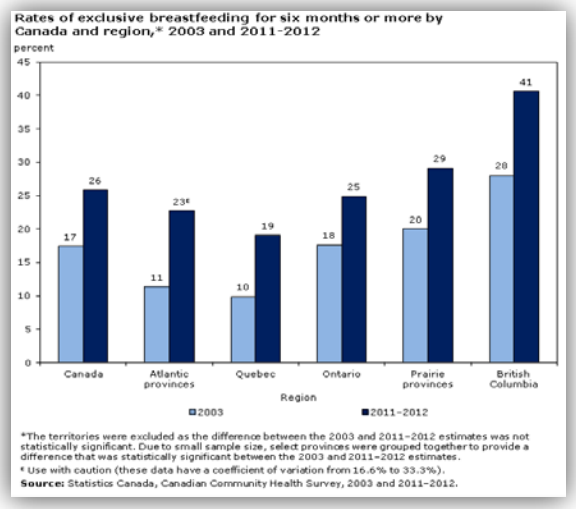
- Collaborate to improve access to publicly funded contraception and low-barrier primary care suitable for teens (hours, culture, and accessibility).
- Attempt to understand the reasons for youth pregnancy and better inform programs.
- Partnerships and innovations to aide in recreational planning for youth in rural areas and remote communities.
- Enhance public messaging (i.e. educational campaigns) and increase use of social media to reach the youth population.
- Increased targeted programming to teen mothers.
- Develop and evaluate universal low-barrier programs and in communities where teen births are highest.
- Develop and evaluate programs focused on First Nations and Aboriginal teens within urban settings.
- Support school districts to deliver comprehensive sexual and reproductive health curriculum as per the BC Education Curriculum.
- Provide universal sexual and reproductive health education, especially for women in childbearing years, including use of condoms and effective reversible methods of birth control.
- Make clinic visits suitable for teens by offering convenient office hours and confidential, respectful, and culturally appropriate services.

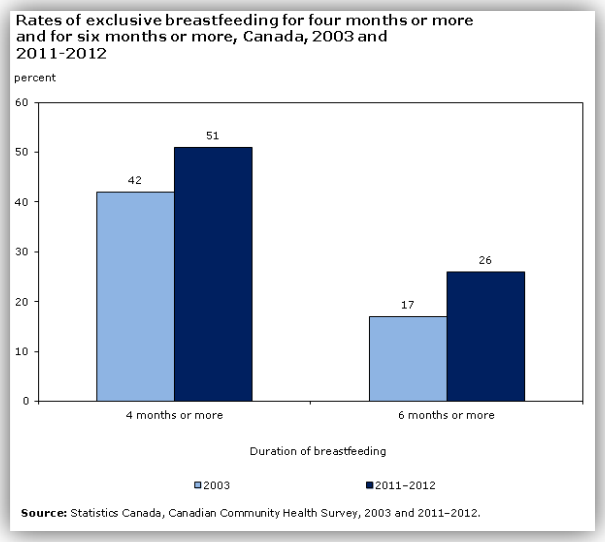
B. Healthy Babies

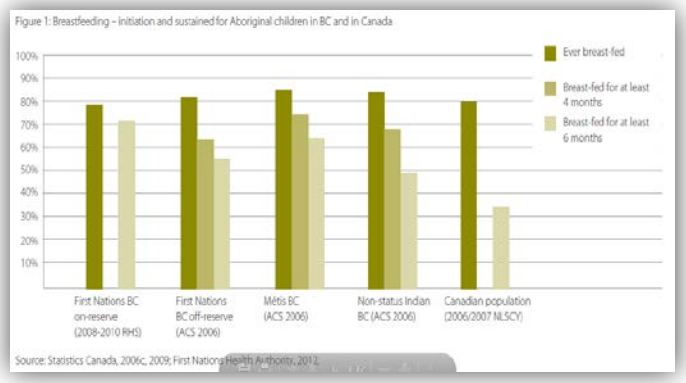
8. Breastfeeding at birth











From Strong Women, Strong Nations, NCCAH 2014

What does the data tell us?

- For the time period of 2009 to 2015, perinatal data collected in Northern Health indicated a rate of 72 to 75 babies out of every 100 was exclusively breastfed after birth.
  - The HSDA with the highest rate is the Northwest and the lowest is the Northeast.
  - Most HSDAs had a gradual increase in the exclusive breastfeeding rate except for the Northern Interior, which had a slight decrease.
  - Rates have been fairly consistent over the last 3 years in Northern Health. Data collection and abstraction from the hospital setting has been consistent over the last several years.
- Breastfeeding initiation rates in BC are among the highest in Canada.
  - Northern Health has a slightly higher exclusive breastfeeding rate at discharge from hospital, compared to the BC rate at 72.2%. Data collection and surveillance is a priority for improvement. [Note: Statistics show that the Northern BC breastfeeding initiation rate is below the provincial average. However, exclusive breastfeeding at hospital discharge is above the provincial average (Perinatal Services BC, 2014)].
  - Potential limitations to the analysis include inconsistent coding practices for newborn feeding practices, the exclusion of home births, and are inclusive only of in-patient breastfeeding and not post-discharge.
- Rates of breastfeeding initiation in Aboriginal families in BC compared to Canada generally. Rates of sustained breastfeeding (for at least six months) are higher for Aboriginal peoples in BC than for the Canadian population (Statistics Canada, 2006, 2009; First Nations Health Authority, 2012). This suggests that Aboriginal mothers who decide to breastfeed are receiving ongoing support from within their families and/or health care providers to continue breastfeeding (National Collaborating Centre for Aboriginal Health, 2014).
- The First Nations Regional Health Survey found that of those surveyed, 21.8% of First Nations women breastfed until three months, 33.4% between three and six months, and 44.8% beyond six months. It found that breastfeeding was significantly more common among mothers who were thirty-five or older (57.9%) (FNIGC, 2012).
  - Correlations between high rates of breastfeeding were also found among women with increasing level of education (post-secondary), income levels (>$80,000), less crowded housing, lived in urban and larger communities, or had parents or grandparents who attended residential school.
  - The length of breastfeeding was also significantly higher with increasing age of the mother at birth, slightly more with higher levels of education, slightly higher for mothers living in urban centers, but seemed to breastfeed longer in rural semi-isolated and remote/special isolated communities (page 93).
- CCHS 2011/12 reports that BC overall has higher provincial rates of exclusive breastfeeding at 6 months when compared to other provinces.

Why is this important?

- Exclusive breastfeeding is recommended as an infant's sole source of nutrition for the first six months of life. Continued breastfeeding is recommended for two years and beyond (BC Baby-Friendly Network, 2015) (Health Canada, 2000).
- Breast milk is rich in nutrients and antibodies that are important for healthy development and protection from infection and disease. The antibodies in breast milk are targeted towards various infectious agents in a mother's environment, agents likely to be present in the child's environment as well (Brandtzaeg, 2003) (Dieterich, Felice, & Rasmussen, 2013).
- Frequency and duration of breastfeeding can impact child health and development, such that infants who breastfeed for a shorter duration of time, or not at all, are at an increased risk for illness and disease (Bernshaw, 1991) (Newburg & Walker, 2007) (Slusser, 2007).

- While there are many breastfeeding initiatives in Northern BC, there is still reason for further effort in this region.
    - Studies have found that women who are older, better educated, and are of a medium-high socio-economic status (SES) are more likely to exclusively breastfeed their infants for the full six month duration. As such, this makes young moms, those of a lower SES, and low education risk factors for not breastfeeding for full duration.
    - Smoking has been linked to decreased breast milk production and decreased breastfeeding practices, such that the breast milk supply of smoking mothers is often insufficient to support the energy needs of newborns (Vio, Salazar, & Infante, 1991).

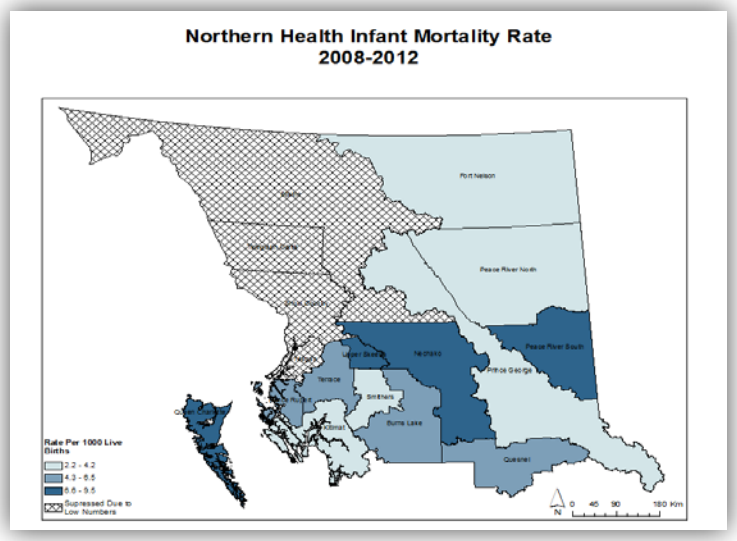
Bottom Line

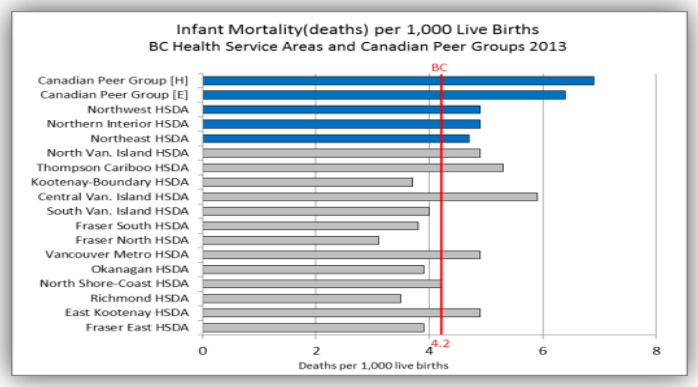
1. Breast milk optimizes infant development and provides health benefits to infants and nursing mothers. Breast milk offers economic benefits for mothers, families, and the health care system.
2. Northern Health does well with initiating breastfeeding in hospitals prior to discharge, with the rate of breastfeeding initiation being on average with the province.
3. However, data on breastfeeding maintenance is notoriously difficult to measure. Canadian average is near 3 of 10 babies exclusively breastfed at 6 months of age. BC, on average is higher at 4 of 10 exclusively breastfed 6 month olds.
4. Barriers to maintenance of breastfeeding and further improvements on initiation should be explored and communities and families should be supportive of breastfeeding.
5. Breast milk banks could be considered as an option for mothers who are unable to provide breast milk for their infants.

Considerations for future action

- Targeted follow-up for mothers with breastfeeding concerns.
- Increasing access to breastfeeding education and supports, including certified lactation consultants and breastfeeding support groups.
- Provide consistent and standard education for all staff and primary care providers connecting with breastfeeding women, from basic to advanced knowledge.
- Target breastfeeding promotions for mothers, all women in childbearing age, and to families and communities.
- Surveillance and data collection is a priority to inform service provision and program evaluation.

9. Infant mortality





Primary Data Source: Statistics Canada, Vital Statistics, Birth and Death Databases, 2005/2007.
CANSIM table no(s).: 102-4305, 102-4306

What does the data tell us?

- BC has one of the lowest infant mortality rates (3.8-4.2 infant deaths per 1,000 live births) amongst the provinces in Canada (Statistics Canada, 2015).
- In 2013, Northern BC's range of infant mortality rates of 4.6-4.8 infant deaths per 1,000 live births was higher than the provincial average of 4.2 infant deaths per 1,000 live births. It should be noted, small populations are a challenge to report on sensitive indicators like infant mortality rate, and variations in reported rates year to year can be dramatic, and interpreted within context.
- While the three Northern Health HSDA rates are higher than the provincial average, Northern Health as a whole reports lower infant mortality rates when compared with similar populations across Canada (Stats Canada peer groups E and H). Causes for the distinctions between rural and urban population measures like Infant Mortality Rates are not well understood (Public Health Agency of Canada, 2006).

Why is this important?

- Infant mortality is defined as the number of infant deaths per 1,000 live births in a calendar year, where an infant is defined as being less than 365 days old.
- Infant mortality rate is an internationally recognized indicator of child health and a country's overall health status (The Conference Board of Canada, n.d.). Infant mortality rates can be linked to: access to health care, family socio-economic status, the health of the mother, and low birth weight (Joloza, 2012). It also reflects the effectiveness of preventive care and the consideration given to maternal and child health (Office of the Provincial Health Officer, 2008).
- It is concerning that the Infant Mortality Rate in Northern Health remains higher than the provincial average. Our vast geography creates barriers for access to care which is directly linked with Infant Mortality. Many areas within Northern BC meet risk factors for infant mortality, such as above average rates of preterm birth as well as both high and low birth weights (Northern Health, 2012). Similar trends are seen for rural populations that have been considered comparable to Northern BC, like the Stats Canada Peer Groups. More research is needed to understand the distinctions between rural and urban population characteristics.
- There is inconsistent provincial and territorial tracking of Aboriginal infant mortality in Canada, despite the fact that socio-demographic profiles of Aboriginal populations indicate they are at risk for a disproportionate burden of infant mortality. In BC, a longitudinal study using vital statistics data

from 1981 to 2000 found that overall infant mortality rates were at least twice as high for First Nations compared to the non-First Nations population. Specifically, Infant Mortality Rates (IMRs) were 2.3 times higher for First Nations infants born to parents living in rural areas and 2.1 times higher for First Nations infants born to parents living in urban areas (Smylie, 2011).

- The Northern Regional Profile compiled by the First Nations Health Authority in January 2014 contains statistics on First Nations infant mortality from 1993 – 2010 (BC Ministry of Health, 2010).
    - The rates of infant mortality show a higher rate among First Nations in the Northern region of BC than other BC residents. First Nations infant mortality was 6 in 1,000 births (24 First Nations infant deaths) between 2006 and 2010, while other BC residents were approximately 3.66 per 1,000 births.
    - Page 16 of this report also depicts a graph that compares infant mortality across the health authorities in BC.

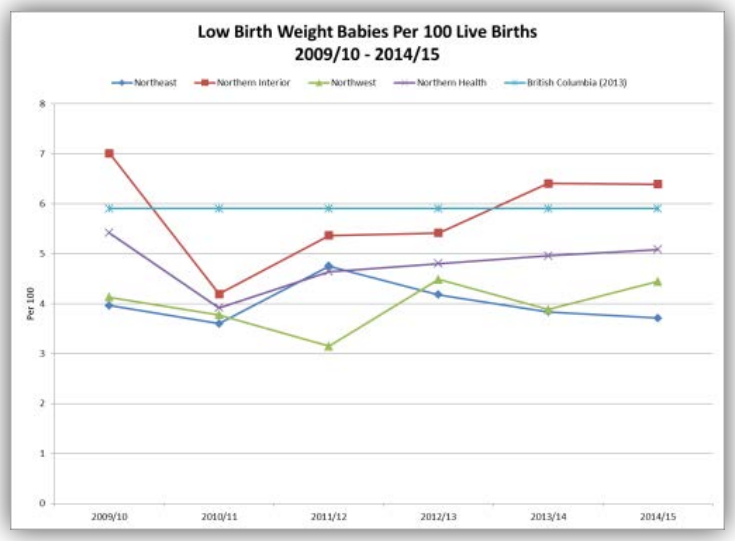
Bottom Line

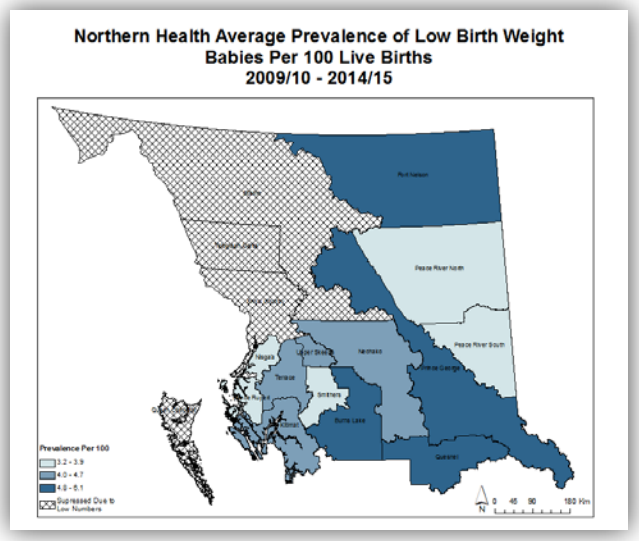
1. BC reports one of the lowest rates of infant mortality in Canada. Rates continue to decrease as technology and clinical practices advance, as well as increased access to quality child and family health services (Office of the Provincial Health Officer & Representative for Children and Youth, Growing Up in B.C., 2015).
2. Aboriginal populations have disproportionately higher rates of infant mortality.
3. Addressing perinatal contributors to infant mortality in high-risk populations could result in a reduced infant mortality rate.
4. As Northern Health's infant mortality rate remains higher than the rest of the province it is important to improve data collection to identify high-risk populations and the leading causes of infant mortality in our HA so interventions can be targeted. The hazards of statistical reporting in small populations must be considered.

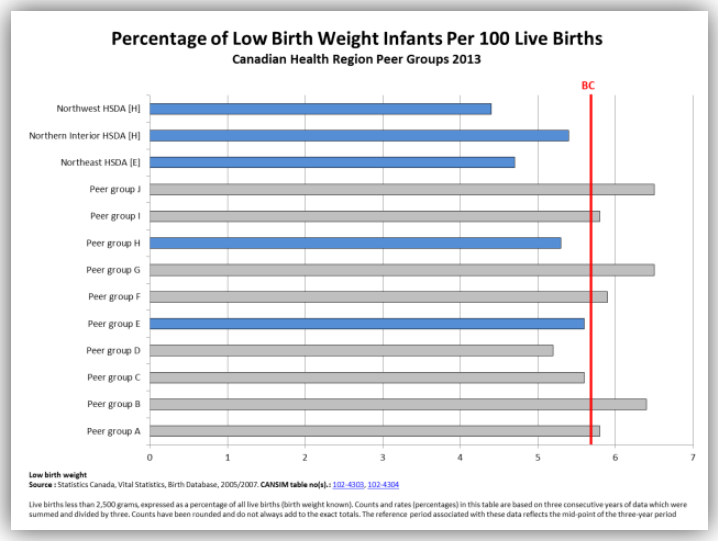
Considerations for future action

- Improve prenatal connections to health and social services through prenatal registry and primary health care integration.
- Northern Health, in partnership with First Nations Health Authority, is to develop culturally appropriate education and resources for healthy pregnancies, prenatal care, breast feeding, and safe sleeping practices as well as promote existing resources.
- Further strategize to meet the outcomes of the Transformative Change Accord.
- Identify high-risk populations and target them with increased access to prenatal education and care as the majority of infant mortality can be attributed to conditions in the perinatal period. Partner with the FNHA to develop and implement culturally appropriate perinatal and parenting resources. Increase awareness and availability of existing culturally appropriate safe sleeping resources. Ensure high-risk populations are attached to a primary care home to receive adequate prenatal care. Increase awareness of parenting programs and breastfeeding support.
- Educate to improve awareness of the importance for healthy child development and the impacts of healthy family and community environments for the growth and development of children.
- Improve data collection and surveillance to better understand morbidity and mortality.
- Rural and remote geographic features contribute to differences in Infant Mortality Rate and other indicators of equity - such as Life Expectancy or Potential Years of Life Lost. Encourage research to better understand these features.

10. Low birth weight infants







What does the data tell us?

- A low birth weight (LBW) infant is one that is born weighing less than 5 pounds 8 ounces (2500 grams) and can be born either at term or before term, although the most common cause of LBW is preterm delivery (Lewit, Baker, Corman, & Shiono, 1995) (Paneth, 1995).
- For the time period of 2009 to 2015, perinatal data collected in Northern Health indicated that an average of five out of 100 babies had low birth weight (weight less than 2500 grams or 5 pounds 8 ounces). The rate remained relatively stable over the time period but the Northern Interior saw an increase in low birth weights over the health authority average in this time period and is among the HSDAs with the highest rates in the province. On the other hand the rates of low birth weight infants in both the Northwest and Northeast have decreased over this time period and are below the provincial average.

- The Regional Health Survey identified approximately 4.8% of babies born to mothers included in the survey were found to be of low birth weight in 2008/10 which is a slight decrease from 5.6% of babies born at a low birth weight in the 2000/02 Regional Health Survey. Infants of low birth weight were found to be more common if the mother was over 35 at the time of birth (8.4 in 3,998 births) and those with only a high school education or less (5.1 in 4,115 births).
- This indicator is another example that allows for comparison with peer groups or similar populations to Northern BC as outlined by Statistics Canada. Northern Health HSDA rates are below the Peer Group rates of low birth weight infants.

Why is this important?

- Low birth weight negatively impacts infant survival and development.
- Specific predictors of LBW include low socioeconomic status, poor maternal nutrition, smoking while pregnant, consumption of drugs and alcohol while pregnant, overall maternal health, experiencing abuse while pregnant, and both low and high maternal age (Kramer, 1987).
- The rates of low birth weight infants in Northern Health are not a major concern at the current time. However, the population in Northern Health has higher rates of risk factors for low birth weight, such as teen pregnancy, women who smoke while pregnant, and poverty, which in turn affects nutritional status.
    - Northern BC has a high rate of teen moms, a higher than average rate of mothers that smoke while pregnant, and a higher than average rate of poverty which may affect nutritional status. These risk factors mean the low birth weight rate is unlikely to decrease further at this time.
- Factors that contribute to preterm birth and low birth weight include: multiple pregnancy rates, in-vitro fertilization rates, tobacco and drug use, age of the mother, maternal disease and infection, poor nutritional status, as well as iatrogenic factors. In Northern BC, nearly 6% of pregnant women use tobacco, which may contribute to the higher rates of low birth weight. Northern BC also has a poverty rate higher than the provincial average, which is linked to lower nutritional status, both of which could increase the rates of low birth weight. Northern BC has more teen pregnancies than the rest of the province, which is also linked to low birth weight.
- The majority of LBW infants grow and have normal outcomes. However, on average this group of individuals has a higher rate of illness, infant mortality, disease (such as cerebral palsy), subnormal growth, childhood disability, and cognitive delays (Hack, Klein, & Taylor, 1995) (Paneth, 1995).
    - Moreover, as birth weight decreases the chance of a child facing these health problems increases. Low birth weight threatens survival when an infant is first born and becomes an issue of development (e.g. cognitive development) in school years, which can carry over to adolescence and can persist through to adult life, as confirmed through longitudinal studies (Barker, Fall, Osmond, Winter, & Shaheen, 1991) (Hack, Klein, & Taylor, 1995).
    - Other studies on developmental outcomes in LBW children have found there are many developmental effects of having lower birth weight, from small effects and delays to more serious ones (Boardman, Powers, Padilla, & Hummer, 2002).

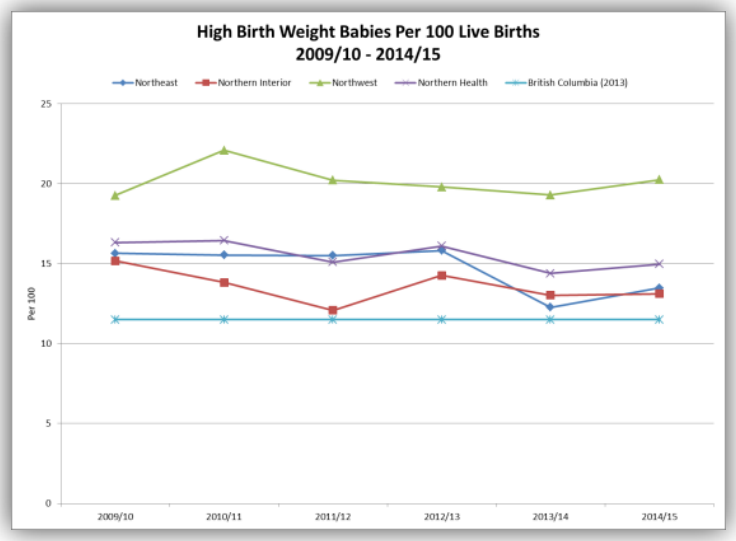
Bottom Line

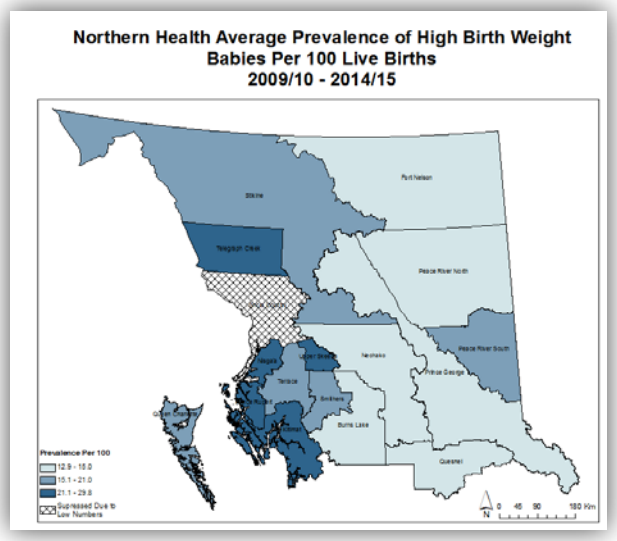
1. Low birth weight impacts infant survival and development. The lower the weight the more likely complications such as learning difficulties and medical complications can occur.
2. The rates of low birth weight infants in Northern Health have been stable and at or below provincial rates. Certain areas with increasing rates, such as the Northern Interior may benefit from initiatives to optimize nutrition for mothers and decrease tobacco and other addictive substance use.

Considerations for future action

- Address health inequities through decreasing poverty and optimizing pregnant women and their infants' nutrition, decrease teen pregnancy rates, and decrease tobacco use in Northern Health.
- Encourage breastfeeding or the use of donor breast milk from the Human Milk Bank for low birth weight infants so the nutrition is optimal for the infant's growth and development.
- Support food security generally, and specifically good nutrition during pregnancy. Promote local food sources and preserving food, in particular for First Nations and rural/remote communities.
    - Local food programs in communities. For example, community groups that can organize local food planting and growing (in some instances), gathering, and preserving to stimulate interest in local foods.
- Significant education in the community, schools, and at Northern Health sites around smoking and low birth weights tying the two together in a way that outlines the risks to the fetus and infant.
- Ensure pregnant women and their families can access smoking cessation supports easily.

11. High birth weight infants





What does the data tell us?

- For the time period from 2009 to 2015, perinatal data collected in Northern Health indicated a rate of 12.9 to 29.8 babies out of every 100 live births were greater than 8 pounds, 8 ounces at birth. During the preceding time period, high birth weights were higher than the BC rate in all HSDAs of Northern Health.
    - Over the observed time period, the Northwest HSDA has on average, higher birth weights than the remainder of Northern Health and the Local Health Areas.
- Over the 6-year time span, the average number of high birth weight infants has decreased slightly to 15 per 100 infants.
- Provincially, the rate of infants born with a high birth weight has shown a decreasing trend. The provincial rate was 12.3 per 100 live births in 2012/2013. While the Northern Health rates have also shown a decreasing trend, they are still higher than the provincial average and the gap is not narrowing. High birth weight has significant linkages with health outcomes.
- The markedly higher rates of high birth weight and large for gestational age for First Nations living on and off-reserve have been linked to relatively high and increasing rates of maternal diabetes for this population as well as higher rates of birth complications (Smylie, 2011).
- The Regional Health Survey found that 19.8% of infants born to First Nations mothers were of high birth weight, which is a slight decrease from the 21.1% found in 2002/03 Regional Health Survey. The highest rate of high birth weight of infants born to First Nations mothers was also found in the thirty-five and older group of women and for those living in a household with an income exceeding $80,000.

Why is this important?

- A high birth weight (HBW) infant is one that is born weighing more than 8 pounds, 8 ounces or more than 4000 grams (Centers for Disease Control and Prevention, 2014). Being born with a high birth weight can be the outcome of many variables. Babies may be heavier if the mother had a high BMI pre-pregnancy and/or gained a significant amount of weight during pregnancy. Similarly, if a mother is very tall there is also an increased chance for a child to be born with a high birth weight.
- Additionally, if a mother is diagnosed with gestational diabetes there is an increased likelihood that an infant will be born with a high birth weight, resulting from exposure to high sugar levels from the mother's bloodstream that can cause the fetus's pancreas to overproduce insulin. An increase in insulin is linked with extra fat storage and the fetus growing larger, and as such can lead to high birth weight (Ørskou, Henriksen, Kesmodel, & Secher, 2003).
    - High maternal leptin levels while pregnant and poor glucose tolerance during pregnancy can affect the fetus and contribute to high birth weight (Retnakaran, et al., 2012)

- High birth weight can also result from gestational hypertension or preeclampsia (the two are related as hypertension can lead to preeclampsia), which affect the fetus by influencing the blood available to the fetus and the blood pressure of the fetus, which can either result in high or low birth weight of the infant (Xiong, Demianczuk, Buekens, & Saunders, 2000).
- Infants born at a high birth weight are at a greater risk for many health outcomes, including problems with blood sugar, birth injuries, obesity (Cnattingius, Villamor, Lagerros, Wikström, & Granath, 2012) (Danielzik, Czerwinski-Mast, Langnäse, Dilba, & Müller, 2004), childhood morbidity (Ørskou, Henriksen, Kesmodel, & Secher, 2003), cognitive deficits as exhibited by school tests (Cesur & Rashad, 2008), and gestational diabetes (Lagerros, Cnattingius, Granath, Hanson, & Wikström, 2012).

Bottom Line

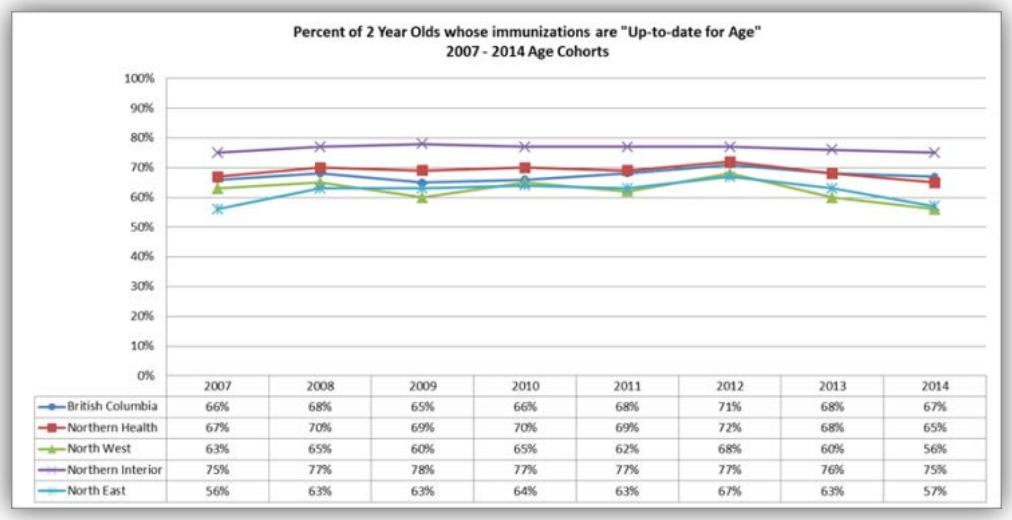
1. High birth weight infants are at greater risk of health outcomes related to birth injuries during delivery and lower levels of blood sugar following birth.
2. High birth weight infants are at greater risk of chronic disease and obesity as a child and into adulthood.
3. It is especially important that high birth weight infants are breast fed so that glucose levels are stabilized as quickly as possible and optimal nutrition is supplied to these infants in order to support normal growth patterns and decrease the risk of obesity into childhood.

Considerations for future action

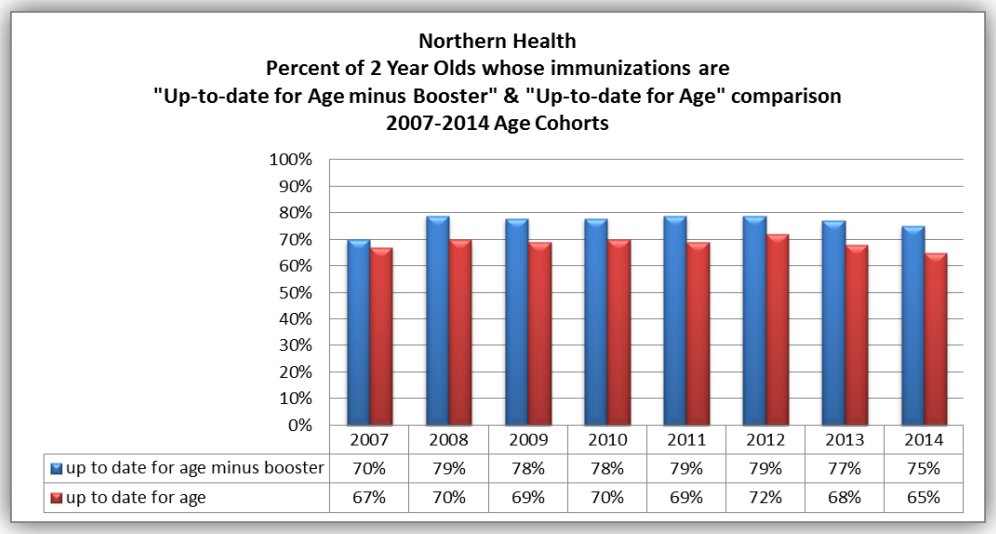
- High birth weight rates are above average in Northern BC, combined with Northern BC's high obesity rates, make it imperative to consider this risk factor for child health and development.
- Northern Health to use Baby Friendly principles based on evidence so that infants and children are breast fed as per World Health Organization guidelines (breast milk only for six months and with complementary feedings until two years and beyond) to optimize infant nutrition and growth patterns.
- Awareness programs regarding pre-pregnancy BMI, pre-pregnancy glucose levels, and being in optimum health before planning a pregnancy (for example, pre-pregnancy folic acid and discontinuing alcohol and tobacco use prior to pregnancy). Making it important to be the healthiest possible to ensure the infants are as healthy as possible. Working with communities to get the message out.
- Seek to improve surveillance and clinical research related to high birth weight infants. Further research may inform service planning.
- Raise awareness of the importance of healthy pre-pregnancy BMI and healthy weight gain in pregnancy. Weight gain in pregnancy is more indicative of birth weight at delivery than pre-pregnancy BMI.
- Encourage normal pre-pregnancy glucose in women with diabetes prior to pregnancy.
- Encourage planning of pregnancy so BMI and glucose levels can be normalized prior to pregnancy (many pregnancies are unplanned).
- Observe for health outcome issues related to high birth weight infants. If we are not collecting data on this group, for example birth injuries or shoulder dystocia at birth, then we should start collecting this information.
- Encourage breastfeeding for this population even though sometimes it is felt that the babies are hungry and are not getting enough. Breast milk amounts will regulate if the infant is fed on demand.
- Create targeted follow-up programs for high birth weight children.

C. Healthy Children

12. Immunization coverage for two year olds



	2007	2008	2009	2010	2011	2012	2013	2014
British Columbia	66%	68%	65%	66%	68%	71%	68%	67%
Northern Health	67%	70%	69%	70%	69%	72%	68%	65%
North West	63%	65%	60%	65%	62%	68%	60%	56%
Northern Interior	75%	77%	78%	77%	77%	77%	76%	75%
North East	56%	63%	63%	64%	63%	67%	63%	57%



	2007	2008	2009	2010	2011	2012	2013	2014
up to date for age minus booster	70%	79%	78%	78%	79%	79%	77%	75%
up to date for age	67%	70%	69%	70%	69%	72%	68%	65%

What does the data tell us?

- For the time period from 2007 to 2014, the immunization data collected for the province confirmed that coverage at the 2nd birthday is on par with or 1-4% higher in Northern Health compared to BC overall, except for 2014 when our rates were 2% lower than the provincial average. The HSDA with the highest rate is Northern Interior while the Northeast and Northwest rates are similar. The rates have been consistently at 75-78% throughout this period in Northern Interior but appreciably lower in the other two HSDAs, with a decline of 12% in the Northwest and of 10% in the Northeast from 2012 to 2014.

Rates have decreased overall for Northern Health since 2007 by 2%. The only exception is the MMR rates, which have increased close to 10%. Contributing factors are most likely due to the outbreaks in the lower mainland, Alberta, and Disneyland, California. As previously stated, Northern Health rates are 2-4% higher than the provincial average from 2007-2013 and then the rate dropped to 2% below the average in 2014.

- Vaccination coverage rates have been relatively stable over the past decade, although an slow decay in rates is being reported. There are significant data limitations in the vaccination records, related to coding, transcription, multiple vaccine providers, and multiple health record systems. Nevertheless, the existing data was used to inform the report.

Why is this important?

In recent years there has been a resurgence of various vaccine preventable diseases, such as pertussis (Cherry J. , 2012), mumps (Lynfield & Daum, 2014), and measles (De Serres, et al., 2013).

Potential reasons for this increase include the following: low vaccine coverage through under vaccination (Cherry & Harriman, 2012), non-vaccination (Omer, Salmon, Orenstein, deHart, & Halsey, 2009), failure (incomplete efficacy/potency) of vaccines, and genetic changes in circulating strains of *B. pertussis* (Cherry J. , 2012)

Although there are many immunization initiatives ongoing in Northern BC, issues still arise around availability, access, and stability of our vaccine supply due to the remote areas.

Variables that may contribute to lower immunization rates (age 0-5) in Northern BC

Family level	Community level
Below average SES Single parent families Below average education Above average financial assistance Higher than average unemployment	Rural/aboriginal hard to reach communities Limited access to health care Lack of education/knowledge on child health

There is evidence that, over the past two decades, there has been an increase in vaccine refusal in the industrialized world, wherein a growing number of parents are choosing not to have their children vaccinated (Omer, Salmon, Orenstein, deHart, & Halsey, 2009) (Tafuri, et al., 2014). This trend has been referred to as the anti-vaccination movement or vaccine hesitancy (World Health Organization, 2014). Beliefs that vaccines cause idiopathic illness and that disease can be fully prevented with a healthy lifestyle, diet, and hygiene are contributing to this phenomenon of anti-vaccination (Tafuri, et al., 2014). Vaccine refusal, combined with increased population density and global travel can increase the outbreaks of disease (Omer, Salmon, Orenstein, deHart, & Halsey, 2009) and a reason that we will continue to see vaccine preventable diseases around for years to come.

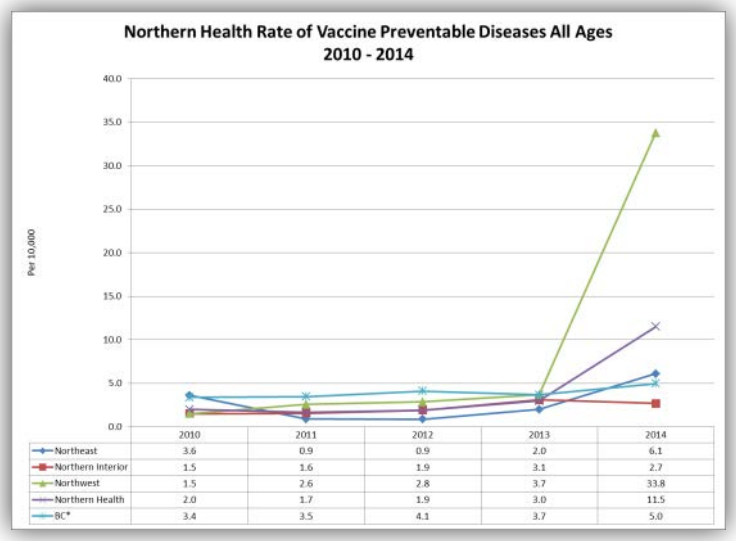
Bottom Line

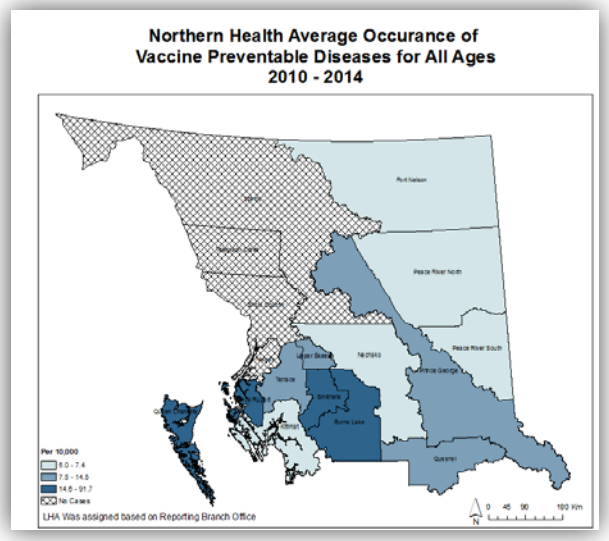
1. Northern Health vaccination rates are stable and close to or above provincial rates. Northern Health rates had been 2-4% higher than the provincial average from 2007-2013 and then the rate dropped to 2% below provincial average in 2014.
2. There are many opportunities to improve vaccination rates, vaccination records, and reporting.
3. For Northern Health, by getting the 18-month booster done on-time, the coverage rate could be increased to 75% from 65%.
4. Immunizing the majority of the population provides herd immunity and protects those that are most vulnerable to disease and those who cannot be protected by vaccines.
5. Immunization reduces illness, hospitalizations, and deaths due to vaccine preventable diseases.

Considerations for future action

- To improve vaccination rates, adopt evidence based measures that may include:
  - Improved access to vaccine providers
  - Improved record keeping and implementation of call back systems
  - Education and information that is timely and meets the information needs of both providers and parents
- Build capacity and networks with Community Vaccine Providers and ensure access to current education and promotional resources.
  - Primary care homes and interprofessional teams should seek to maximize vaccination coverage rates
- Increased Immunization promotion year round.
- Improve capacity for reporting and surveillance, recognizing that the diversity of health records and issues around privacy will continue to challenge the goal of a comprehensive singular vaccine record.

13. Vaccine preventable diseases





What does the data tell us?

The graph shows low levels of vaccine preventable disease from 2010 through 2012. The increase in vaccine preventable disease in Northern Health beginning in 2013 and rising through 2014 is largely attributable to: outbreaks of pertussis, two clusters of mumps in 2013, and high rates of invasive pneumococcal disease.

- Pertussis incidence was higher in Northern Health than elsewhere in the province in 2014 and the first half of 2015. In the five years preceding the 2014 outbreak, pertussis incidence in Northern Health paralleled or was slightly lower than the rest of Canada.
- Mumps is endemic in BC with resurgence in the province since 2008 and ongoing activity with periodic outbreaks since that time (BC Centre for Disease Control, 2013). From 2003 to 2012 the number of reported cases has ranged from 1 to 132 per year in BC (BC Centre for Disease Control, 2013). There were two clusters of mumps in 2013 in the Northern Interior and Northwest Service Delivery Areas.

In addition to the aforementioned diseases, vaccine preventable disease surveillance in BC also includes monitoring case reports of: influenza, Invasive Meningococcal Disease, Measles, Rubella and congenital Rubella syndrome, as well as Tetanus among others. With the exception of influenza, which persisted at low levels throughout this period, very few or no cases of these other diseases were reported in Northern Health from 2010 through 2014.

- There were no reports of cases of Haemophilus influenzae type b (Hib) in children in Northern Health during the 5-year period from 2010 through 2014. Hib disease has declined dramatically since the introduction of Hib vaccines in the early 1990s (BC Centre for Disease Control, 2014).
- A few cases of rubella in adults were reported in 2010 and 2011. No cases of congenital rubella syndrome have been reported in BC since 2004 (BC Centre for Disease Control, 2015).
- Only rarely are cases of Tetanus reported in BC. The last reported BC case was in an adult in 2014 (BC Centre for Disease Control, 2015).
- Sporadic cases of Invasive Meningococcal Disease (IMD) continue to occur in BC and these primarily occur in young adults. Rates of IMD have declined significantly reflecting the impact of the infant and school age catch-up meningococcal C conjugate immunization program beginning in 2003 (BC Centre for Disease Control, 2015).

The true burden of influenza among children 0-5 years in Northern BC is difficult to assess. There is little Health Authority-specific data on laboratory confirmed **influenza** cases by age from which to draw prevalence data. Even if there were, rates would likely be underestimates as influenza testing is not often sought to confirm the diagnosis or may be sought too late.

The data only reflects reportable vaccine preventable disease. There are other endemic vaccine preventable diseases, for example, caused by **Rotavirus** or **Varicella,** that are not systematically monitored. There are also diseases, not reflected in the chart, for which a vaccine exists in Canada but is not publically funded because risk is typically associated with travel or occupational risks. Examples include, but are not limited to: Hepatitis A, Typhoid, Cholera, Entero-toxigenic Escherichia coli (ETEC), Rabies, Japanese Encephalitis, and Tick Borne Encephalitis (removed from Canadian market in 2014).

Why is this important?

Over the past five years, people in Northern BC have escaped prominent vaccine preventable disease outbreaks, such as measles, that significantly impacted other health jurisdictions in BC. However the most notable recent communicable disease challenge is the 2014 outbreak of pertussis and the lingering low level transmission since that time.

- Pertussis remains endemic in BC with recurring cyclical peaks. Following almost a decade of low levels of Pertussis activity, likely attributable to previous outbreaks and immunization program expansions that may have contributed to population immunity, BC experienced a cyclical resurgence commencing in 2012.
- In 2014, a large outbreak of pertussis occurred in parts of Northern Health affecting mainly children. The pertussis incidence rate in the Northwest climbed to 164 per 100,000. The highest age specific incidence was in infants < 1 year old, followed by pre-school aged children (1-4 years).
- Variation in pertussis peaks and age-related patterns must be considered including the influence of prior outbreaks on population immunity, social mixing patterns, as well as differential testing, reporting, and other surveillance practices. Vaccine preventable disease outbreaks or clusters often occur where there is a substantial aggregate of under or unimmunized individuals.
- While pertussis outbreaks tend to cycle, peaking every 3-5 years, the pertussis outbreak of 2014 in the Northwest can, to some extent, be attributed to suboptimal vaccination rates, combined with waning immunity in those who have been immunized.

As became readily apparent in the pertussis outbreak, access to timely quality health care in rural, remote, and Northern communities can be a factor, both in immunization status and early identification and treatment of communicable disease.

- Geographic remoteness, long distances, lack of transport, low population densities, lesser availability of health care providers, limited availability of culturally appropriate services, and inclement weather conditions can pose a challenge to accessing health care, timely diagnosis through lab services, and other significant health human resource surge challenges.

Growing bodies of misinformation on the internet and social media will continue to contradict the fundamental science of vaccines. Vaccine preventable diseases may experience resurgence and result in subsequent morbidity and mortality for individuals, families, and communities.

- Certain communities in Northern Health experience increased rates of vaccine preventable disease that may be attributed to their predominant cultural or religious beliefs about vaccinations.
- Adequate vaccination rates and prevention of disease, disability, and death will require creative, comprehensive, and collaborative messaging that is respectful of individual choices, yet provides adequate information for informed choices and actions.

Bottom Line

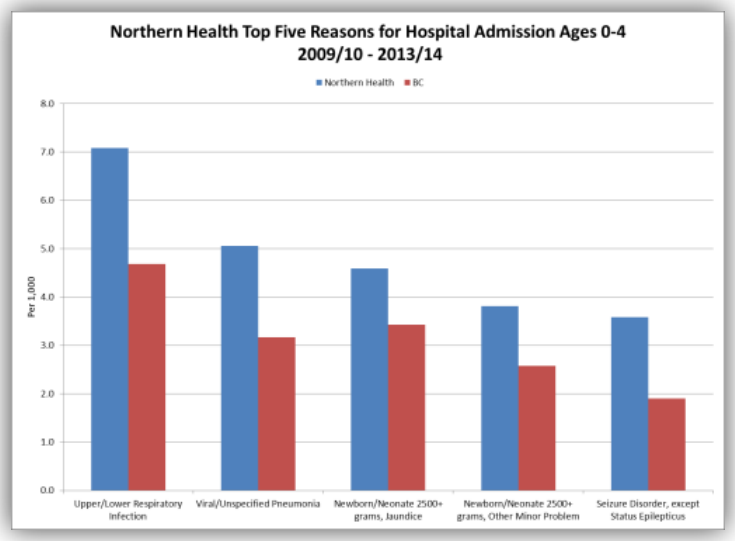
1. Vaccine preventable diseases pose a threat to the health and well-being of children, pregnant women, and families. They can result in potentially life-threatening complications and impacts to families and communities.
2. Today, vaccine preventable diseases are at or near record lows because of the success of vaccination programs. Vaccine hesitancy will continue to grow without the stark reality of vaccine preventable diseases causing illness in communities.
3. Recent outbreaks of vaccine preventable diseases show that even vaccinated people are at risk for disease if there is inadequate vaccine coverage in the population.

4. Some vaccine preventable diseases, such as influenza, circulate at low levels as expected. Ongoing education and efforts to improve vaccine acceptability and acceptance will continue to improve vaccination rates.
5. There have been great successes in preventing maternal (vertical) transmission of public health relevance. Improvements in screening and access to prenatal care are sure to continue to improve on this indicator.

Considerations for future action

- Improved health authority immunization and communicable disease control program measures and evaluation and timely surveillance activities to better inform responsiveness of prevention programs; all aided by a user friendly, linked electronic health record system.
    - Improved surveillance capacity for timely identification of clusters and rapid mobilization of an outbreak investigation team to protect the health of the population.
- Adoption of new vaccination programs as recommended by the BC Centre for Disease Control.
- To protect Northerners against vaccine preventable disease, it is recommended that immunization coverage rates be improved.
    - The proportion of BC children fully up to date for all routine immunizations by their second birthday is suboptimal (e.g., 68% in 2013). When vaccines were considered individually, 76-86% of children turning 2 in 2013 were up to date for a particular vaccine (BC Centre for Disease Control, 2014).
- Integration of primary health care services in the primary care home model will emphasize primary prevention of communicable disease in primary care settings.
- Improved collaboration with all partners in control of communicable disease including primary care, BC Centre for Disease Control, and First Nations Health Authority.

14. Leading causes of hospitalization



What does the data tell us?

The data collected from 2009/10 - 2013/14 is consistent with our expectations for leading causes of hospitalization for children 0-5. Upper/lower respiratory infections are the leading cause of admissions, followed by:

- viral/unspecified pneumonia;
- newborn jaundice;
- other newborn problems; and,
- seizures not related to epilepsy.

Severity of presentation and appropriateness of admission was not the purpose of the indicator review. This is a review of the most common reasons for admission to hospital for ages 0-5 years old. Further investigation into how patients can receive their care closer to home and prevent illness and disease would be beneficial.

Why is this important?

- Vaccine preventable diseases, as well as common respiratory viruses, likely contribute to the causes of the respiratory presentations (Stover & Litwin, 2014) -- basic preventive measures are available.
- More information is becoming available about the diagnosis of asthma in ages younger than 5, the Canadian Pediatric Society recently provided improved guidance for asthma in the preschool population (Ducharme, et al., 2015).
- Programs exist to support smaller community hospitals in the early identification and management of clinical deterioration of pediatric patients. Improved surveillance of severe pediatric presentations would inform service planning for management of hospitalized pediatric patients.
- Geographic challenges of rural and remote communities as well as social conditions, including inadequate housing, may contribute to disproportionate burden of illness and hardship on families who may need to travel to seek care and rates of hospitalization (Cevey-Macherel, et al., 2009).

Bottom Line

1. While the leading causes for hospitalization are consistent with our expectations, an increase in Northern Health's immunization rates and primary care attachment for vulnerable populations would likely decrease the rate of hospitalizations due to respiratory and other neonatal illnesses.
2. Defining care pathways to address the most common presentations that lead to hospitalization

would decrease variability in practice and thereby improve outcomes.

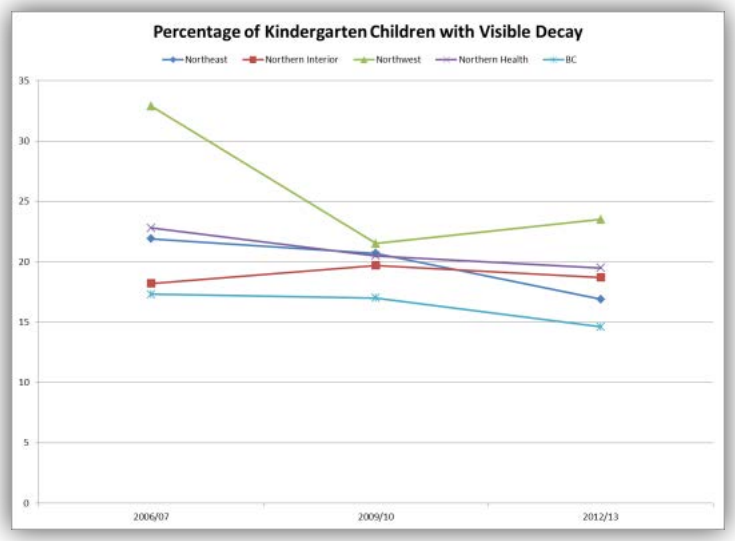
3. Background social issues should always be considered in a trauma informed, culturally safe, and patient and family centred manner. Consider careful discharge planning at the outset.

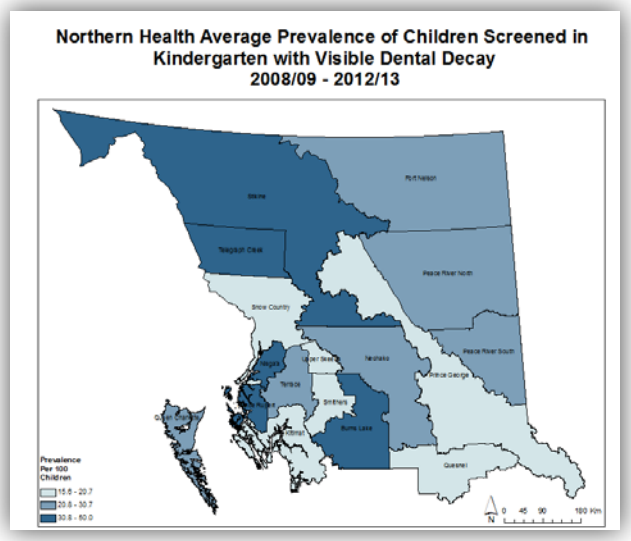
4. Surveillance within the acute and primary care setting, and public health surveillance as a larger system, is a priority. More extensive data collection inclusive of causative agents for infection, ambulatory data examining emergency department visits, and length of stay within the Local Health Areas would help guide interventions and service planning.

Considerations for future action

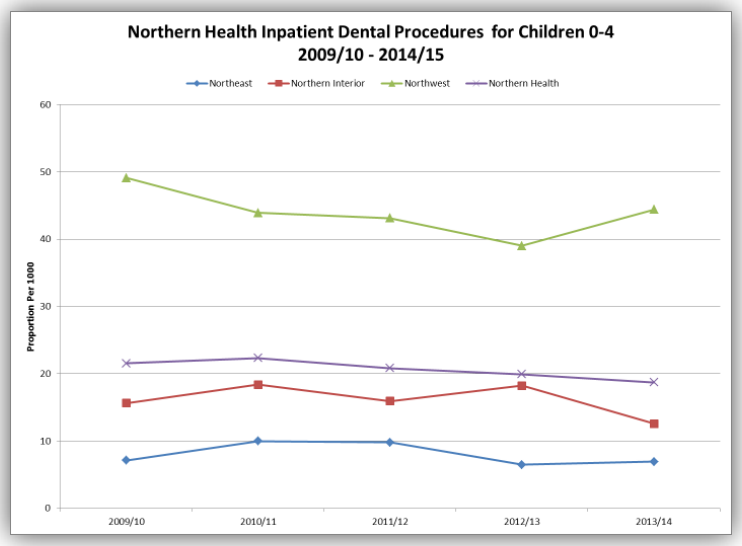
- Promote hand washing as basic hygiene and immunizations as primary prevention for vaccine preventable diseases and increase immunization rates to decrease any vaccine preventable respiratory illnesses. All children and families to be attached to a primary care provider.
- All sites treating children have access to paediatric care pathways and tools that increase recognition and response to deterioration in order to mitigate risk and reduce mortality and morbidity. Given the most common reasons for hospitalization, priority should be given to care pathways for newborn jaundice and infant and childhood respiratory presentations:
    - Consider implementing pathways for the most common neonatal, infant, and childhood respiratory presentations. Including referral to specialty care centres.
- Recognize and address the unique geographic challenges faced by populations living in rural and remote locations.
    - Implement novel service delivery methods and outreach services to provide primary care access to vulnerable and remote populations
- Through early identification in prenatal registration, parents should be offered early prenatal education about immunizations, breastfeeding, caring for illness in the infant, and general capacity building for caregiving. This may improve confidence, early identification of illness, and access to care when conditions can be treated in ambulatory settings.
- Resource guides for families, caregivers, and health care providers can improve access to services.
- Addressing the underlying social determinants of health and raising overall family well-being and community capacity requires collaborative intersectoral action, and will benefit families and communities.

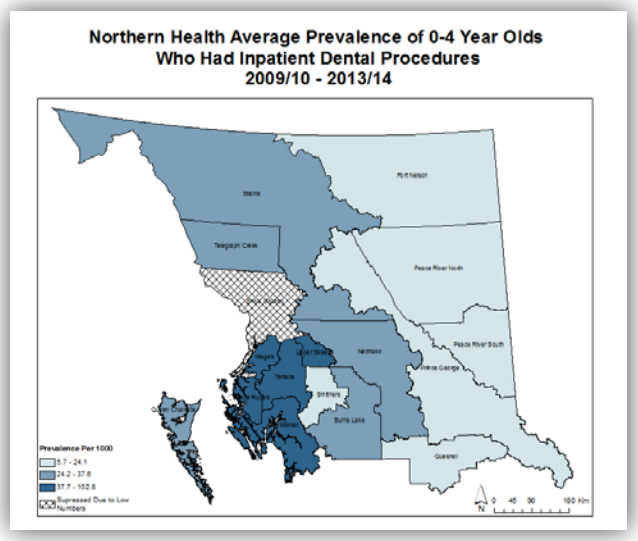
15. Dental caries rate

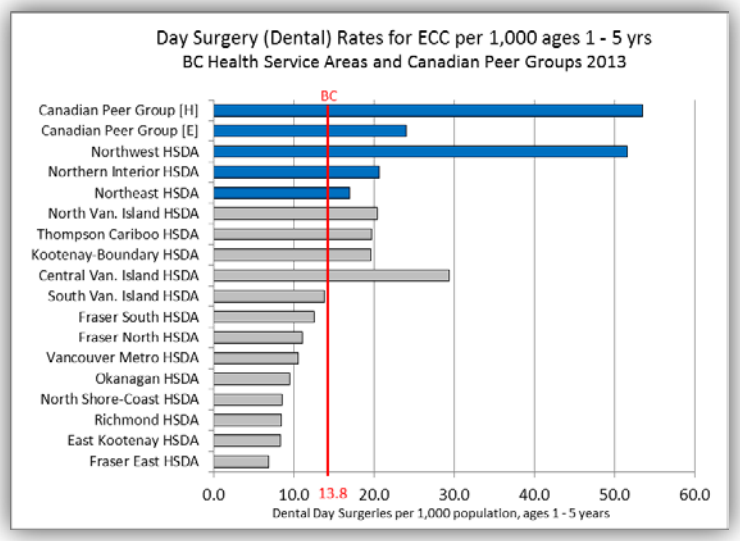




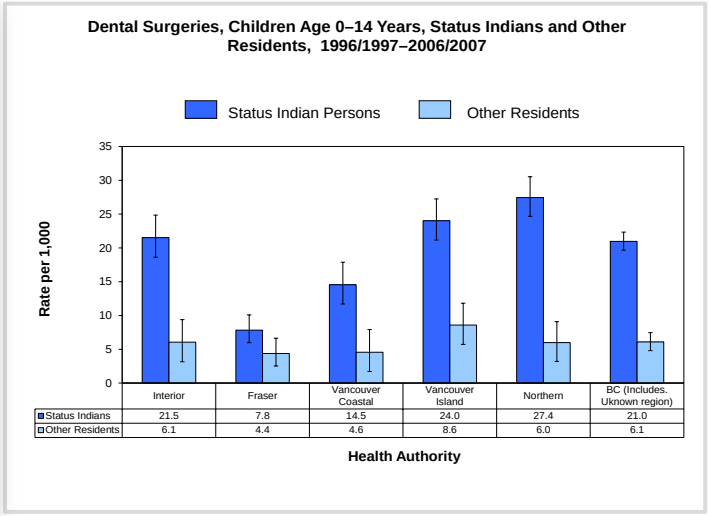
16. Dental surgeries rate







Primary Data Source: Canadian Institute for Health Information (CIHI: Treatment of Preventable Dental Cavities in Preschoolers, 2013)



Source: (Office of the Provincial Health Officer, 2007)

What does the data tell us about dental caries (tooth decay)?

- First and foremost, it is important to recognize the weaknesses of the data. The variability in what is collected year to year, screening actively and passively collecting data, should be considered when interpreting the data. Kindergarten screening is done every year in Northern Health. However, it is not recommended to use the data for all years it is collected.
  - Intensively collect data every 3 years with the Provincial Kindergarten Survey, with a goal of screening at least 85% of Kindergarten children (95.1% of Kindergarten children in Northern Health were screened in 2012-13) (BC Ministry of Health, 2014, p. 8).
  - Passively collect data for the two years between Provincial Kindergarten Survey years.
- Provincially, since the 2006-07 school year, the number of Kindergarten children who are caries free has increased by 6.2% and the number who have with visible decay has decreased by 2.7% (BC Ministry of Health, 2014).
  - Northern Health has the lowest percentage of children who are caries free (60.6%) and the highest percentage of children with visible decay (19.5%) in BC (BC Ministry of Health, 2014, p. 11)
  - Since the 2006-07 school year, Northern Health Kindergarten children dental health has improved
    - Caries free rates have increased by 1.8% (=60.6% - 58.8%) (BC Ministry of Health, 2014, pp. 12,24)
    - Visible decay rates decreased by 3.3% (=22.8% - 19.5%) (BC Ministry of Health, 2014, pp. 13,24)
    - Treated caries has increased by 1.4% (=19.9% - 18.5%) (BC Ministry of Health, 2014, pp. 13,24)
  - The Northwest has the highest percentage of visible decay (23.5%) and treated caries (23.2%) of any HSDA in the province
    - Northern Interior (18.7%) and Northeast (16.9%) have a higher percentages of visible decay than the provincial average (14.6%) (BC Ministry of Health, 2014, pp. 16-17)
- The dental health of kindergarten children is getting better. However, the risk factors still exist.
  - Low socio-economic status is one of the most important risk factors for developing caries (BC Ministry of Health, 2014, p. VII)
  - No dental insurance plans for low-income parents/caregivers. Cannot access services.
  - Caries are transmissible. For adults with untreated caries, their children are at higher risk for

caries.

- In the 2012/13 BC Kindergarten Survey (BC Ministry of Health, 2014, p. 9):
  - The percentage of Aboriginal children who were caries free was 26.2% lower than that of non-Aboriginal children (43.3% compared to 69.5%)
  - The percentage of Aboriginal children with visible decay was 11.1% higher than that of non-Aboriginal children (24.8% compared to 13.7%)
- Since the 2009/10 Kindergarten Survey, the 2012/13 results show (BC Ministry of Health, 2014, p. 10):
  - The percentage of Aboriginal children who are caries free had increased by 4.0%
  - The percentage of Aboriginal children with visible decay had decreased by 3.7%
- Compared to BC Health Authorities Aboriginal Kindergarten Children surveyed in 2012/13, the 92.6% of all (BC Ministry of Health & First Nations Health Authority, 2015, p. 16) Northern Health Aboriginal Children surveyed had:
  - A significantly lower percentage was caries free (38.0%). BC was 43.3% (BC Ministry of Health & First Nations Health Authority, 2015, pp. 10-11).
  - A significantly higher percentage with visible decay (31.8%). BC was 24.8% (BC Ministry of Health & First Nations Health Authority, 2015, pp. 10-11).
  - Highest non-urgent referrals in BC (25.6% as compared to 20.3% in BC) and almost double non-Aboriginal children in Northern Health (12.9%) (BC Ministry of Health & First Nations Health Authority, 2015, p. 13).
  - Highest urgent referrals in BC (7.9% as compared with 5.7% in BC) and almost five times non-Aboriginal children in Northern Health (1.6%) (BC Ministry of Health & First Nations Health Authority, 2015, p. 13).

What does the data tell us about dental surgeries?

- In this recent CIHI report, the patterns we see in our own local data and the research findings of many others are consistent in that children living in rural and remote locations, Aboriginal people, and persons living in circumstances of low socio-economic status (SES) are:
  - Disproportionately affected by Early Childhood Caries (ECC)
  - More likely to require restorative dental care in a hospital setting. (CIHI: Treatment of Preventable Dental Cavities in Preschoolers, 2013) (National Collaborating Centre for Aboriginal Health, 2013; Canadian Dental Association, 2010) (BC Ministry of Health, 2014) (First Nations Health Authority, Health Canada and Province of BC, 2014).
- The Northwest HSDA has a persistently elevated rate of inpatient dental procedures over the past several years. When compared to other Northern Canadian regions, the same phenomenon is seen with respect to dental surgeries.
- A proportion of the dental caries rates that are seen in the visible decay screens eventually show up in the dental surgery docket.

Why is dental caries important?

- Northern Health kindergarten children have *the poorest dental health in BC*:
  - Northern children have more vulnerabilities (BC Ministry of Health, 2015)
  - Limited access to dental care (both for treatment and prevention services)
- Among infectious childhood diseases, dental caries is the most prevalent, affecting children worldwide (Caufield, Li, & Bromage, 2012). While the primary population affected by dental caries is disadvantaged children, this disease can occur to anybody (Early Childhood Dental Evaluation Subcommittee, 2011).
- Dental caries significantly impact child development and has also been linked with many health outcomes (BC Ministry of Health, 2014).
- Dental disease is progressive - it is necessary to focus on child health early in life (Early Childhood Dental Evaluation Subcommittee, 2011).
- While prevalence of Early Childhood Caries (ECC) in urban areas of Canada is 6-8% (Rowan-Legg & Canadian Paediatric Society, 2013) the prevalence in BC is much higher. One survey indicated that 41%

of children surveyed in BC experienced some form of dental caries before they reached kindergarten (Early Childhood Dental Evaluation Subcommittee, 2011).

  - In Northern BC, Kindergarten children surveyed in 2012/13 had 39.4% caries experience (treated and visible decay). The provincial average was 32.7% caries experience (BC Ministry of Health, 2014).

- Improvement in dental health: the Fluoride Varnish program (FV) is a plausible cause for the results we observe in the data (improvement) as research has demonstrated the application of fluoride varnish is highly effective in preventing dental caries in both primary and permanent teeth (BC Ministry of Health, 2014).
- People living in isolated or remote communities may have decreased access to preventive care and may only receive preventive or treatment services when a health professional makes a scheduled visit (National Collaborating Centre for Aboriginal Health, 2013). Additionally, rural families must travel more often for preventive and treatment services than their urban counterparts.
- Financial barriers may also be significant for families.

Why are dental surgeries important?

- The reality that dental services are not provided by the publicly funded health system contributes to significant disparities related to oral health.
  - Employment, income, and benefits that include dental coverage result in better outcomes than limited income without benefits and no dental coverage.
- Identifying the burden of serious dental outcomes, such as dental surgeries, provides an opportunity to intervene to prevent the unnecessary morbidity and costs, both direct and indirect.
- Strict attention to preventive measures is a good place to start. Encouraging others that are responsible for dental health to consider more comprehensive approaches and at the very least consider advocacy for passive population level interventions to improve dental health.

Bottom Line for Dental Caries

1. Dental caries (tooth decay) is preventable. One of the most important risk factors for developing oral disease (especially caries) is lower socio-economic status (SES), where 50% of children in low SES neighbourhoods experience tooth decay compared to 30-33% of children in high to moderate SES neighbourhoods (BC Ministry of Health, 2014).
2. Oral health is part of overall health and share common risk factors with a number of chronic diseases (BC Ministry of Health, 2014).
3. It costs Northern Health about $2 million each year for dental surgery, completely preventable. In Canada, dental disease accounts for 7% of total health expenditures and 39.1% of Canadians experience a time loss annually from work, school, or normal activities due to high levels of dental visits and dental sick days (BC Ministry of Health, 2014).
4. Access to appropriate primary and secondary dental care is a challenge in Northern and remote communities. Equitable approaches to dental care would improve the oral health of the population.

Bottom Line for Dental Surgeries

1. The needless suffering and negative developmental impacts for children are preventable.
2. The economic burden incurred by families, the health system, and society as result of ECC and the need for restorative interventions, adds up quickly, is significant, and avoidable.
3. While Pediatric dental surgeries satisfy an immediate urgent medical need, they do not address the determinants of demand, nor are they a cost effective approach.
4. Inequities exist in terms of children's oral health and their ability to access appropriate preventive and restorative dental care. These inequities need to be addressed.
5. Work together in partnership with communities, provincial partners, and the First Nations Health Authority to address the differences in dental outcomes for residents in Northern Health.

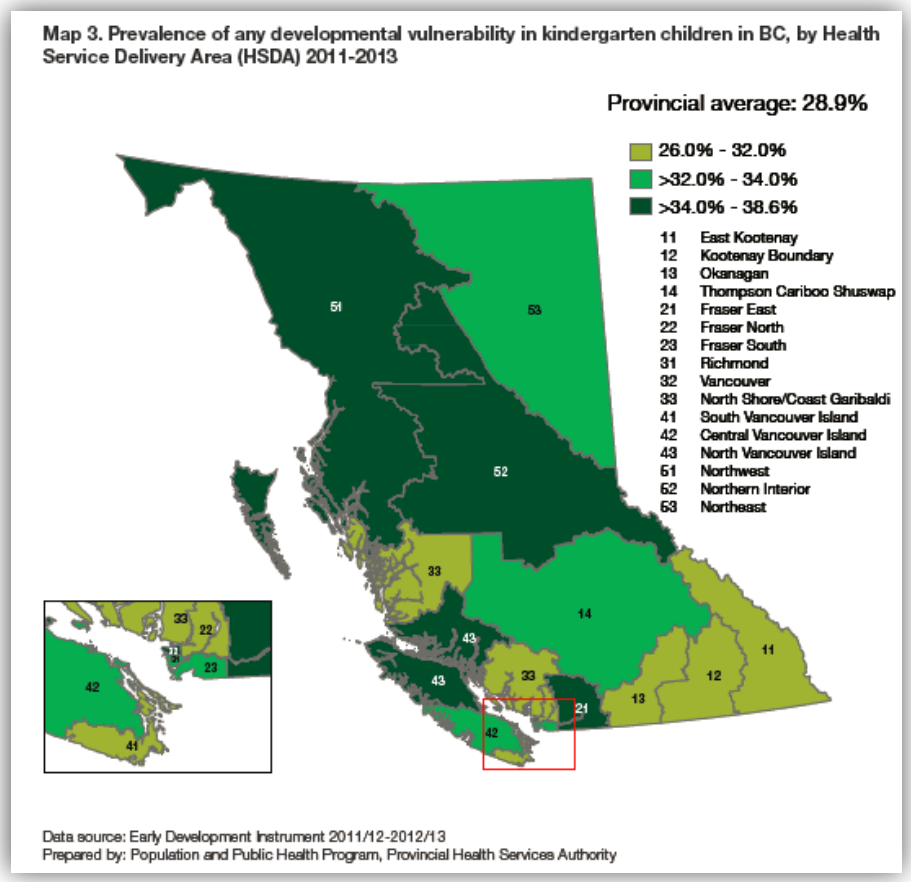
Considerations for Future Action for Dental Caries

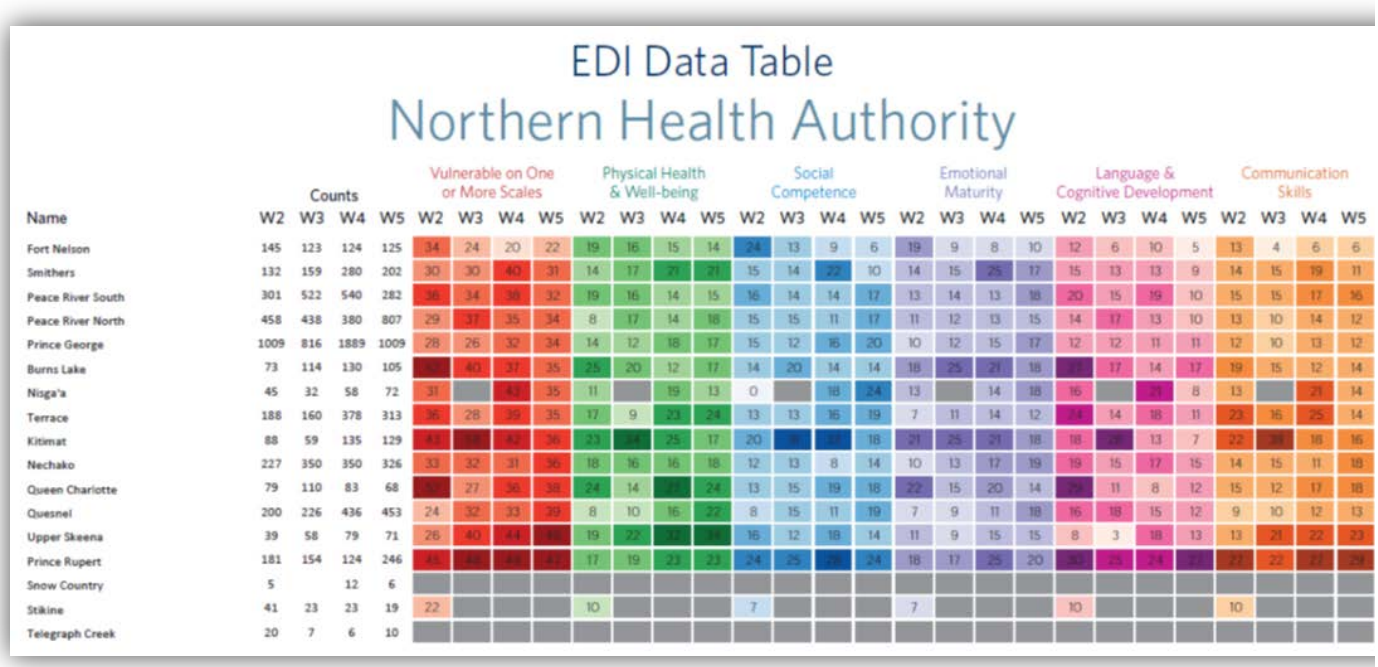
- Consider innovative partnerships to improve oral health of children in the North.
- Increase Sealant program – Northern Health Dental partners with CNC Dental studies program to provide a limited program to vulnerable children in Prince George. However only about 200 students are able to participate once a year from one or two schools.
- Reduce barriers to accessing dental care (financial, geographical, limited services)
    - Advocate for dental treatment programs for low-income adults and other vulnerable populations.
    - In partnership with Northern Health, the Prince George Native Friendship Centre operates a non-profit emergency dental clinic. The clinic is open to anyone in the community who cannot afford treatment and who are experiencing pain or infection. Dentists, Certified Dental Assistants, and Dental Hygienists volunteer their time and expertise (Prince George Native Friendship Centre, 2011) (British Columbia Dental Association, 2014).
    - Unfortunately, this is the only clinic in Northern BC and treatment options for clients are limited and they must be prepared to have their teeth extracted rather than repaired as a solution. As such, this approach does not support the retention of teeth throughout the life-course and the ability to consume a variety of foods. It illustrates the depth of invisible inequities (Haggerstone, 2015).
- Oral health is a determinant of overall health. Northerners have poorer health outcomes than the rest of the province.
- Advocate for ongoing training programs at all levels of dental professions.

Considerations for future action to prevent dental surgeries

- Encourage a public health dental strategy for at risk populations that may include expansion of existing programs (fluoride varnish) or adoption of new programs (dental sealants) in communities where the burden of dental caries is significant.
- Work in partnership with educators to ensure low barrier dental services for residents in Northern BC.
    - Consider advocating with the BC Dental Association to provide coverage of dental services to underserved communities
    - Dental hygienist, dental assistant, and dental aide programs are valuable to the ongoing promotion and protection of oral health for the North
- Identify opportunities to decrease dental surgeries in targeted communities or populations.
    - Partnerships and enhanced prevention services may be required
    - Research to understand the distribution of morbidity and key risk, and protective factors to reduce the burden related to dental caries and surgical dentistry
- Improve surveillance and data interpretation to better inform programs.

17. Early Developmental Instrument measures



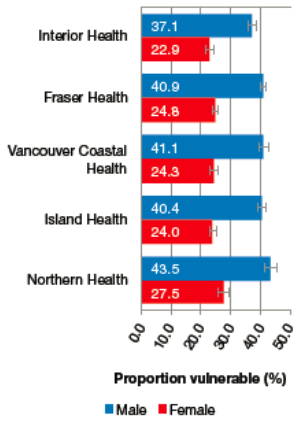


EDI Data Table

Northern Health Authority

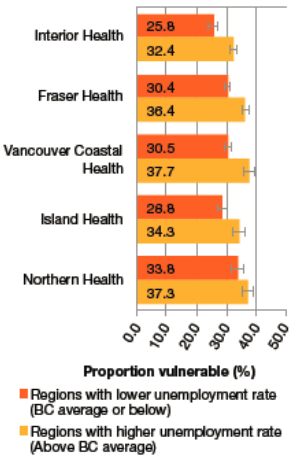
Name	Counts				Vulnerable on One or More Scales				Physical Health & Well-being				Social Competence				Emotional Maturity				Language & Cognitive Development				Communication Skills			
	W2	W3	W4	W5	W2	W3	W4	W5	W2	W3	W4	W5	W2	W3	W4	W5	W2	W3	W4	W5	W2	W3	W4	W5	W2	W3	W4	W5
Fort Nelson	145	123	124	125	34	24	20	22	19	16	15	14	24	13	9	6	19	9	8	10	12	6	10	5	13	4	6	6
Smithers	132	159	280	202	30	30	40	31	14	17	21	21	15	14	22	10	14	15	25	17	15	13	13	9	14	15	19	11
Peace River South	301	522	540	282	36	34	38	32	19	16	14	15	16	14	14	17	13	14	13	18	20	15	19	10	15	15	17	16
Peace River North	458	438	380	807	29	37	35	34	8	17	14	18	15	15	11	17	11	12	13	15	14	17	13	10	13	10	14	12
Prince George	1009	816	1889	1009	28	26	32	34	14	12	18	17	15	12	16	20	10	12	15	17	12	12	11	11	12	10	13	12
Burns Lake	73	114	130	105	40	40	37	35	25	20	12	17	14	20	14	14	18	25	21	18	23	17	14	17	19	15	12	14
Nisga'a	45	32	58	72	31		43	35	11		19	13	0		18	24	13		14	18	16		21	8	13		21	14
Terrace	188	160	378	313	36	28	39	35	17	9	23	24	13	13	16	19	7	11	14	12	24	14	18	11	23	16	25	14
Kitimat	88	59	135	129	43	38	42	36	23	24	25	17	20	16	22	18	21	25	21	18	18	28	13	7	22	28	18	16
Nechako	227	350	350	326	33	32	31	36	18	16	16	18	12	13	8	14	10	13	17	19	19	15	17	15	14	15	11	18
Queen Charlotte	79	110	83	68	36	27	36	38	24	14	23	24	13	15	19	18	22	15	20	14	26	11	8	12	15	12	17	18
Quesnel	200	226	436	453	24	32	33	39	8	10	16	22	8	15	11	19	7	9	11	18	16	18	15	12	9	10	12	13
Upper Skeena	39	58	79	71	26	40	44	46	19	22	32	34	16	12	18	14	11	9	15	15	8	3	18	13	13	21	22	23
Prince Rupert	181	154	124	246	45	44	44	47	17	19	23	23	24	25	28	24	18	17	25	20	34	25	24	23	27	22	27	29
Snow Country	5		12	6																								
Stikine	41	23	23	19	22				10				7				7				10				10			
Telegraph Creek	20	7	6	10																								

Figure 6. Percentage of kindergarten children vulnerable in one or more EDI areas in each health authority, by sex, EDI 2011/12 - 2012/13



Across BC health authorities, the differences in vulnerability rates between boys and girls were consistent with provincial findings.

Figure 7. Percentage of kindergarten children vulnerable in one or more EDI areas in each health authority, by neighbourhood unemployment rate measure, EDI 2011/12 - 2012/13, NHS 2011



Across BC health authorities, the differences in vulnerability rates between regions with higher or lower unemployment were consistent with provincial findings.

What does the data tell us?

- 1 of 3 children in Northern BC is vulnerable in any one of the Early Developmental Instrument (EDI) dimensions.
- Males also show more vulnerability than females, and in areas with higher unemployment.
- Rates of vulnerability in Northern BC tend to be higher than the provincial rates. The majority of communities in Northern BC demonstrate vulnerability on one or more scales of the EDI.
- Physical Health: The provincial vulnerability rate is 15.70%. Eleven of Fourteen Northern communities have a higher vulnerability rate, with the exception of Nisga'a at 13%, Fort Nelson at 14%, and Peace River South at 15%.
- Language and Cognitive Development: The provincial vulnerability rate is 9%. Ten of Fourteen Northern communities have a higher vulnerability rate, with the exception of Nisga'a at 8%, Kitimat at 7%, Smithers at 9%, and Fort Nelson at 5%.
- Social Competence: The provincial vulnerability rate is 15.60%. Nine of Fourteen Northern communities have a higher vulnerability rate, with the exception of Smithers at 10%, Burns Lake at 14%, Nechako at 14%, Fort Nelson at 6%, and Upper Skeena at 14%.
- Emotional Maturity: The provincial vulnerability rate is 14.90%. Eleven of Fourteen Northern communities have a higher vulnerability rate, with the exception of Terrace at 12%, Haida Gwaii at 14%, and Fort Nelson at 10%.
- Communication Skills and General Knowledge: The provincial vulnerability rate is 13.70%. Nine of Fourteen Northern communities have a higher vulnerability rate, with the exception of Smithers at 11%, Quesnel at 13%, Fort Nelson at 6%, Prince George at 12%, and Peace River North at 12%.

Why is this important?

- General performance on the Early Developmental Instrument is a measure of the outcome of the nurturing childhood environment and possibly a predictor of the likely success in school.
- The importance of early childhood development has led to the development of benchmarks of success of early childhood development.
- Successful development of physical, emotional, pro-social, and communication skills are key determinants in a child's successful trajectory along the life course.

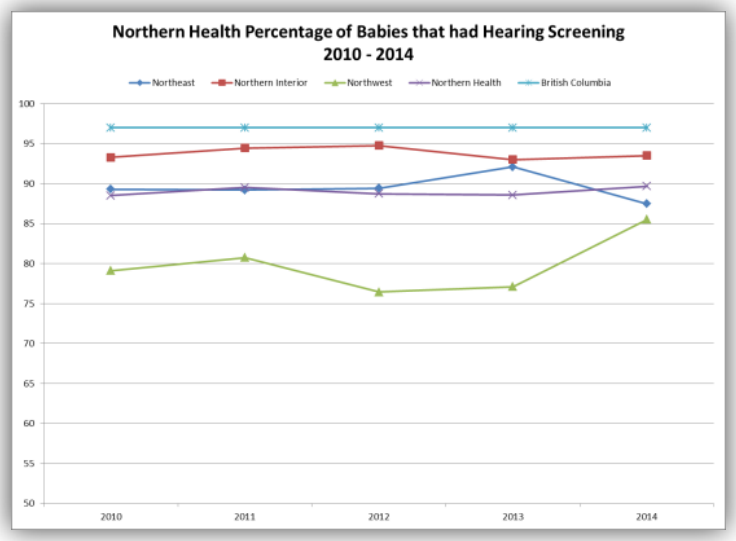
Bottom Line

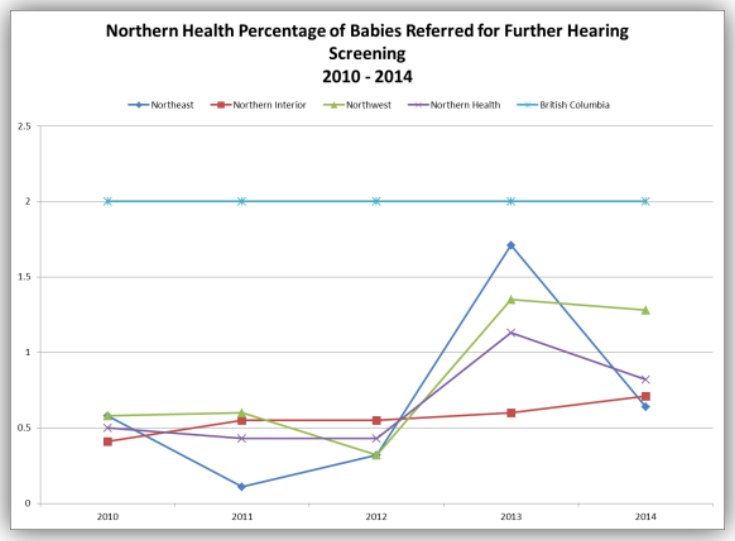
1. The EDI measures developmental change or trends in populations of children at varied geographies (Provincial, Regional, Neighbourhood).
2. The EDI measures important areas of child development.
3. The EDI is a tool that supports informed decision-making at a program and policy level.

Considerations for future action

- The EDI be used as a tool, in consultation with the above partners, to support changes to service delivery, coordination, integration, and policy focussed on children and families.
- Further research is needed to better understand effective interventions to make an impact on the trends in EDI vulnerability.
- Areas of high vulnerability require additional resources and programs - how to determine what is needed, how to define who the responsible: ministry or governmental partner.

18. Hearing screening





What does the data tell us?

- From January 2010 to December 2014 (5 years), the percentage of babies screened within Northern Health was 89%. This finding is below the BC average of 97%, but is just slightly below the expected rate of 90% as determined by PHSA.
- The number of babies that needed diagnostic testing was 0.66%. This is below the 2% average for the province. The referral rate is lower as expected as much of NH hearing screening are on older babies compared to the rest of the province.
- The Northwest data indicates a lower percentage of babies who received a hearing screening but this has been on the rise over the past year. The Northwest HSDA has had more staffing difficulties than other HSDAs and also encompasses some of the more difficult to access rural/remote sites including Haida Gwaii.

Why is this important?

- Six infants out of every one thousand births are born with some degree of hearing loss. Prior to the introduction of early screening programs, many of these children would not be identified with hearing loss until between the ages of 2-3 years. The first 3 years of life is a critical window for the development of communication and social skills. The development of new technology now makes it possible to identify hearing loss before six months of age. Early identification and intervention allows these children to develop the communication, social, and cognitive skills essential for life success (BC Early Hearing Program, 2015).
- Regional Health Authorities are responsible for the delivery of screening, audiology, and intervention services (by Speech Language Pathologists who are designated service providers for BCEHP clients) according to the BCEHP Intervention Services Plan, BCEHP policies, procedures, clinical protocols, and standards (as per Standards and Protocols documents, Policy and Procedures documents, and the Letters of Understanding). The Health Authorities provide the infrastructure and resources to implement the BCEHP at a regional level.
- With the introduction of newborn hearing screening, diagnosis of hearing loss occurs in the majority of healthy babies by three months of age. In BC, hearing devices are usually fitted within one month of the confirmed diagnosis.
- Evidence shows that detection of hearing loss and intervention by six months to nine months of age improves language development (Watkin, et al., 2007). Even when the condition is more severe, adaptive abilities, such as learning sign language, can be acquired at an earlier age.
- It is a significant achievement to reach high screening rates in a setting with significant access issues -

including health human resource challenges and transportation for both staff and clients across a very large health region.

Bottom Line

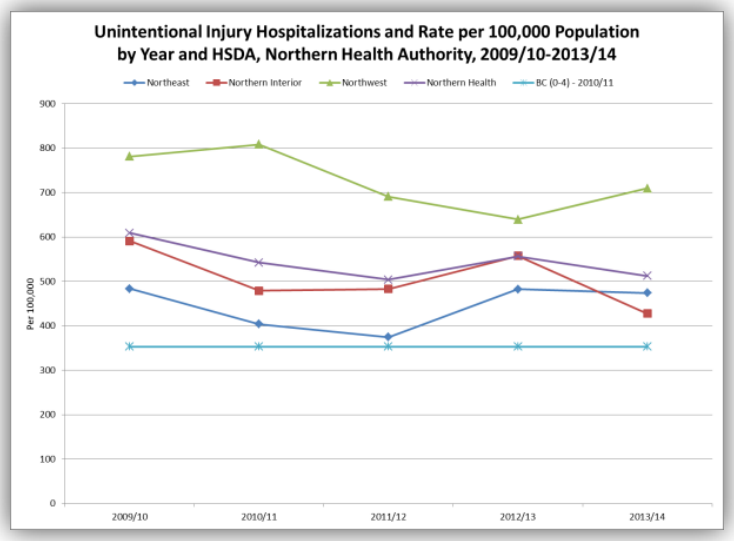
1. Hearing and communication are critical to a child's development; any impairment can have a cascading effect on other aspects of a child's life.
2. Early detection of auditory impairments has a significant impact on development over the lifespan of the child.
3. If undiagnosed and untreated, especially during those critical first years of life, hearing loss can result in language, cognitive, academic, social, and emotional difficulties. The most direct way to minimize the impact of hearing loss on a child's life is through early identification and intervention.
4. There are significant challenges in staffing, geography, and access that exist in rural and remote settings.

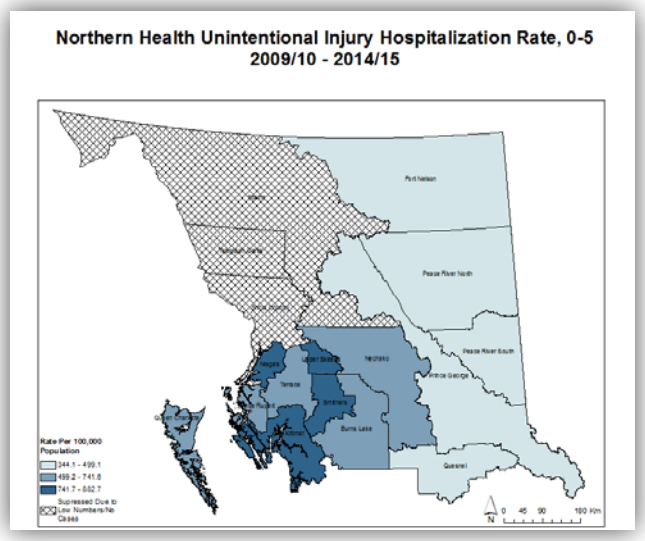
Considerations for future action

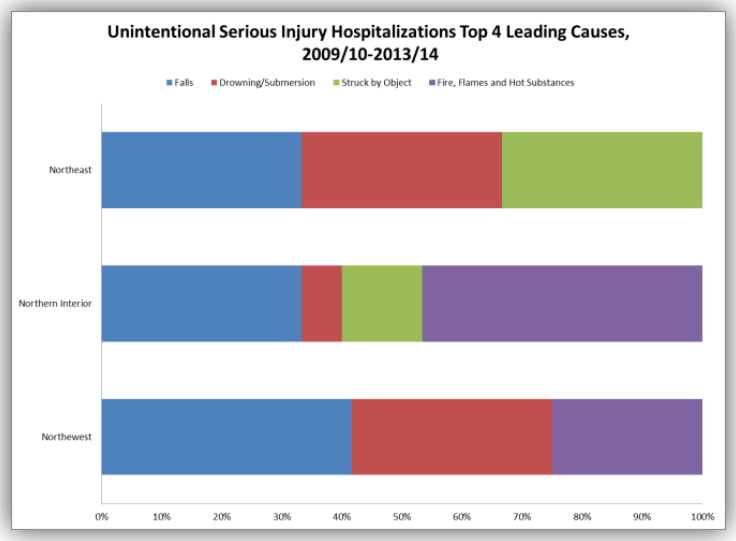
- Continued improvements to reach full screening of infants in the BC Early Hearing Program in collaboration with primary care homes.
- Consider creative approaches to improve access to hearing screening in rural and remote settings.
- Acknowledge and plan for the challenges of rural and remote settings for specialized services such as Audiology or Hearing Screening.
    - Expenses in equipment, training, and travel are out of proportion to the population numbers served, who likely have higher needs, based on determinants of health.

D. Children at Risk

19. Childhood injuries







What does the data tell us?

- Transport related incidents are the leading cause of injury mortality for children ages 0-5 years from 2002-2011 (BC Vital Statistics, 2015).
  - Injury mortality rates in the Northern Interior and Northeast are among the highest in the province and while injury mortality rates have decreased significantly for children and youth in BC from 2006-2011 (BC Injury Research and Prevention Unit, 2015), the same cannot be said for Northern Health.
- Unintentional injury hospitalization rates for children ages 0-5 years have decreased from 2009/10 to 2013/14. As seen with national and provincial rates (Piedt, Rajabal, Turcotte, Barnett, & Pike), falls are the leading cause of injury hospitalizations for this age group across Northern Health.
  - In the Northwest HSDA, males were hospitalized at twice the rate as females. Falls, drowning/submersion and fire, flames and hot substances were the leading causes of unintentional serious injury hospitalization for children ages 0-5 years in the Northwest HSDA.

  - Males and females in the Northern Interior HSDA were hospitalized at almost equal rates. Fire, flames and hot substances, and falls were the leading causes of unintentional serious injury hospitalization for children ages 0-5 years in the Northern Interior HSDA.
  - Falls, drowning/submersion, and being struck by objects are evenly distributed leading causes of serious unintentional injury hospitalizations for children ages 0-5 years.
- Limitations exist in this data analysis such that numbers of injuries maybe small so that a broader inquiry (going beyond the specified ages in the report) was necessary to be able report on indicators of interest like injury mortality.

Why is this important?

- Injuries are the leading cause of mortality and a significant cause of morbidity in children (Pike, Richmond, Rothman, & Macpherson, 2015).
- Unintentional injuries among children are related to age, stage of development, and exposure to hazards. As well, children's physical and psychological characteristics make them more vulnerable to injuries.
- As much as injuries have a considerable effect on all age groups and communities, potentially for the rest of their lives. However, it is also important to recognize the development benefits of independent play and exploration as described in the position statement on Active Outdoor Play (Tremblay, et al., 2015).
- Children and parents are at heightened vulnerability when distracted or not focusing.
- Although bumps and bruises are a part of childhood, serious and life-threatening injuries place a burden on a child's physical health and wellbeing. It also affects the social and psychological life of the child and their family, while placing an economic hardship on these families and their communities. Injuries are not accidents. The vast majority of injuries are unintentional and follow predictable patterns making them preventable (BC Injury Research and Prevention Unit, 2015).

Bottom Line

1. Northern Health has the highest injury mortality rates for children 0-14 in the province, primarily due to transportation accidents but also from falls.
2. Northern Health has the highest injury hospitalization rates for children 0-14 in the province. The top causes include falls, burns, drowning, and being struck by an object.
3. Surveillance capacity could be enhanced to better understand trends in injury morbidity for early implementation of interventions.
4. By far, the majority of injuries burdening the 0-5 year age group are unintentional, follow predicable patterns, and are preventable.
5. Active outdoor play is an important part of early childhood development and parents should encourage independent exploration and resist being over protective.

Considerations for future action

- Encourage and educate the public to become more active partners in injury prevention in their families and communities.
- Engage with communities in an effort to improve the safety of their communities. Ultimately encouraging people to be active safely in the places where they live, work, learn, and play.
- Enhance primary care tools for anticipatory guidance and prevention of household injuries in the 0-5 year old age group.
  - Mechanisms of injury for the top injury presentations should be shared in public service announcements and educational campaigns.
- Create an avenue to share and collaborate around injury prevention in the North through the creation of a Northern Health Injury Prevention Coalition, or Injury Prevention participation on Executive Councils.
- Follow a population and public health approach addressing the social determinants of health when implementing and evaluating injury prevention initiatives. Consider equity in all programs.
- Improvements to surveillance capacity are a priority to better understand injury related morbidity and mortality and plan for interventions.

20. Reported physical and sexual abuse rates

21. Children in protection

What does the data tell us?

- Child abuse is defined as any form of physical or emotional abuse, sexual maltreatment, or lack of care of a child that results in physical or psychological damage to a child or youth (Ministry of Children and Family Development , 2014).
    - Physical abuse, emotional harm, sexual abuse, and neglect are different forms of abuse. Abuse and neglect have immediate and long-term intergenerational effects for children, including physical injuries, long-term negative psychological impacts, and sexually transmitted infections (Office of The Provincial Health Officer; Representative for Children and Youth, 2007).
- Northern BC has some of the highest rates of children and youth in care in the province (BC Stats).
    - Rates of children in care vary by region. Children in the Interior, Vancouver Island and Northern regions (each over 13 per 1,000 child population) are two times more likely to be in care than children in the Fraser region (7.2 per 1,000) (Office of The Provincial Health Officer; Representative for Children and Youth, 2007, p. 32).
- Aboriginal youth health survey results reported in the Raven's Children IV (Tourand, Smith, Poon, Saewyc, & McCreary Centre Society , 2016)
    - More than 23% aboriginal girls reported being either sexually or physically abused.
- Northern BC was rated the highest for child abuse in regards to intentional injuries, unintentional injuries, injuries resulting from medical complication including post-operative complications, and injuries of an undetermined origin (Office of The Provincial Health Officer; Representative for Children and Youth, 2007).
    - Children raised in low-income homes were more likely to be abused, and BC has the highest rates of poverty stricken families compared to any other province (Office of The Provincial Health Officer; Representative for Children and Youth, 2007).
    - Components that contribute to healthy child development such as, being/feeling loved, having a sense of control, and feeling socially connected are at risk as a result of abuse/neglect (Office of The Provincial Health Officer; Representative for Children and Youth, 2007).
    - In BC, the rate of reoccurrence of child abuse and neglect by family varied slightly from 2004/2005 (19.7%) to 2010/2011 (19.4%) (Office of the Provincial Health Officer & Representative for Children and Youth, Growing Up in B.C., 2015).

Why is this important?

- Child abuse is said to do more harm on child development than any other risk factor, and is easier and less costly to prevent than any other risk factor (Office of the Provincial Health Officer & Representative for Children and Youth, Growing Up in B.C., 2015).
- *Growing Up in BC* (2007) reports children who are abused might experience poor school performance, fear, learning disorders, poor peer relations, substance abuse, anti-social behavior, criminal behavior, and mental disorders. Furthermore, child abuse and neglect have been linked to adult illnesses such as fibromyalgia, irritable bowel syndrome, chronic lung disease, and cancer (Office of The Provincial Health Officer; Representative for Children and Youth, 2007).
    - The long-term impacts of abuse and neglect on individuals, families and communities are immeasurable. Trauma and adversity in childhood contributes to adverse lifetime health outcomes for the child, and beyond.
    - The Adverse Childhood Experiences Study outlined the key experiences that were linked with long term health outcomes, including child abuse and neglect, and separation from parents.
    - People will react to stressors in their own way and memories are stored both implicitly and explicitly. The body remembers events genetically, physiologically, and psychologically.

Bottom Line

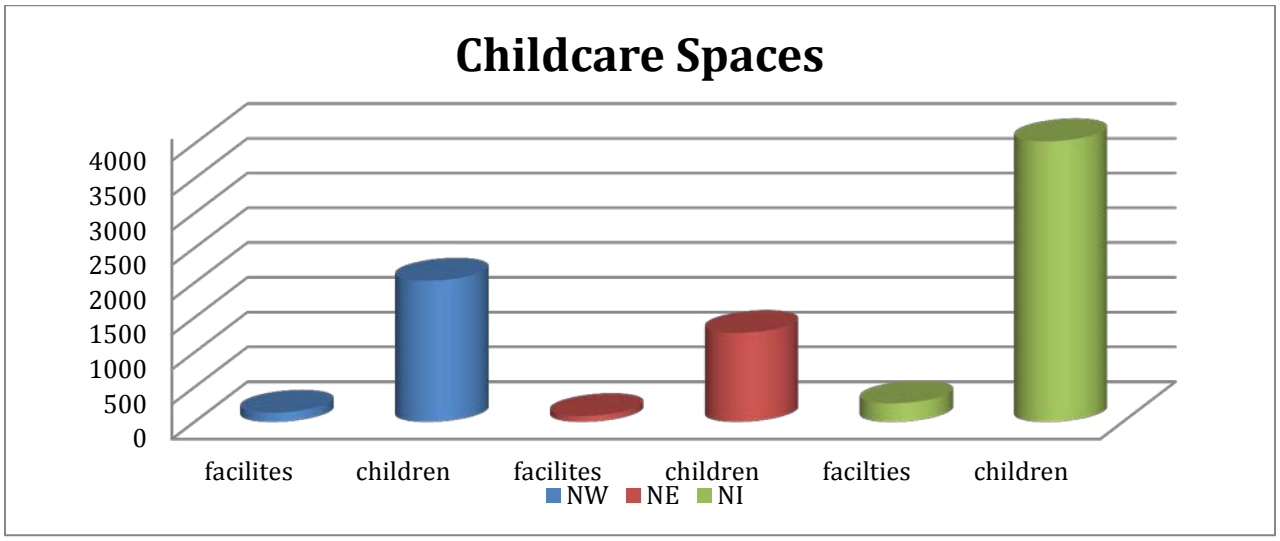
1. Secure and healthy attachment as well as knowledge and attitudes around appropriate development and interactions are protective factors against abuse and neglect.
2. Permanence for children in care and prevention of abuse are top priorities.
3. High rates of abuse and neglect as well as children in care will have enduring effects on the health of the population.
4. Colonization and the resultant trans-generational harms contribute to the complexity of the impacts.
5. Culturally safe approaches, that include trauma as a foundation, need to be identified to assist individuals, families, and communities to rebuild and end the cycles of abuse.

Considerations for future action

- Prepare and support parents and families to provide nurturing environments for their infants and young children. Recognize that some families need more support than others.
- All health care providers should be aware of their duty to report suspected child abuse.
- Health care providers should apply a patient and family centred, trauma informed practice.
- Primary care providers may benefit from improved access to resources to address impacts of trauma.
- Build community supports around children who are aging out of care and into mainstream community roles.
    - Support children in care to pursue secondary education funding programs.
- Strengthen relationships between Northern Health children health program areas, Ministry of Education, and Ministry of Child and Family Development (MCFD).
- Support MCFD in their work to appropriately address children in care and incidents of child abuse and neglect.
- Ensure safe and appropriate licensed care facilities as legislated under the *Community Care and Assisted Living Act* (Queen's Printer, 2016).

E. Healthy Families

22. Licensed childcare spaces



What does the data tell us?

- The Community Care Facility Licensing program supports a total of 7,287 childcare spaces throughout 447 facilities across our health authority.
  - In the Northern Interior region, 3,974 childcare spaces being supported in 247 facilities,
  - 2,036 childcare spaces supported within 126 facilities in the North West (NW) and
  - 1,277 childcare spaces over 74 facilities in the North East (NE).
- Unlicensed and informal childcare facilities are not tracked in any way, but complaints in unlicensed situations are followed up when indicated.

Why is this important?

- Licensed childcare settings provide quality early childhood education, in a nurturing environment within prescribed specifications (space, programming, staffing) to meet the licensing requirements.
- Licensing officers work with the care providers to help prevent injuries and illnesses through routine facility monitoring, education, relationship building, and enforcement when necessary. Licensing officers attend the facilities for the purpose of follow up reportable incidents, complaints, and for education purpose.
  - It is through these routine interactions, operators provide support towards maintaining sustained compliance with legislative standards. The licensing officers work closely with the licensee to ensure the children in care receive safe care to promote the child's development. A key requisite for optimal child development is secure attachment to a trusted caregiver, with consistent caring, support, and affection early in life (Maggi, Irwin, Siddiqi, & Hertzman, 2010).
- Additional childcare spaces are needed in the North as anecdotally evidenced through communications with parents are care providers. We have observed additional childcare spaces increasing in the North due in part to an increase in government funding to new childcare operators. However, there is no system for understanding supply and demand for childcare spaces.
  - Social determinants of health, such as income or race, can impact access to childcare
  - Some parents have challenges with accessing care (costs, available space, challenges with routines, concerns with others supervising their children)
  - Maggi et al (2010) states that broader social, health, and environmental policies (upkeep and presence of playgrounds and green space, presence of neighbourhood policing office,

placement of public libraries, availability of enrichment programmes, and quality preschools) influence neighbourhood condition, which affects children's development

- Access to quality and low cost childcare allows a family to increase their income earning potential. Low cost ($10/day) day care is achievable and should be a goal for communities.

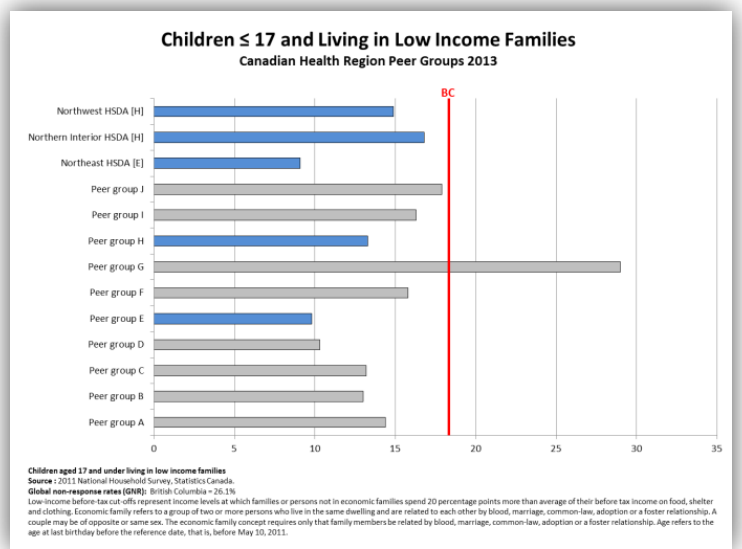
Bottom Line

1. Families rely on quality, affordable daycare to be able to support their families financially as parents work while someone cares for their child.
2. Daycare spaces in Northern BC are likely not adequate to meet the needs of the community.

Considerations for future action

- Improve access to quality, affordable child care for Northern families.
- Recognize the unique challenges that rural and remote settings pose for families as they plan for the childcare needs of their families.
- Engage and encourage partnerships with community and non-governmental organizations to support families in communities.
- Improved surveillance and data management is a priority to ensure the safety and health of those in care in programs or facilities.
- Licensing programs may require flexibility to accommodate creative solutions to childcare in community settings.

23. Children living in low income families



What does the data tell us?

There is limited data exploring family economics in Northern BC. The most consistent and available data focuses on incidence of low income in families, specifically numbers of children living in families on income assistance.

- The Northwest (28-33%) and Northern Interior (18%) have significant numbers of children under 17 living in low-income situations and this is above the provincial average of (19%). The Northeast HSDA has the lowest percentage (15.8 to 18.4%) of children living in low-income situations (FirstCall BC, 2015) (BC Stats). Other important trends in child poverty include the rates of child poverty in urban centres of the north (Firstcall BC, 2015).
- Provincially, BC (1in 5 children) has a higher child poverty rate, one of the highest in Canada and higher than the national average of about 18%.
- The peer groups most similar to Northern BC report lower rates of children living in poverty.

Why is this important?

- A low-income environment is possibly the most widely used indicator of child health and Socio-economic status (SES) is the measure of an individual or family's economic and social status based on education, income, and occupation.
- Poor family economics is also linked to:
  - family dynamic (i.e. Two-parent families vs one-parent families), food security, and access to safe affordable housing; and,
  - poorer health, lower literacy, poor school performance for children, and greater stress for family members.
- Having low income is likely the greatest vulnerability in the social determinants of health.
  - It paradoxically affects earning power, transportation, access to social and health services, ability to provide for self and family, and sense of pride and worth.

Bottom Line

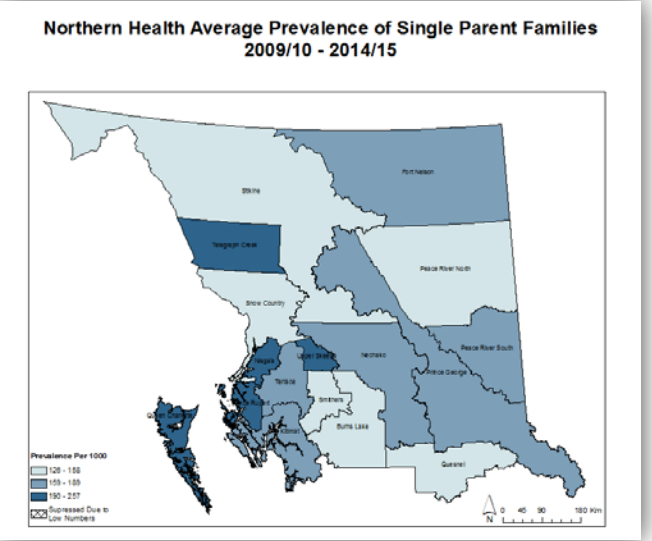
1. Northern BC has rates of child poverty that are above the provincial and national averages. One in five children in Northern BC lives in poverty.
2. Low socioeconomic conditions are linked to poor health, lower literacy, poor school performance for children, increased crime, and greater stress for family members.
3. Risks increase with the depth and duration of family poverty.

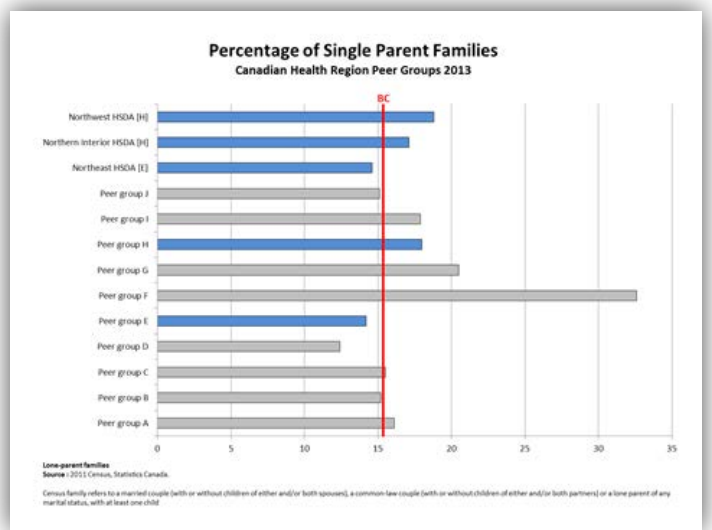
4. Family poverty has the potential to affect us all because it influences the capacities of children to become all that they can be and function as self-sufficient and engaged adults.
5. Community, health, and social supports are often inadequate in rural and remote settings.
6. Transportation is a challenge for many in the North. Travel for social, commercial, medical, and occupational purposes are important considerations for rural families and communities.

Considerations for future action

- Improved surveillance for social indicators, tracking for health inequities, and advocacy for approaches to address social disparities is a priority.
- Raise awareness of the impacts of the determinants of health and the impacts that poverty has on individuals, families, and communities.
- Provide resources, such as poverty screening tools, health care providers in communities to assist individuals and families, and access maximal benefits to optimize their health and wellness.
- Primary care homes and interprofessional teams can assist in connecting patients and families with resources to meet their basic needs and seek to optimize their health.

24. Single parent families





What does the data tell us?

- From the evidence review**,** within BC there are a total of 31,200 single-parent families of children ages 0-4 years. Of those single-parent families, 26,185 are female parents, and 5,015 are male parent families (Statistics Canada, 2011). The median family income of a female single-parent is approximately 42,610 dollars per year.
- The Northern Health average for single-parent families from 2009 to 2015 indicates a prevalence range of 125-257 per 1,000. The highest Local Health Area rate is the Northwest and variations between moderate to low prevalence in the Northeast and the Northern Interior. There is no data available to indicate the trends from 2009 to 2015.
- Compared to similar populations across Canada, Northern Health reports similar or higher rates of single-parent families. That said, single-parent families are becoming more common in society over time, and the use of single-parent families/lone parent families as an indicator of social circumstances is becoming less favoured.

Why is this important?

- Being a child in a lone-parent family means having a much higher chance of living in poverty than being a child in a two parent family. In British Columbia in 2013, more than half (50.3%) of children 0–17 years old in lone-parent families lived in poverty, compared with 13.0% of children in two parent families (FirstCall BC, 2015).
- Families within the North may be more negatively affected by the effects of single-parent homes due to the limited social resources available in the North. A single parent faces many challenges in regards to childcare in general. In certain circumstances, with the additional impacts of lower levels of education, limited access to nutritious food and health care services, some vulnerable children in the North show poorer health outcomes.
- Families that are separated for purposes of working away from home are, at times, functionally single-parent families. There are varied opinions and just as many experiences that are very unique to each family. It is something that should be considered when discussing family dynamics in rural resource extraction based communities.
- Additionally, there is current research available that one supportive adult is required for successful growth and development for children (Center on the Developing Child).
    - Adequate warning against overgeneralization of single-parent families. A loving home of any type can be nurturing and render successful loving and contributory offspring.

Bottom Line

1. While children in single-parent families may be at risk for impacts to their health and wellness, the characteristics that lead to negative consequences are not well understood in this population. It is possible that income is the determining factor, rather than the presence of two parents.
2. A secure and loving relationship in the home with a stable caregiver is protective against:
    - Mental health and addiction issues in adolescence and adulthood
    - Chronic disease and maladaptive coping practices in adulthood
3. Families experience stress related to seemingly functional lone parent families while family members work away from home.
4. Single-parent families are becoming more common in society over time and the use of single-parent families/lone parent families as an indicator of social circumstances is becoming less favoured.
5. One in two children in single parent families were living in poverty.

Considerations for future action

- Recognize and address the unique challenges that face parents in rural and remote settings when families are separated or parents work away from home.
- Consider opportunities to improve connectedness for children as they grow up in their communities.
- Increased social support programs and outreach programs to single-parent families is critical.
- Increased parenting skill building is essential - consider supports for respite/subsidized childcare.

Appendix E: Technical Appendix

Methodology

The methodology for this report includes a descriptive analysis of various health indicators. Descriptive epidemiology is used to help discover areas of concern, generate hypotheses, and evaluate programs. A number of different administrative datasets were used to examine the health status of children living in Northern Health over the past 5 years and in the different health regions within Northern Health.

Health Regions

Northern Health encompasses a large area of Northern British Columbia and it is broken down into three Health Service Delivery Areas (HSDA) (Figure 1), Northwest (Figure 2), Northeast (Figure 3), and Northern Interior (Figure 4). These three HSDAs are further divided into 16 smaller Local Health Areas. The data was analysed both at the HSDA and Local Health Area level. Yearly trends were provided at the HSDA level and a 5-year average was presented at the Local Health Area level.

Indicator Selection

A comprehensive literature search was undertaken to identify all indicators that had previously been used in population child and youth health reports in Canada. Once all the indicators were gathered from various sources, the child health working group identified the top indicators that should be included and added additional indicators that were deemed necessary to report on and were not identified in the literature search. After the indicator list was developed, it was then determined what data sources were available and the accessibility of those data sources. Those indicators that did not have a reliable data source were not reported on in this report.

Indicator Review

Once the indicators data sets were populated, indicator summaries were prepared by Northern Health program experts. These indicator summaries provided a brief review of the literature, identified key points, programs, and provided considerations for future action. The program experts also identified other stakeholders that required consultation.

Overall Data Limitations

Small populations within Northern Health combined with the small subpopulation this report addresses and the fact that many health events are relatively rare means there is instability in yearly rates. Where possible, years were combined and a higher level of geography was used to provide more certainty in the rates.

The location of the individual was based on the postal code of the individual (where they receive their mail), which means if someone lives rurally but chooses to have their mail delivered to a town or village that individual will be coded as a resident of that town or village. Currently there is no way to determine how big of an issue this is.

The analysis in this report is purely descriptive, so there is no in-depth review of how related risk factors may explain some of the findings. Further research may be required for those areas that are deemed important.

Data sources, Definitions and Limitations

The main source of data for all indicators is administrative databases. Several of the indicators have data that was pulled from the BC Socio-Economic Indices[1]. However, the Indices are only current to the year 2012. Another main data source was the Northern Health BC Perinatal Database Cube that provides the data for many of the prenatal and perinatal indicators.

For specific indicator descriptions and limitations, an Indicator reference sheets is provided for many of the indicators. These sheets provide a brief description, unit of measurement, data source, inclusion/exclusion criteria, and limitations.

[1] http://www.bcstats.gov.bc.ca/StatisticsBySubject/SocialStatistics/SocioEconomicProfilesIndices/SocioEconomicIndices/LHAReports.aspx

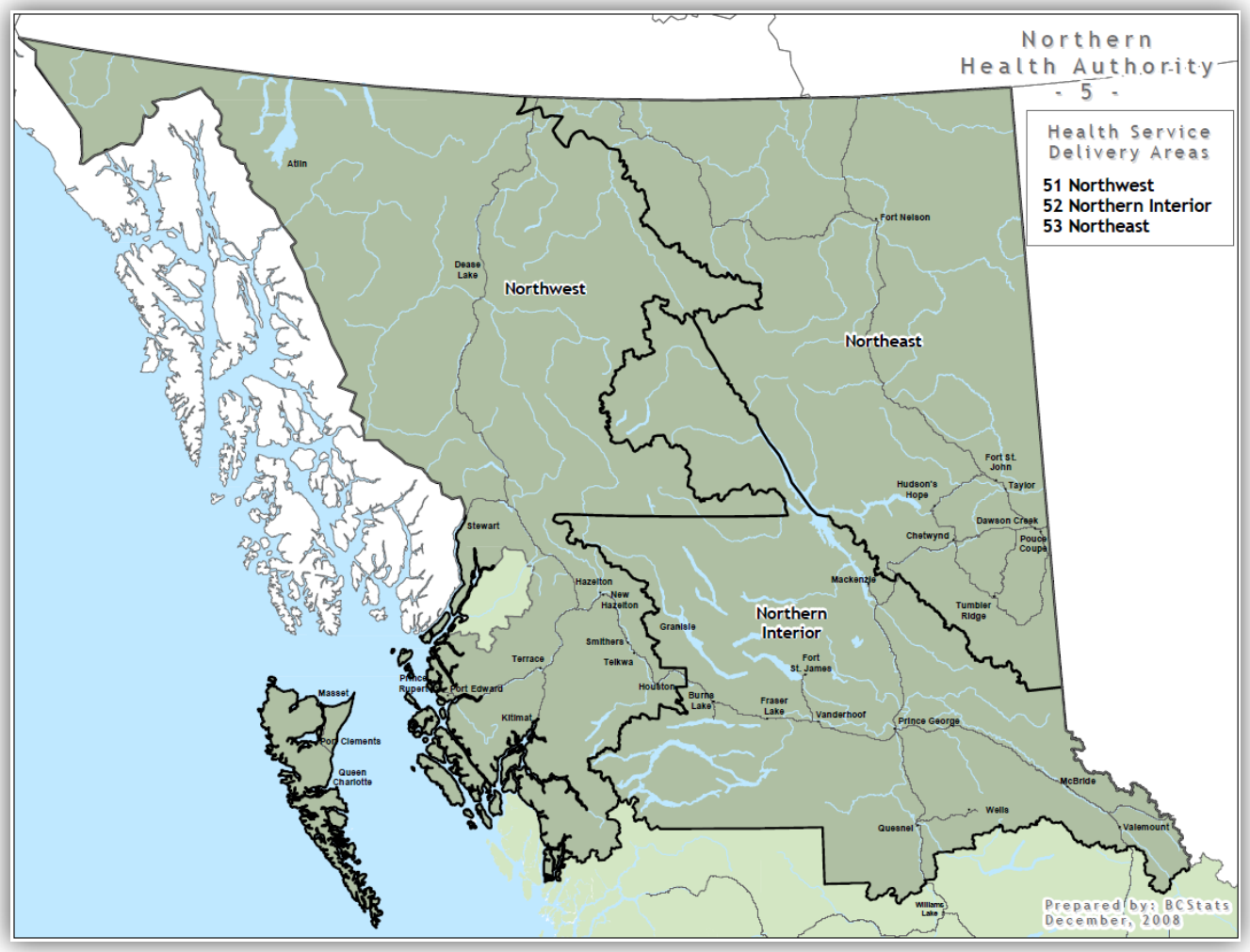


Figure 1. Northern Health Authority Map
http://www.bcstats.gov.bc.ca/statisticsbysubject/geography/referencemaps/health.aspx

Figure 2. Northwest HSDA Map
http://www.bcstats.gov.bc.ca/statisticsbysubject/geography/referencemaps/health.aspx

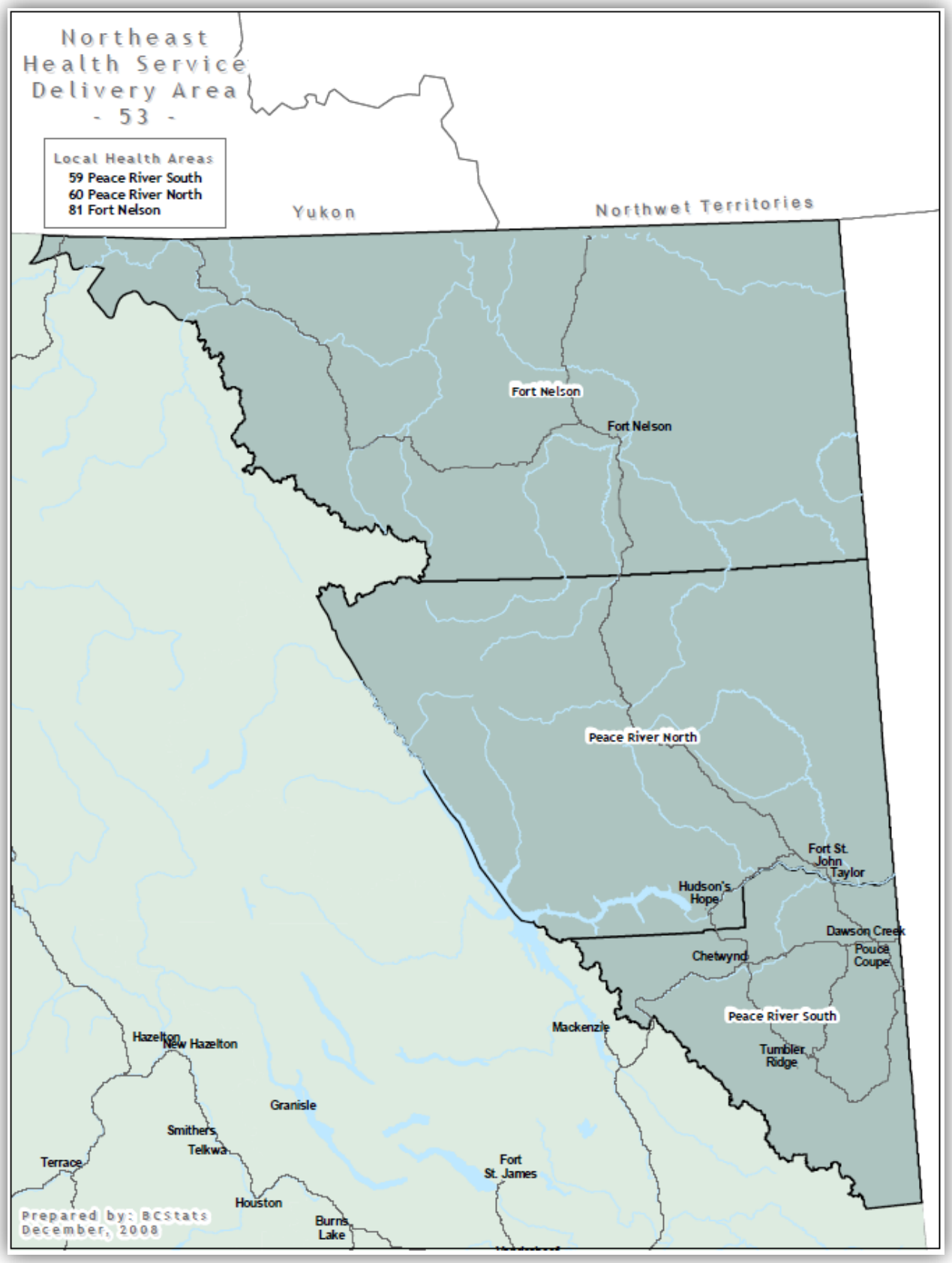


Figure 3. Northeast HSDA Map
http://www.bcstats.gov.bc.ca/statisticsbysubject/geography/referencemaps/health.aspx

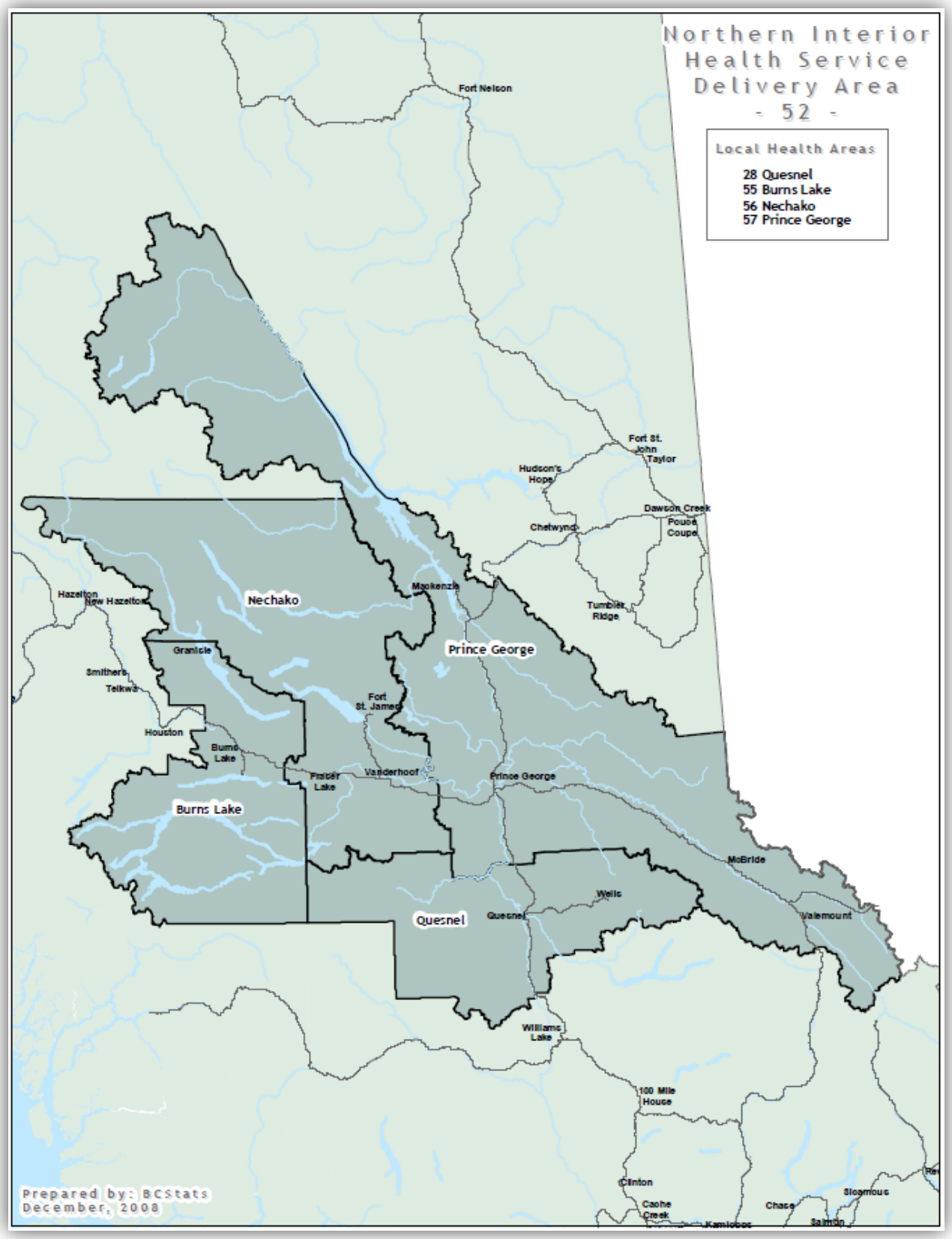


Figure 4. Northern Interior HSDA Map
http://www.bcstats.gov.bc.ca/statisticsbysubject/geography/referencemaps/health.aspx

Count of Northern Health Births and Prenatal Registered Births	
Definition/Description	Comparision between total number of births and number of mothers registered in the Northern Health prenatal registry
Unit of measurement (rate, count, %)	Count
Data source	Birth Counts are Perinatal Service BC Online Surveillance Reports Registrations are Community MOIS synamic form counts
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region
Exclusion criteria	Women who do not have a postal code corresponding to Northern Health
Standards/ Benchmarks	No standards or benchmarks provided
Limitations	• The transition from a manual spreadsheet of data collection in the early stages of prenatal registry to the use of ICCIS. • PHNS started documenting in ICCIS at varying times depending on their training. • The varying timings of prenatal registry start-up by the communities. • There are no reports built to pull out data at specific intervals. No consistency for fiscal year reporting.
Comments	Comparing pregnancies/registrations via Community MOIS dynamic form counts with deliveries from the DAD cube and pregnancy data is not abstracted until the delivery.

Women Who Smoked Tobacco During Pregnancy	
Definition/Description	The mother smoked tobacco products.
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health Facility with a postal code associated with the Northern Health Region
Exclusion criteria	Women whose postal code is associated with another jurisdiction
Numerator	Count of women who are current smokers
Denominator	Total women in Perinatal Database
Treatment of Missing Values	Considered a “Non-smoker”
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	
Comments	Calculations may not be the same between benchmark and NH numbers

Women Who Consumed Alcohol During Pregnancy	
Definition/Description	The care provider indicates the mother's use of alcohol as a risk factor in the current pregnancy.
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	If a women had one or two drinks prior to knowing she was pregnant. All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region.
Exclusion criteria	Women whose postal code is associated with another jurisdiction
Numerator	Count of women who responded yes, to if they had one or two drinks prior to knowing she was pregnant.
Denominator	Total women in Perinatal Database
Treatment of Missing Values	Considered a "No" response
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	This question has only been regularly asked of women in recent years. Therefore, any changes in prevalence may be a result of mothers response rate not an actual change in the rate of alcohol consuption.
Comments	Calculations may not be the same between benchmark and NH numbers

Women with a Pre-pregnancy High BMI	
Definition/Description	Women who had a pre-pregnancy BMI > 24.9
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region
Exclusion criteria	Women who do not have a postal code corresponding to Northern Health
Numerator	Count of women with a pre-preganancy BMC >24.9
Denominator	Total women in Perinatal Database
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	
Comments	Calculations may not be the same between benchmark and NH numbers

Women with a Pre-pregnancy Low BMI	
Definition/Description	Women who have a pre-pregnancy BMI <18.5
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region
Exclusion criteria	Women who do not have a postal code corresponding to Northern Health
Numerator	Count of women with a BMI <18.5
Denominator	Total women in Perinatal Database
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	
Comments	Calculations may not be the same between benchmark and NH numbers

Women Who Self-Identified Mental Health Issues	
Definition/Description	The specific type of mental illness(es) that the mother has suffered from prior to or during current pregnancy: Including Anxiety, Depression, Bipolar, PP Depression, Other, or Unknown
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region
Exclusion criteria	Women who do not have a postal code corresponding to Northern Health
Numerator	Count of women who responded “yes”
Denominator	Total women in Perinatal Database
Treatment of Missing Values	Considered a "No" response
Standards/ Benchmarks	http://www.ncbi.nlm.nih.gov/pubmed/18606953
Limitations	This question has only been regularly asked of women in recent years. Therefore, any changes in prevalence may be a result of mothers response rate not an acutual change in the rate of mental health issues.
Comments	Calculations and Data source are not be the same between benchmark and NH numbers

Births to Mothers ≤ 19 Years Old	
Definition/Description	Women who gave birth who were ≤19 years old
Unit of measurement (rate, count, %)	Prevalence per 1000
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All women who gave birth in a Northern Health facility with a postal code associated with the Northern Health region
Exclusion criteria	Women who do not have a postal code corresponding to Northern Health
Numerator	Count of women ≤19 who gave birth
Denominator	Population of ≤19 year olds in reference population
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	
Comments	Calculations may not be the same between benchmark and NH numbers

Newborns Exclusively Breastfed After Birth	
Definition/Description	Baby was given only breast milk (including expressed breast milk) either orally or by gavage feed, for the duration of their hospital stay. If water was given with the breast milk, it is not exclusive breast milk. The breast milk may be given by the mother, health care provider, or family member / supporter.
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All newborns born in a Northern Health facility with a mother whose postal code is associated with Northern Health region
Exclusion criteria	Newborns whose mother does not have a postal code corresponding to Northern Health
Numerator	Count of babies receiving breast milk exclusively
Denominator	Total count of babies
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	http://www.perinatalservicesbc.ca/Documents/Data-Surveillance/Reports/PHR/PHR_BC_Deliveries_201314.pdf
Limitations	
Comments	Calculations may not be the same between benchmark and NH numbers

Exclusively Breastfeeding Until 6 Months	
Definition/Description	Baby was given only breast milk (including expressed breast milk) either orally for the first 6 months. If water was given with the breast milk, it is not exclusive breast milk. The breast milk may be given by the mother, health care provider, or family member / supporter.
Unit of measurement (rate, count, %)	Percentage
Data source	Statistics Canada, Canadian Community Health Survey (CCHS). CANSIM table 105-0502 is an update of CANSIM table 105-0400.
Frequency of data collection	Yearly
Comments	Based on information provided by females aged 15 to 55 who had a baby in the last 5 years.

Infant Mortality Rate 2008-2012	
Definition/Description	The infant mortality rate is an estimate of the number of infant deaths for every 1,000 live births.
Unit of measurement (rate, count, %)	Rate per 1000
Data source	BC Stats
Frequency of data collection	Yearly
Standards/ Benchmarks	3.7 / 1,000 (BC Rate)
Limitations	
Comments	Can be found in the Children at Risk Document at: http://www.bcstats.gov.bc.ca/StatisticsBySubject/SocialStatistics/SocioEconomicProfilesIndices/SocioEconomicIndices/LHAReports.aspx

Low Birth Weight Babies Per 100 Live Births	
Definition/Description	Baby born weighing < 2,500 grams
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All newborns born in a Northern Health facility with a mother whose postal code is associated with Northern Health region
Exclusion criteria	Newborns whose mother does not have a postal code corresponding to Northern Health
Numerator	Count of babies with birth weight < 2,500 grams
Denominator	Total count of babies in perinatal database
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	5.9 for BC 2013
Limitations	
Comments	Data source is not the same between benchmark and NH Numbers

High Birth Weight Babies Per 100 Live Births	
Definition/Description	Baby born weighing > 4,000 grams
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Perinatal Database - Northern Health Data Cube
Frequency of data collection	Yearly
Inclusion criteria	All newborns born in a Northern Health facility with a mother whose postal code is associated with Northern Health
Exclusion criteria	Newborns whose mother does not have a postal code corresponding to Northern Health
Numerator	Count of babies with birth weight > 4,000 grams
Denominator	Total count of babies in perinatal database
Treatment of Missing Values	Excluded from both numerator and denominator
Standards/ Benchmarks	11.5 for BC 2013
Limitations	
Comments	Data source is not the same between benchmark and NH Numbers

Two Year Olds Who Are Up-to-date on Immunizations	
Definition/Description	Up-to-date for the: 2010-13 cohort = 4 doses DTP, 3 doses Polio, at least one dose of HIB after month 15, 3 doses HEP B, 1 dose Measles, 1 dose Mumps, 1 dose Rubella, at least 2 doses Pneumo, at least 1 dose Meningo, and 1 dose Varicella or past disease (i.e. immune) by the 2nd birthday; 2007-2009 Cohort = 4 doses DTP, 3 doses Polio, at least one dose of HIB after month 15, 3 doses HEP B, 2 doses Measles, 2 doses Mumps, 1 dose Rubella, at least 2 doses Pneumo, at least 1 dose Meningo, and 1 dose Varicella or past disease (i.e. immune) by the 2nd birthday.
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	iPHIS
Frequency of data collection	Yearly
Numerator	Count of two year olds who are considered up-to-date on immunizations
Denominator	Total Number of Children in Cohort
Standards/ Benchmarks	http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Immunization/Coverage/2_Year_Old_Coverage_20082012_Birth_Cohorts.pdf
Limitations	Implementation of Panorama information system in 2014 resulted in several health units / branch offices being declared inactive - this will affect coverage rates
Comments	Benchmark numbers and 2013 and 2014 HSDA cohort numbers taken from BCCDC Report

Average Occurrence of Vaccine Preventable Diseases for All Ages	
Definition/Description	Includes occurrences of: Haemophilus Influenza b, Invasive Hepatitis A Hepatitis B: Acute Hepatitis B: Chronic Carrier Hepatitis B: Unknown/Undetermined Status Measles Meningococcal Disease, Invasive Mumps Pertussis Pneumococcal Disease, Invasive Rubella (non-congenital) Tetanus Varicella
Unit of measurement (rate, count, %)	Prevalence per 10,000
Data source	BCCDC - CD Datamart
Frequency of data collection	Ongoing
Numerator	Count of Vaccine Preventable Diseases
Denominator	Estimated population in reference year
Standards/ Benchmarks	
Limitations	The count of Vaccine Preventable Diseases relies upon reporting of the disease to Public Health by physicians and the patient seeking care, therefore the numbers may not reflect a the true occurrence of disease.
Comments	The counts for Vaccine Preventable Diseases are so small in Northern Health that an age group specific rate was not available, this indicator represents the Vaccine Preventable Diseases that occur in all age groups.

Leading Cause of Hospitalization 0-4 Year Olds	
Definition/Description	The top 5 reasons for hospitalization based on the Case Mix Groups (CMG) for 0-4, by Northern Health residence
Unit of measurement (rate, count, %)	Prevalence per 1,000
Data source	Ministry of Health – Healthideas
Frequency of data collection	Yearly
Inclusion criteria	All children aged 0-4 who had an abstracted stay in a BC Acute Care Hospital
Exclusion criteria	Children who are not from a Northern Health residence
Numerator	Count of children with an acute care stay
Denominator	Population of 0-4 year olds in the reference year
Treatment of Missing Values	N/A
Standards/ Benchmarks	
Limitations	Any children with an acute care stay out of province would not be represented in the data
Comments	

0-4 Year Olds Who Had Inpatient Dental Procedures	
Definition/Description	The prevalence of children who had a dental procedure in hospital [CACS Dental/Periodontal Intervention (C109)] based on child's home Local Health Area
Unit of measurement (rate, count, %)	Prevalence per 1,000
Data source	Ministry of Health - Healthideas
Frequency of data collection	Yearly
Inclusion criteria	All children who had an abstracted CACS C109 in a BC facility, aged 0-4 years
Exclusion criteria	Children who are not from a Northern Health residence
Numerator	Count of children who had an inpatient dental procedure
Denominator	Population of 0-4 year olds in the reference year
Treatment of Missing Values	N/A
Standards/ Benchmarks	
Limitations	Any children who had dental surgery in facilities out of province
Comments	

Children Screened with Visible Dental Decay	
Definition/Description	Of the children screened, the number of children who have visible broken enamel
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	http://www.health.gov.bc.ca/library/publications/year/2011/Evaluation-BC-Early-Childhood-Dental-Programs-Final.pdf
Comments	Data used from the provincial report

Early Developmental Instrument Measures	
Definition/Description	The EDI is a questionnaire that evaluates five core areas of early child development that are known to be good predictors of adult health, edcuation, and outcomes. They include: • Physical health and • Language and cognitive development • Social competence • Emotional maturity • Communication skills and general knowledge These questionnaires are completed in kindergarten.
Data source	http://earlylearning.ubc.ca/edi/
Comments	Data provided by Human Early Learning partnership

Babies Screened for Hearing Problems	
Definition/Description	The number of newborns screened for hearing problems
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Northern Health Speech and Hearing Program
Frequency of data collection	Yearly
Standards/ Benchmarks	http://www.phsa.ca/our-services/programs-services/bc-early-hearing-program/testing-services/newborn-screening
Limitations	Calculations may not be the same between benchmark and NH numbers
Comments	

Babies Referred for Further Hearing Screening	
Definition/Description	Of those newborns that were screened for hearing loss, the percentage of them referred for further screening
Unit of measurement (rate, count, %)	Prevalence per 100
Data source	Northern Health Speech and Hearing Program
Frequency of data collection	Yearly
Standards/ Benchmarks	http://www.phsa.ca/Documents/bcehp_physiciansinfofall09.pdf
Limitations	Calculations may not be the same between benchmark and NH numbers
Comments	

Childhood Injuries	
Definition/Description	Incidence and type of injuries that require hospitalization among children age 0-5
Data source	BC Injury Research and Prevention Unit http://www.injuryresearch.bc.ca/
Frequency of data collection	Yearly
Limitations	
Comments	Data and analysis provided by the BC Injury Research and Prevention Unit

Children in Care Rate	
Definition/Description	Rate of children in care, espressed as a rate per 1,000 children
Comments	Not Available

Reported Physical Abuse	
Definition/Description	Non-recurrence of Child Neglect and/or Abuse by Family
Comments	Not Available

Low Income Families	
Definition/Description	Percentage of children (0-14 years old) living in households that report annual household after tax income below the low income cutoff as defined by statistics Canada
Data source	BC Stats
Frequency of data collection	Every 4 years
Comments	Can be found in the Children at Risk Document at: http://www.bcstats.gov.bc.ca/StatisticsBySubject/SocialStatistics/SocioEconomicProfilesIndices/SocioEconomicIndices/LHAReports.aspx

Single Parent Families	
Definition/Description	Number of Single Parent Census Families
Unit of measurement (rate, count, %)	Prevalence per 1000
Data source	Stats Canada - 2011 Census
Frequency of data collection	Every 4 Years
Numerator	Count of Single Parent Census Family With Children
Denominator	Total Census Families
Treatment of Missing Values	Follows Statistics Canada's edit and imputation standards
Standards/ Benchmarks	153.4 / 1,000 (BC)
Limitations	This data is limited by the degree to which Census respondents' accurate description of living arrangements
Comments	Based on Census 2011 data. Census family refers to a married couple (with or without children of either and/or both spouses), a common-law couple (with or without children of either and/or both partners), or a lone parent of any marital status, with at least one child. A couple may be of opposite sex or same sex. A couple family with children may be further classified as either an intact family in which all children are the biological and/or adopted children of both married spouses or of both common-law partners or a stepfamily with at least one biological or adopted child of only one married spouse or common-law partner and whose birth or adoption preceded the current relationship. Stepfamilies, in turn may be classified as simple or complex. A simple stepfamily is a couple family in which all children are biological or adopted children of one, and only one, married spouse or common-law partner whose birth or adoption preceded the current relationship. A complex stepfamily is a couple family which contains at least one biological or adopted child whose birth or adoption preceded the current relationship. These families contain children from: • each married spouse or common-law partner and no other children • one married spouse or common-law partner and at least one other biological or adopted child of the couple • each married spouse or common-law partner and at least one other biological or adopted child of the couple.

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