



The Health of First Nations Children and the Environment

Discussion Paper

**Assembly of First Nations
Environmental Stewardship Unit
March, 2008**



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1. Introduction

There is a growing body of environmental epidemiological¹ health research and concern among First Nations regarding the health effects that exposures to toxic chemicals and other environmental hazards may pose to their children and unborn fetuses. It is widely recognized that children are often more vulnerable than adults to environmental risks such as: air pollution, contaminants in water and soil, environmental tobacco smoke, pesticides, soil contaminants, radiation, and noise. A child's physiology and behaviour differs from that of an adult and they experience unique vulnerabilities at different stages of growth and development. Recent research has shown a link between environmental contaminants, exposure and adverse child health outcomes. These include: learning and developmental disabilities; birth defects; low birth weight; Fetal Alcohol Spectrum Disorder (FASD); some cancers; endocrine disruption; and asthma.

Although all children in Canada are at some degree of risk from a range of environmental threats, First Nations children are at greater risks of exposures and/or may be more susceptible to the effects of environmental exposures. The aim of this paper is to provide a basic overview of the issues of concern and provide background information on how environmental impacts affect First Nations children's health. It serves as a starting point for dialogue and future discussions and explores the question of how First Nations children may be at increased risk of exposure from environmental hazards as compared to other children in the Canadian population.

Environmental hazards include:²

- **Physical hazards.** Physical factors/hazards in the biophysical environment can occur in the natural and built environments, whether urban, rural, agricultural, aquatic or marine. They can relate to land use and quality, water quality and availability, mechanical agents, and forces of climate, weather and earth processes. They also include hazards related to global environmental change such as threats to habitats, natural resources and the services provided by ecosystems.
- **Biological hazards.** Biological factors/hazards refer to pathogenic microorganisms in water, soil, air and products encountered in both the natural and built environments, including vector-borne microbes and pathogens, pollen, fungi and spores, and invasive species.
- **Chemical hazards.** Chemical hazards are chemicals that are, or may be, dangerous to human health and that are present in indoor and outdoor air, water, soil, food, and consumer and commercial products. They may be of natural or anthropogenic origin.
- **Radiological hazards.** Radiological hazards refer to ionizing and non-ionizing radiation from both natural and anthropogenic sources, including ultraviolet radiation, electromagnetic frequencies and noise.



2. Demographics

First Nations people continue to be substantially younger than the general Canadian population. According to the 2006 Census data³, nearly one third (32%) of the 698,025 people who identified themselves as North American Indian (status and non-status Indians) were aged 0-14. In terms of Aboriginal people in Canada, including First Nations, Metis and Inuit populations, almost half (48%) of the Aboriginal population consists of children and youth aged 24 and under, compared with 31% for the non-Aboriginal population.

First Nations children represented a slightly higher share of the on-reserve population. About one-third (34%) of on-reserve First Nations people were aged 14 and under, compared with 31% of those living off-reserve.

Chart 1 - Age distribution of First Nation populations living on and off reserve, Canada, 2006⁴

Age Groups	Total		On-Reserve		Off-Reserve	
	Number	Percentage	Number	Percentage	Number	Percentage
Total – Age Groups	698,025	100	300,755	100	397,265	100
0-14	224,790	32	102,425	34	122,360	31
15-24	124,835	18	55,835	19	69,000	17
25-54	272,250	39	109,680	36	162,570	41
55-64	44,175	18	18,055	26	26,120	7
65 & over	31,975	5	14,760	5	17,210	4

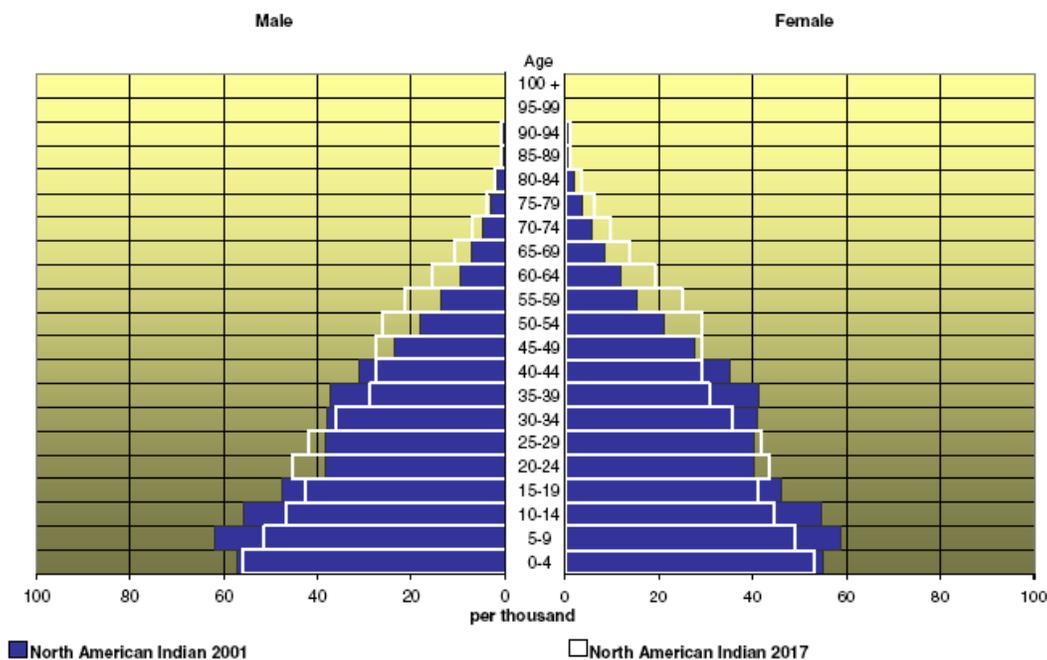
In 2000, the First Nations birth rate was 23.4 births per 1,000 population - more than twice the Canadian rate of 10.7 births per 1,000. One in five (20%) First Nations births involved teenaged mothers while only 5.6% of births among the Canadian population involved teenage mothers.⁵ Also in 2000, life expectancy at birth was estimated at 68.9 years for males and 76.6 for females.

First Nations infants experience two times the infant mortality rate than the Canadian average and levels of morbidity and mortality among First Nations children and youth remain high throughout their first 18 years of life. Contributing factors include high injury rates, high incidence of respiratory and infectious diseases, high suicide rates, depression and childhood sexual or physical abuse that are deemed to be significantly higher than those of the non-Aboriginal population.⁶

A 2005 Statistics Canada report projected a reduction in North American Indians less than 15 years old to 30% by 2017. Despite this projected reduction, Aboriginal people could account for a growing segment of the young adult population over the next decade. By 2017, 30% of the Aboriginal population living in the Western provinces and the northern territories will be in their 20s.



Chart 2 - Age pyramid for the North American Indian population, Canada, 2001 and 2017⁷



Source: Statistics Canada, Demography Division.

The socio-economic status of the family, including family income, parental education level, employment, and social status in the community, is recognized as a significant determinant of health status for children. Average incomes for households with children in First Nations were considerably below the Canadian population.⁸

With respect to housing conditions, First Nations are four times more likely to live in a home in need of major repairs. The 2006 Census reports that 28% of the First Nations population lived in homes in need of major repairs as compared to only 7% of the non-First Nations population. These poor housing conditions were especially evident on reserves, where 44% required major repairs, in comparison to 17% of off-reserve First Nations and 7% among non-First Nations.

In addition to homes in need of major repairs, crowded living conditions are another housing concern. First Nations people were five times more likely than non-Aboriginal people to live in crowded homes, defined as more than one person per room. This was observed on-reserve where 26% lived in crowded conditions. According to the RHS Report, crowding was a problem for almost one in three children and was serious for over two-thirds of all children living in households with five or more children. Poor housing conditions and crowding can contribute to serious health problems, including respiratory illnesses, the spread of infectious diseases such as tuberculosis and Hepatitis A, and it can also increase risk for injuries, mental stress and impacts on relationships to family and other household members.



3. Current Health Status of First Nations Children

In general, First Nations people, especially children, experience poorer health than the overall Canadian population. Health, as defined by the World Health Organization (WHO), is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.⁹ Health from a First Nations perspective views the physical, mental, emotional and spiritual aspects of one's life as interconnected and equally important in maintaining balance and overall health. This holistic concept of health also includes culture, family, community, and environment as important determinants or influences to achieving health and well-being.¹⁰

According to a report by the Assembly of First Nations¹¹, the health of First Nations people has been drastically impacted by changes associated with colonization. Health impacts include:

- A movement away from traditional foods to more processed foods;
- Restrictions to hunting, fishing and gathering of foods;
- Reduced access to safe and secure food supplies;
- Poor understanding of nutrition and nutritious food choices as a result of Indian Residential School experiences; and,
- Depression, addictions and other mental health issues, also as a result of poverty and intergenerational impacts of residential schools.

First Nations continue to face numerous barriers and obstacles such as poverty, low education, lack of access to healthy foods and clean drinking water, lack of access to proper health care, and lack of social supports all of which hinder their abilities to achieve good health. Other factors such as genetics, personal lifestyle practices, physical fitness, and built and natural environments are also important influences.

3.1 First Nations Health Determinants

There is strong evidence that higher socio-economic status is associated with better health outcomes for children, and vice versa. Closely linked to socio-economic status, housing conditions and home environments adversely impact on a child's health. Children in families with low incomes are more likely to live in inadequate housing and overcrowded conditions. A child's most influential physical environment is where he/she lives, as it is where she/he spend most of her/his time. Beyond the physical environment is the social environment in which First Nations children live. For centuries, the family and community environments of First Nations children played a fundamental role in fostering the close relationship that First Nations children had with their traditional culture and language, spirituality and overall connectedness. There are clear associations between strong social supports, healthy families and communities, and healthy child development. These aspects in a child's life are essential to maintaining balance and overall health.



As a determinant of health, the environment plays a considerable role in the lives of First Nations children, as many families continue to rely heavily on the land and natural resources for their subsistence, including their socio-economic, cultural and physical survival. Ecological knowledge, traditions and cultural practices are passed on with the shared understanding, commitment, and vision to respect, preserve, and protect the health of the environment for future generations. Unfortunately, the state of the environment has significantly contributed to the declining health status of First Nations peoples in Canada, especially children. Environment-related influences are key factors in shaping the health of many First Nation peoples today. Changes in local and global environmental conditions, both human induced and natural, are having a significant impact on shifts in First Nations health status. The quality of one's environment (natural, built, social, and physical), is clearly an important aspect of individual and community well-being. Air, water, and land pollution, and other environmental degradation are compromising to one's quality of life.

In addition to contaminant exposures in the natural environment, interdependent factors such as nutrition, physical safety, socioeconomic conditions, and culture collectively impact on the overall health of children in Canada. "The emotional and social well-being of First Nations children is impacted by a variety of factors such as the residential school legacy, importance and participation in cultural and traditional activities, school attendance, activity participation and limitations, diet and residential school attendance of parents and grandparents."¹²

Through each stage of development in a child's life, there are many influences, or determinants, on their health affecting them differently as they transition from one stage to the next. The below key determinants will provide a better chance for healthy child development, which in turn is a determinant of adult health.

Based on the 2006 AFN First Nations Health Reporting Framework, First Nations have accepted four broad determinants of health. They include: Community, Individual, Environmental and Social/Cultural determinants of health as a reflection of their holistic view of wellness and balance in one's life.

Community Health: Include incidence of chronic diseases, diabetes, and alcohol and drug consumption in the community. Also includes immunization coverage, availability of traditional health services, access to primary or mental health care, access to home care services, and satisfaction with health care services.

Individual Health: Includes rates of life expectancy, infant mortality, suicide and unintentional injuries in the community. Also includes income and education level.

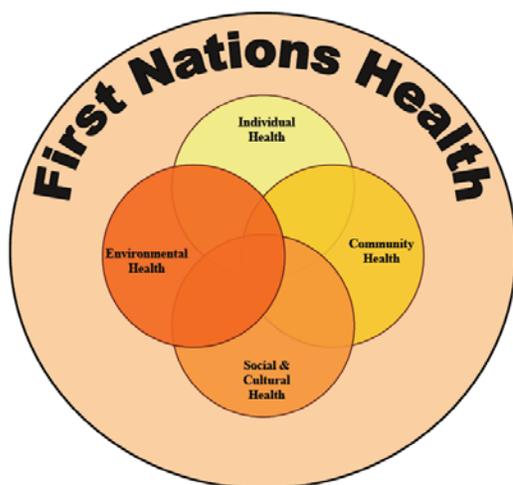
Environmental Health: Includes housing, water, land, [and air] quality in the community.



Socio/Cultural Health: Includes the effects of colonization and residential schools. Also includes self-determination and community involvement (Elders & Youth), knowledge and use of traditional language, cultural practices - ceremonies, etc., and traditional use of land.

As illustrated in Figure 1, each of the determinants extends beyond its own area and intersects / interacts with all others. This Figure illustrates the inter-connectedness of the determinants.

Figure 1 - First Nations Determinants of Health¹³



The First Nations Regional Longitudinal Health Survey (RHS) report identified a need to understand and consider a First Nations cultural framework perspective that considers the “total health” of the total person in the “total environment”. This framework includes a population health or ecological approach that takes into account, “an individual’s spiritual, emotional, mental, and physical well-being; their culture’s values, beliefs, identity, and practices; their community and relationship to the physical environment; and, their connectivity to their family”.¹⁴

3.2 Health Disparities

First Nations children experience poorer health outcomes than the rest of the Canadian children. According to Health Canada’s Report, *A Statistical Profile on the Health of First Nations in Canada for the Year 2000*, First Nations have a lower life expectancy at birth, higher rates of chronic and contagious diseases and higher suicide rates than the rest of the Canadian population. Health disparities among First Nations children include:



- Infant mortality rates and rates of hospitalization among Aboriginal children remain significantly elevated. In 1999, the First Nations infant mortality rate was 8.0 deaths per 1,000 live births or 1.5 times higher than the Canadian infant mortality rate of 5.5.¹⁵
- In 1999, the leading individual cause of First Nations infant mortality was Sudden Infant Death Syndrome (SIDS). Several studies show that the SIDS rates among First Nations are higher (ranging from 3 to 10 times higher) across Canada.¹⁶
- Rates of high birth weight (>4kg) among First Nations are much higher than those of the general Canadian population (21% as compared to 13.1%). High birth weight infants are more likely to be overweight or are at risk of being overweight.¹⁷
- First Nations children have consistently higher rates of being overweight and obese than the overall Canadian population. Half of First Nations children are either overweight (22.3%) or obese (36.2%).¹⁸
- Rates of maternal smoking during pregnancy among First Nations are much higher than those of other Canadians. There is a strong link between maternal smoking and long-term adverse health outcomes for children. The rate of household smoking during pregnancy is also very high. Passive smoke exposure during pregnancy occurred in close to 50% of First Nations homes.¹⁹
- Rates of breastfeeding among First Nations mothers are considerably lower than those of other Canadians. Sixty percent (60%) of First Nations women are breast feeding at a lower rate than their non-Aboriginal counterparts.
- First Nations children in Manitoba experience at least four times higher rates of tooth decay than non-Aboriginal children.²⁰ Dental decay rates for Aboriginal children in Ontario are two to five times higher than rates among non-Aboriginal children.²¹
- Attack rates and disease incidence for enteric, food and waterborne diseases tend to be higher among First Nation Children aged 0 to 14. Giardiasis, Hepatitis A, and Shigellosis.
- In general, First Nations people experience a disproportionate burden of many infectious diseases including pertussis, Chlamydia, hepatitis, shigellosis, tuberculosis, and AIDS.²²
- In 1999, the four leading causes of death were injury and poisoning, circulatory diseases, cancer and respiratory diseases. For children under the age of 10, deaths were primarily unintentional injuries or accidental.²³



- First Nation children are more likely than Canadian children in general to have injuries. The most common causes of injury mentioned were falls, sport related injury and bicycle accidents.
- Childhood disability is more prevalent among First Nations children, almost double the rate, than in the general population.²⁴

4. Pathways of Exposure & Vulnerabilities of Children to Environmental Hazards

“Millions of kilograms of toxic chemicals are discharged into Canadian air, water, and land each year. In 2003, major polluters in Canada released 22 million kilograms of carcinogens, 16 million kilograms of hormone disruptors, 4.3 billion kilograms of respiratory toxins, and more than billion kilograms of reproductive/developmental toxins”.²⁵ Children are more vulnerable than adults and at a greater risk of adverse health effects from these environmental exposures. Environmental contaminants travel through multiple pathways and affect children differently than adults. Children differ in their ability to absorb, metabolize and rid their bodies of contaminants. The main pathways of exposure are through inhalation, ingestion, and skin contact of air, food, water, soil, and consumer products. Chemicals are absorbed or transfer into your body through your lungs, digestive system, and skin. For unborn fetuses, exposure occurs when toxic chemicals enter the mother’s body via one of the main pathways and pass through the placenta. Nursing mothers also pass along chemicals to their infants through breast milk. While moving thorough these pathways, contaminants interact with one another and can change in composition and lead to various health effects, especially in children.

Clearly, a child’s physiology and behavior differs from that of an adult. In proportion to their body weight, children eat more, drink more and breathe more rapidly than adults, which all contribute to a proportionately greater uptake of nutrients, water, air, as well as contaminants. In addition, children experience unique vulnerabilities at different stages of growth and development. “Because children’s bodies and physiological systems undergo substantial growth and development from conception through adolescence [in particular immature organs and body systems], they are particularly sensitive to chemical interference.”²⁶ At a young age, children’s immune systems are not fully developed and may not be able to fully defend their bodies from contaminants. Since children are more physically active in general, they are increasing their uptake of air and air pollutants. Children spend a great deal of time playing on the ground indoors and outdoors and are more likely to put soil or objects in their mouths resulting in greater exposure to contaminants.

Naturally, children do not fully understand potential risks and are unable of fully protecting themselves from harmful exposures. They have little or no decision making ability with regards to where they live, where they play, the water and food they consume, the air they breathe, the consumer products they use, and the schools they



attend. Adding to these vulnerabilities, a fetus in utero, is completely defenseless against chemicals that pass across the mothers' placenta.

Physiology and behavior interact between other health determinants to place certain sub-populations, such as First Nations children, at even greater risk. Poverty is believed to result in greater environmental exposures. Children in families with low incomes are more likely to live in inadequate and/or overcrowded housing conditions, or to live in areas with high levels of air pollution. The effects of poverty may also result in poor nutrition and hygiene reducing the body's abilities to effectively fight against environmental toxicants and lead to poorer health status.

It is believed that early life exposures to endocrine-disrupting contaminants, may adversely affect the human reproductive system. Endocrine disruptors interfere primarily with three hormonal systems - estrogen, androgen, and thyroid – all of which are critical in the development and function of the brain, immune system, and the reproductive system. Exposures to these may potentially result in infertility, birth defects of the reproductive organs, lower sperm count, testicular cancer, breast cancer, and premature puberty in girls. “A number of synthetic and naturally occurring organic chemicals, such as phytoestrogens, dioxins, PCBs, phthalate esters, and DDT, are referred to as endocrine disruptors.”²⁷

4.1 Unique Vulnerabilities Facing First Nations Children & Health Effects

First Nations children are at an increased risk of environmental exposures as compared to other children in Canada. First Nations children face unique vulnerabilities relating to socio-economic, cultural, and environmental factors. As mentioned earlier, susceptibility and exposure to environmental contaminants increases for children living in poverty. “Among the disadvantaged, poor housing and neighbourhood quality may lead to increased exposure to a range of chemical and biological contaminants and unsafe conditions leading to a range of adverse health effects including injury, respiratory disease, deficiencies in emotional development and mental health, cardiovascular disease later in life, and mortality. Disadvantaged children are also more likely to have a poorer nutritional and health status, increasing susceptibility to environmental exposures.”²⁸

“Vulnerable groups of Canadians include children, Aboriginal people, individuals with environmental sensitivities or compromised immune systems, and people experiencing social and economic disadvantages such as poverty and homelessness. Often these factors operate in combination. Environmental hazards can have particularly dire consequences for the health of individuals facing compounded vulnerabilities. For example, authorities have known since the mid-1980s that children in Ontario who live in poverty are at greater risk of exposure to harmful levels of lead. Similarly, Aboriginal children in northern Canada are exposed to high levels of PCBs, mercury, lead, pesticides, and other harmful environmental contaminants”.²⁹



One in four First Nations children live in poverty, compared to 1 in 6 Canadian children. Associated with poverty are poor housing conditions, of which First Nations homes are about four times more likely to require major repairs compared to Canadians. Over one third of First Nations households with children are overcrowded. Housing issues such as lack of safe drinking water, hot and cold running water, flushing toilets, lack of proper sewage services, and poor ventilation are realities for many First Nations households. Mould contaminates exist in almost half of all First Nations homes First Nations children experience higher rates of respiratory illnesses due in part to poor housing conditions, overcrowding, and poor air circulation in school portables, leading to elevated exposures from infectious agents, moulds and allergens. According the 2002/2003 First Nations Regional Longitudinal Health Survey Peoples Report, the most commonly reported long-term conditions among First Nations children are asthma, allergies and chronic ear infections/problems.

Poor indoor air quality is also a major risk factor and contributor to respiratory illnesses and other health problems among First Nations children. First Nations children experience greater levels of exposure to environmental tobacco smoke as compared to non-aboriginal children. High incidence of smoking among First Nations, including maternal smoking, can lead to long-term child health outcomes. Health conditions such as high blood pressure, heart disease and diabetes have been linked to fetal, infant, and childhood experiences and exposures to second hand smoke.

With respect to nutrition, rates of breastfeeding among First Nations mothers are considerably lower than the general population in Canada. Breast milk is known to provide optimal nutrition for infants and enhance their immune systems. With the increased fear among First Nations of environmental contaminants in traditional foods and the switch to more store bought foods, many First Nations children are not receiving adequate levels of nutrients. Iron deficiency remains an important issue and almost half of First Nations children are overweight (22.3%) or obese (36.2%).³⁰ With a trend to consuming more store bought foods, cultural activities such as hunting, fishing, and berry picking are not as essential to some First Nations children resulting in reduced physical activity. “Rapid social and lifestyle changes are responsible for the increase in prevalence of both obesity and chronic diseases such as diabetes, cardiovascular disease and cancer in this segment of the population which represents over one third of First Nations people in Canada”.³¹

Infant mortality rates among First Nations children are 1.5 times higher than the Canadian infant mortality rate of 5.5. First Nations children also experience high rates of low birth babies but this is not significantly different from the rest of the general Canadian population. “Measures such as infant mortality and the incidence of low birth weight have been firmly linked to underlying determinants of health such as adequate food supply, adequate housing, employment, education level, and environmental exposures”.³² A leading cause of First Nations infant mortality is Sudden infant death syndrome (SIDS), the sudden, unexpected and unexplained death of a healthy baby before one year of age when there is no evidence or exact cause of death can be



determined upon a full medical investigation. A recent study shows that Aboriginal infants in Alberta are ten times more likely to die as a result of SIDS as compared to non-Aboriginal infants.³³

First Nations children are more likely than Canadian children in general to be injured. Common injuries in children include scalds, accidental poisoning, and fractures. For those under the age of 10, deaths were primarily due to unintentional injuries or accidents.

Other health effects of concern among First Nations children include Attention Deficit Hyperactivity Disorder (ADHD), learning disabilities, and Fetal Alcohol Spectrum Disorder. Environmental exposures may be largely attributable to these conditions. “In 2000 suicide accounted for 22% of all deaths in youth (aged 10 to 19 years) First Nations youth are at an increased risk of suffering from a physical, developmental or learning disability (Assembly of First Nations 1997), with one regional study going so far as to suggest that Fetal Alcohol Syndrome (FAS) and Fetal Alcohol Effects (FAE) are responsible for nearly 75 percent of these cases (Asante and Nelms-Matzke 1985)”.³⁴

Childhood disability is more prevalent among First Nations children, almost double the rate, than in the general population. Many First Nations are situated in close proximity to industrial or agricultural activity which leads to increased exposure to air, water and soil contamination. Further research is needed to fully understand the long-term health effects and risks to First Nations children.

4.2 Children’s Environmental Health as Emerging Priority for First Nations

Children health effects/risks as a result of exposure to environmental contaminants remain a serious concern for many First Nation communities. Of growing concern is the cumulative effect of long-term exposure to low doses of environmental contaminants. The primary health concerns related to contaminant exposure for First Nations children include effects on the respiratory system, neurological development, immune functions, cancer, nutrition, anemia, kidney and bone function, and reproduction. “Concerns about the effects of exposures to toxic substances are often about the interference of these substances with the chemical interactions that occur during human development.”³⁵

Based on the unique vulnerabilities of children in general, the high percentage of children in proportion to the total First Nations population, and the health disparities of First Nations children as compared to the Canadian population, environmental health is a priority public health issue for First Nations children. With the growth of the younger population, First Nations children will account for a significant percentage of the future working force population in Canada. With elevating health conditions among First Nations children, the cost of doing nothing will have major socio-economic consequences and create a huge burden on the health care system in Canada.

5. Environmental Threats/ Risks



5.1 Indoor & Outdoor Air Pollution

Since children spend a majority of their time indoors, indoor air quality has a significant impact on their health. It is important to ensure that they are in an environment that has good quality indoor air. A major cause of poor indoor air quality is poor air ventilation and circulation, and overall lack of fresh air. This can lead to humidity and dampness which contributes to the growth of mold, bacteria and dust mites. Unhealthy air can lead to many health problems such as allergies, headaches, and respiratory illnesses such as asthma and bronchitis.

Other contributors to poor indoor air quality include poor housing conditions, wood and/or coal burning, environmental tobacco smoke, fumes from personal care products and commercial cleaners that contain harmful chemicals and toxins all compromise indoor air quality. Improperly maintained homes can lead to leaks, flooding, and humidity which encourage bacteria growth and mold. Environmental tobacco smoke contains over 4,000 toxic chemicals, many of which are carcinogens - meaning they cause cancer. This smoke is considerably dangerous to children and infants since their lungs are smaller and their rate of breathing is much quicker than adults. Also, their lungs and immune systems are still developing and cannot sufficiently protect them. Scientifically confirmed health risks to children from exposure to second-hand smoke include: cancer; Sudden Infant Death Syndrome (SIDS); and respiratory illnesses such as asthma, bronchitis, pneumonia, and croup. “Although environmental contaminants have been highlighted as dangers to children’s health, children spend more than 80% of their time indoors, and therefore elements such as second-hand smoke are likely to make a greater contribution to the detriment of their health”.³⁶ Toxic chemicals found in home cleaning and personal care products can emit harmful fumes/vapors. Short-term exposures by children to these fumes can also lead to serious respiratory effects and other health problems.

Although indoor air in the home has been found to be more polluted and have higher toxic chemical concentrations, outdoor air quality is still a major area of concern. There are many sources of outdoor air pollution, many of which are naturally occurring and others which are man made. Of more concern is the man made outdoor pollution resulting from activities such as the burning of fossil fuels, industrial development, construction, agriculture, pesticide use, wood burning, waste burning, and motor vehicle operating. These sources produce a significant amount of different types of air pollutants including particulate matter, sulphur dioxide and carbon monoxide. Some substances released can accumulate, mix together, or be transported in the environment through the air, water and in the soil. Smog is a mixture of different types of air pollutants and can have harmful health effects. Children can have increased sensitivity to the effects of air pollution due to their developing respiratory systems and vigorous outdoor activities, and may have difficulties breathing when the air is heavily polluted. Additional research is needed on the full effects of low-level environmental exposures to children.

5.2 Water Pollution



Safe drinking water and sanitation are essential for good health. Microbial contamination can lead to outbreaks of waterborne diseases. Chemical contamination of drinking water occurs less frequently but may also have health impacts, generally chronic and long-term. “The major threats to drinking water quality in Canada are microbiological contaminants — bacteria, viruses, and protozoa — such as *E. coli*, *Giardia*, *Cryptosporidium*, and *Toxoplasmosis*. These water-borne pathogens cause adverse effects ranging from mild gastroenteritis (upset stomach) to severe diarrhea and death”.³⁷

Presently, many First Nations continue to have unsafe drinking water and are under water boil advisories. In 2008, “at least 85 First Nation water systems are in high risk and there are close to 100 boil water advisories in various communities”.³⁸ For instance, Kashechewan First Nation, a remote community in northern Ontario, has faced a water boil advisory and unsafe drinking water crisis since 2003. Unsettling images of children from the community with sores and skin conditions such as impetigo and impetigo all over their bodies received much media attention and prompted immediate government action. These conditions were exacerbated by the high chlorine levels in the drinking water used to neutralize the community’s water supply from harmful bacteria.

5.3 *Contaminants in the Soil/Land*

Soil quality and contamination is an issue for First Nations communities that are in proximity to existing or closed industry operations that have contaminated areas with by-products, tailings or aerial fallout from their activities. Soil contamination may also result from improper garbage dump facilities within communities or from existing / past land uses on contained sites like gas stations and certain agricultural operations.

While an entire community’s health is at risk when soil contamination occurs, children often exhibit effects first, because they tend to play quite intimately with soil and the plants growing in it and have lower thresholds of resilience than adults to toxic and chemical exposure. “Lead continues to be a concern because of lead contamination in soil and dust, industrial lead emissions, lead-based paint in older houses, lead in drinking water from plumbing, and lead in consumer products (e.g., crystal, costume jewelry, and make-up)³⁹”.

5.4 *Contaminants in Traditional Foods*

Contaminants in the environment can be accumulated in food species. Bioavailability of contaminants found in soils, sediments, plants, or water depends on factors such as their concentration and physical and chemical forms and physicochemical factors such as pH and organic-carbon content. Once an organism in the food chain assimilates a contaminant, it can be subject to bioaccumulation or can facilitate transfer of the contaminant to other organisms. Factors such as inertness of the chemical, solubility in lipid or water, and speciation for metals all influence bioaccumulation.



In addition, the length of the food chain or the number of species it passes through before consumption by humans affects concentration of a contaminant in food through bio-magnification - the successive increase in chemical concentration. For example, the highest bio-magnification occurs between fish (prey) and marine mammals or sea birds.” Lead shot ammunition also contributes to lead poisoning, particularly among Aboriginal people whose diets are more dependent on wild fish and game”.⁴⁰ The threat of environmental contamination may have indirect health effects by causing a rapid change of diet from traditional food to market food which may be major risk factors for chronic disease such as diabetes and cardiovascular diseases.

5.5 *Climate Change*

Climate change is likely to cause direct and indirect effects on human health including increased health-related mortality, the spread of vector-borne diseases and changes in food production. Children may be especially vulnerable to the effects of climate change because of their metabolism, physiology and behaviour, which includes long periods of outdoor play. As a northern country, Canada is likely to experience disproportionate climate change. Hence, the health effects experienced by Canadians and their children are likely to be more significant than those in many other countries at lower latitudes. Information is needed to understand more fully how climate change is likely to affect Canadian Children. “Health Canada identifies eight major categories of negative health-related impacts associated with climate⁴¹:

- illnesses and deaths caused by hotter and colder temperatures;
- deaths, injuries, and illnesses caused by extreme weather events;
- increased exposure to outdoor and indoor air pollutants;
- water-borne and food-borne contamination;
- increased exposure to ultraviolet radiation;
- the spread of vector-borne diseases to previously unaffected areas;
- disproportionate impacts on vulnerable populations; and
- socio-economic impacts.

6. Existing Policy on Children’s Health and the Environment

6.1 *Canada*⁴²

There are gaps exist in the Canadian federal legislation, in particular, the *Hazardous Products Act* and the *Canadian Environmental Protection Act* with regards to inadequate regulation of toxic exposures from consumer products resulting in risks to children, (prenatal and during childhood and adolescence). Many Canadian health and environmental laws and policies are lagging behind other countries. For example⁴³:

- Canada does not have legally binding national standards for air quality and drinking water quality.



- Canada permits the use of pesticides that other countries have banned for health and environmental reasons.
- Compared to other nations, Canada allows higher levels of pesticide residues on our food.
- Canada has completely failed to regulate some toxic substances, including
- polybrominated diphenyl ethers (PBDEs), phthalates, and polycyclic aromatic hydrocarbons (PAHs).
- Canada has weaker regulations for toxic substances such as radon, lead, mercury, arsenic, and asbestos.

The following are some of the current existing policies at the federal level for the protection of children's environmental health in Canada.

Canadian Environmental Protection Act (CEPA): governs pollution prevention and protection of the environment and human health, all within the context of sustainable development goals. Although "children" are not specifically referenced in the existing substances provisions of CEPA 1999, the protection of children's health is an important component of activities related to the identification and assessment of existing substances that may pose a risk to the health and well-being of children in Canada. Unfortunately, the existence of knowledge gaps, lack of capacity, and the jurisdictional issues regarding First Nations health issues are some of the barriers that impede effective policy decision making. There is a need to complete a comprehensive review on the existing legislation and policies and frameworks for protecting and strengthening First Nations children's environmental health.

Canadian Environmental Assessment Act (CEAA): ensures all new projects with federal involvement include an environmental impact assessment, including an assessment of human health impacts

Hazardous Products Act (HPA): prohibits the advertising, sale and importation of hazardous Products

Food and Drugs Act (FDA): ensures the safety of food, drugs, cosmetics and therapeutic devices

Pest Control Products Act (PCPA): governs the importation, manufacture, sale and use of pesticides

6.2 First Nations

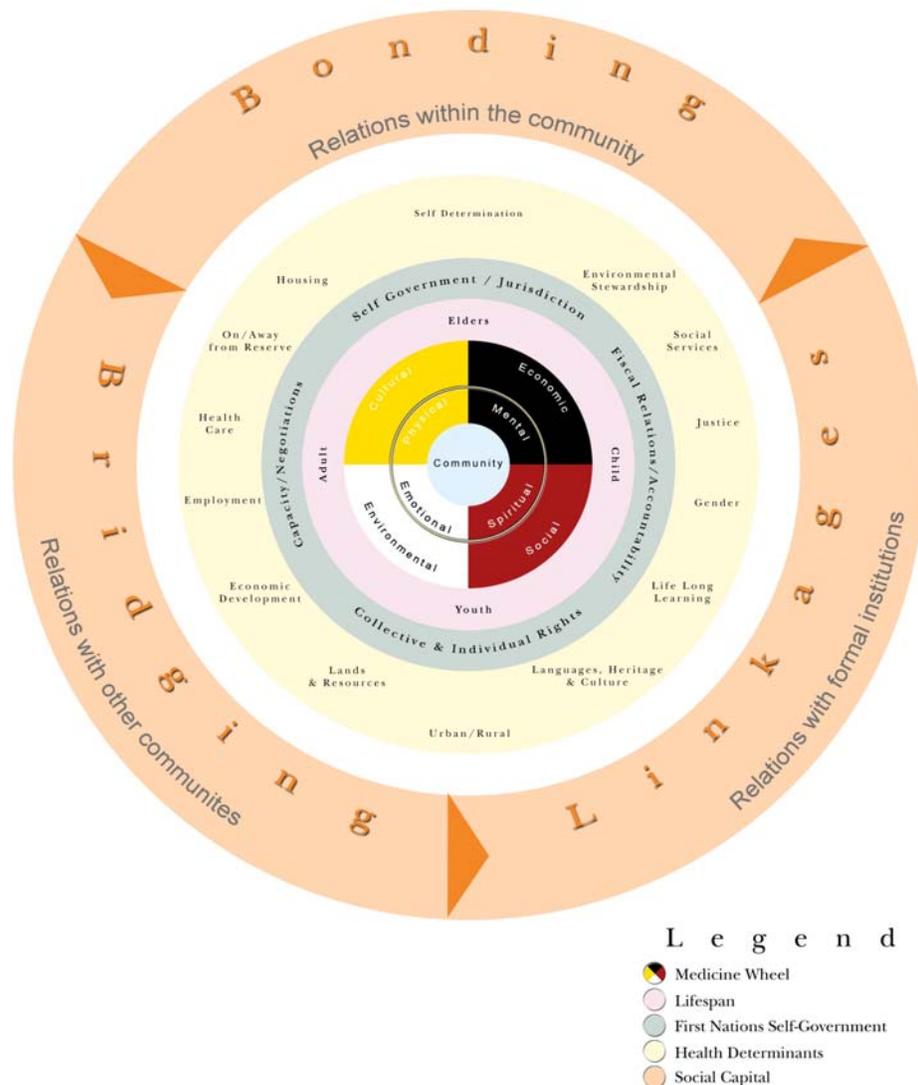
In 2005, a First Nations Wholistic Health Strategy was developed which addresses the unique determinants of health relevant to First Nations communities. This strategy includes a proposed First Nations Wholistic Policy and Planning Model (Figure 2) which emphasizes the significance of self-government in looking at potential new investments and partnerships in promoting positive health outcomes. This population health approach focuses on the interrelationship of the determinants of health, addresses health issues,



considers community initiatives and may be used in making policy recommendations around environmental health and First Nations children. The model also provides a conceptual overview of how to approach health promotion when addressing First Nations community health issues. “Clearly, for a policy initiative to be successful, it must both respond to and be directed by First Nations. In other words, First Nations must have a central role in directing change in order to achieve sustainable solutions. Also, past experience has demonstrated that all parties involved in a process of change must secure clear political commitment and mandates for change. Finally, it appears that joint or shared discussions and dialogue are the necessary vehicles to arrive at innovative, accountable and sustainable solutions”.⁴⁴ Characteristics of the model can be incorporated in First Nations children environmental health policy making and include the following:

- Must be First Nations driven;
- Community health approach;
- Social capital (bonding, bridging, and linkages between and outside of community);
- Build on successes;
- Wholistic approach to healthy living;
- Seek adequate funding to support research, infrastructure, programs and resources to promote action; and,
- Being inclusive of solutions around determinant of health issues specific to First Nations children.

Figure 2: First Nations Wholistic Policy and Planning Model⁴⁵



7. Scope of Research on Environmental Risks to Children’s Health in Canada

There exists an extensive literature gaps in the state of knowledge on environmental health for First Nations children in Canada. This is not surprising, as the literature also identifies significant gaps in research and professional development in the environmental health field for Canada as a whole. The current evidence base on the effects of the physical environment on human health in many areas is still fairly new, especially with respect to the cumulative effects of long-term exposure to environmental change.

However, scientific evidence does exist on the “associations between environmental hazards and asthma and other respiratory ailments, cancer, impacts on the developing fetal brain, a child’s behaviour and ability to learn, low birth weight and birth defects. Hundred of toxic exposures, such as air pollutants or pesticides, and physical hazards,



such as radiation, are either known to contribute, or are suspected of contributing to these health outcomes. However, very few exposures have been fully evaluated for their effects on prenatal and child development. Full scientific certainty is not possible since it would require carefully controlled scientific experiments on children. Ethically, such experiments would never be allowed”.⁴⁶

The major challenge for First Nations is to develop their own definitions of what environmental health encompasses, to collect and access adequate quantities of baseline environmental monitoring and health data, to develop First Nations-specific research methods, to implement community-based environmental health projects, to effectively share research findings and to create networks of environmental health experts on First Nations.

7.1 Research and Surveillance Initiatives

Relatively little data exists about the health and development of First Nations children in Canada. In particular, comprehensive national data concerning environmental health of First Nations children are not readily available. “While most developed countries have adopted national health and environment strategies or action plans, Canada has not. Unlike the U.S., Australia, and the European Union, Canada lacks both a national program to monitor children’s exposures to environmental contaminants, and a national system to track diseases and deaths caused by environmental contaminants”.⁴⁷ The following are health research and surveillance initiatives in Canada that do exist but do not fully address the research gap.

The First Nations Regional Longitudinal Health Survey, conducted on reserves across Canada in 2002-03, collected information on the health and developmental of children under the age of 12. This survey provides valuable information on important health and developmental indicators for children, including a description of their families, households, and childcare arrangements. Although this survey provides some health and developmental indicators for children, there is limited information on environmental indicators. It also covers only part of the First Nations population (those living on reserve).

The Aboriginal Children’s Survey (ACS) is national in scope and intends to collect information on the health and development of Aboriginal children (First Nations, Métis and Inuit) under 6 years of age, living in Canada. This survey will parallel the early childhood component of the National Longitudinal Study on Children and Youth but will include culturally specific questions. Data collection for this survey began in the fall of 2006 and will be repeated every five years following the Census. The main objective of the survey is to provide a comprehensive picture on the health, social and economic characteristics of Aboriginal children under the age of 6. It is hoped that this will help to provide fill an important gap in the availability of information on their development and well-being.



Data concerning registered Indians are maintained by Indian and Northern Affairs Canada (INAC), including topics such as age and gender, education, access to social services, and others. This information is mainly concerned with registered Indians living on reserve, and little information is available regarding First Nations children and youth.

In 2006, a Report for the Committee on Health and the Environment (CHE) was completed which reviewed existing bio-monitoring studies of human exposure to environmental contaminants in Canada. The report includes 133 Canadian studies on human bio-monitoring for environment contaminants published between 1990 and 2005. It also includes information specific to children and Aboriginal populations in Canada. Bio-monitoring “is a continuous or repeated measurement of potentially toxic substances, their metabolites or their biochemical effects. In tissues, secreta, excreta, expired air or any combination of these. Its purpose is to evaluate occupational or environmental exposure and health risk by comparison with appropriate reference values based on knowledge of the probable relationship between ambient exposure and resultant adverse health effect.”⁴⁸ Although this study reveals that many environmental contaminants have been studied in Canada, in general, most authors recommended that further research needs to be undertaken with respect to establishing linkages between tissue concentrations and exposure levels and effects.

A 2006 University of Ottawa Report entitled, Health Policy Approaches to Children’s Environmental Health, identifies a gap in research on the developmental toxicity testing of chemicals. It emphasizes the need for further epidemiological studies to improve our understanding of “critical exposure time windows, genetic and social/behavioural – environment interactions, the influence of pre-conceptual exposures, multimedia exposures, and low-dose effects. It also highlights the need for a national bio-monitoring program in order to better understand current levels of exposure of children to environmental toxicants and to establish their trends over time.”⁴⁹

In the United States, the National Children’s Study, a national longitudinal study which began in 2000, will follow 100,000 children from before birth to age 21. By working with pregnant women and couples, this study will gather data about how environmental factors alone, or interacting with genetic factors, affect childhood health. It will examine a wide range of environmental factors—from air, water, and dust to what children eat and how often they see a doctor. This valuable information will assist in the development of prevention strategies and cures for a wide range of childhood diseases. A similar research study in Canada is needed which includes specific data on First Nations children.

8. Considerations

Some of the key challenges in the area of First Nations children and environmental health are in addressing the huge research & knowledge gaps. Adequate resources are required to obtain essential baseline data. Another challenge is preventing and reducing environmental exposures and risks to First Nations children. Through education and raising awareness, many environmental health risks may be prevented. Preventing



children's environmental exposure to hazardous chemicals and toxins early on in the womb can help to prevent lifelong health impacts.

First Nations communities need to take precautionary action to reduce and prevent future harm. Precautionary action is an approach that advocates for immediately preventing harm in the absence of complete scientific information, as opposed to sacrificing the health of one generation in order to complete scientific research and belatedly preventing harm in the next. "This approach denotes a duty, on all members of society, to prevent harm, when it is within our power to do so, even when the evidence is uncertain or unattainable. Prevention of harmful environmental exposures is all the more essential when such exposures can permanently alter or damage a child's development. Protecting children from harm is at the core of sustainable development – to protect future generations – and is the basic foundation of social justice – to protect the most vulnerable members of society."⁵⁰

Canada needs to strengthen federal laws, regulations and policies around Children's Environmental Health which includes incorporating environmental justice in its policies. Environmental Justice promotes the equal protection of all citizens from environmental hazards, regardless of their economic status or race. It also recognizes that certain sub-populations are more vulnerable than others. Canada must "confront the unjust distribution of environmental harms and protect vulnerable populations".⁵¹

Increased research and improved surveillance on Children's Environmental Health in Canada are needed. This includes address the research needs of First Nations in this area and developing Environmental Health indicators specific to First Nations children. Baseline data is needed, as well as a longitudinal cohort study in Canada to aid in the investigation of the interactions between environmental exposures and child health outcomes. This research will assist in identifying children's exposure sources and track exposure trends over time.

Building First Nations capacity in the area of Children's Environmental Health is essential along with securing adequate resources and funding to effectively address the issue. First Nations need build research capacity to monitor their own environmental health. Community engagement and action is necessary to ensure culturally appropriate and efficient programs and services, education, and public awareness.

Lastly, the development of a First Nations National Children's Environmental Health Strategy, in collaboration with the regions and communities, would serve to confront the issue in a strong and united front. It would assist in bringing forward this important issue and enhancing the First Nations children's environmental health research agenda in Canada. It will also help in setting short-term and long-term objectives and targets for environmental health outcomes.



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10. Endnotes

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