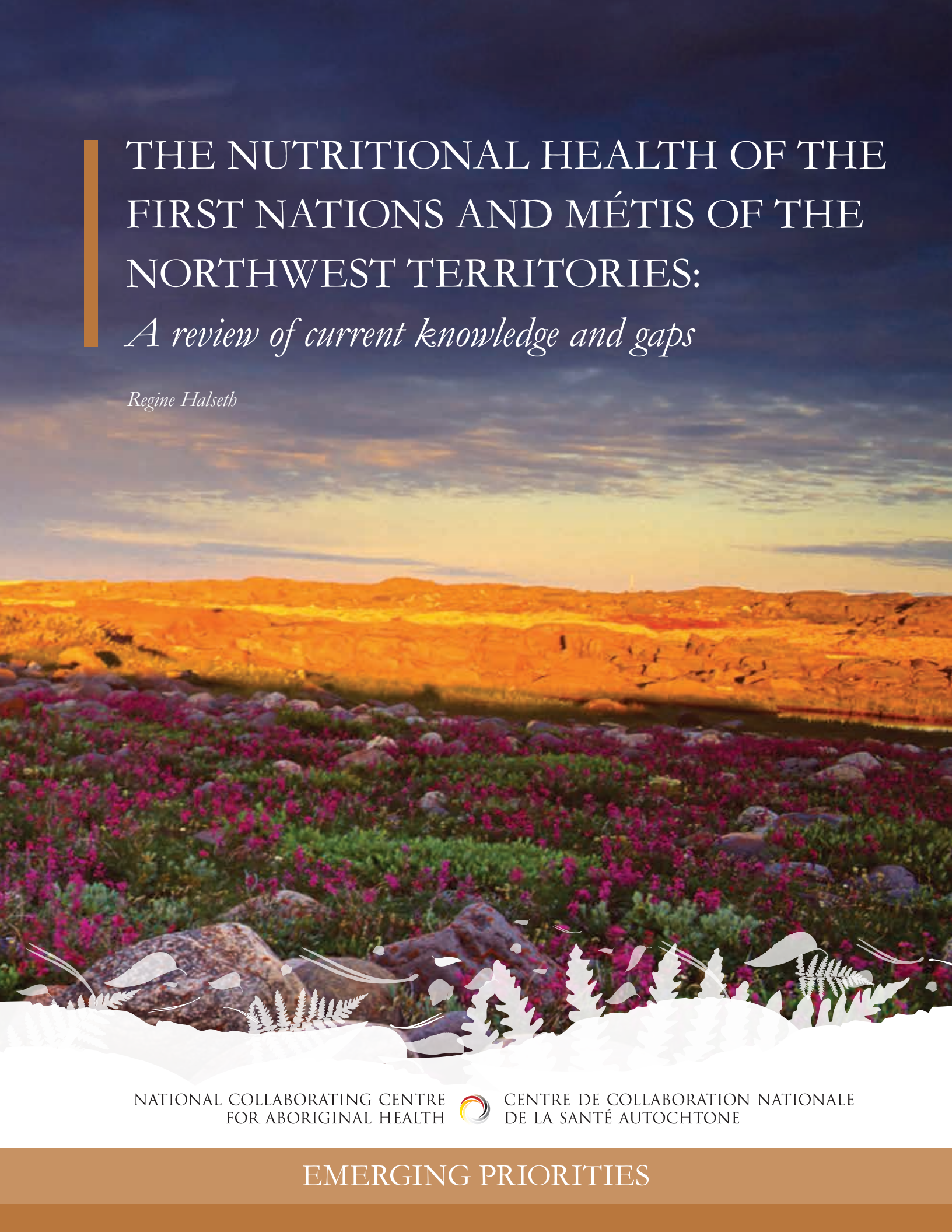




THE NUTRITIONAL HEALTH OF THE FIRST NATIONS AND MÉTIS OF THE NORTHWEST TERRITORIES:

A review of current knowledge and gaps

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NATIONAL COLLABORATING CENTRE
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DE LA SANTÉ AUTOCHTONE

EMERGING PRIORITIES

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List of Acronyms & Abbreviations

AANDC	Aboriginal Affairs and Northern Development Canada
BCC.....	Breastfeeding Committee of Canada
BFI	Baby Friendly Initiative
BMI	Body Mass Index
Cbz	Carboxybenzyl
CCHS.....	Canadian Community Health Survey
CDC.....	Centers for Disease Control and Prevention
CFP	Community Food Program
CINE	Centre for Indigenous Peoples' Nutrition and Environment
CO2	Carbon dioxide
CPNP.....	Canada Prenatal Nutrition Program
CWD.....	Chronic Wasting Disease
DDE (pp-DDE)	Dichlorodiphenyldichloroethylene
DDT.....	Dichlorodiphenyltrichloroethane
DHSS.....	Department of Health and Social Services
DNA	Deoxyribonucleic acid
GM	Geometric Mean
HC	Health Canada
HCH.....	Hexachlorocyclohexane
MF	Market Food
NAHO	National Aboriginal Health Organization
NCCAH	National Collaborating Centre for Aboriginal Health
NIDDM	Non-insulin Dependent Diabetes Mellitus
NU.....	Nunavut
NWT.....	Northwest Territories
NWT ECE.....	Northwest Territories Education, Culture and Employment
NWT HSS.....	Northwest Territories Health and Social Services
OC.....	Organic Contaminants
PCB	Polychlorinated biphenyl
PHAC	Public Health Agency of Canada
POPs	Persistent Organic Pollutants
TF	Traditional Food



EXECUTIVE SUMMARY



Aboriginal peoples have been experiencing a nutrition transition that has resulted in a greater proportion of their diet being comprised of nutrient poor market foods. This has led to a growing crisis linked to unhealthy weights. Socio-economic, cultural and environmental factors are contributing to this transition. Nevertheless, harvesting and consumption of traditional foods remains important for Aboriginal peoples, providing numerous cultural, economic, social and health benefits.

This report is meant to engage First Nations and Métis peoples residing in the Northwest Territories (NWT) in conversations about healthy food, nutrition and eating, with the overall aim of supporting them in achieving optimal health and well-being. While there has been considerable research on the nutritional health of the Inuit population or on Aboriginal people in the NWT collectively, less is known about the nutritional health of First Nations and Métis populations specifically. The report aims to summarize current knowledge about the nutritional health of this population and highlight any knowledge gaps.

The report begins by providing a demographic profile of the Aboriginal population in the NWT. It then outlines the methodology used to identify literature relevant to the nutritional health of First Nations and Métis in the NWT. This will be followed by

a summary of the relevant literature, including publication trends over time, and the priority topics and sub-populations of interest. The next section will provide an overview of current knowledge about the nutritional health of First Nations and Métis in the NWT, drawing on the relevant literature as well as broader sources, including research related to all Aboriginal populations residing in the NWT, the North and nationally where this research has relevance for the nutritional health of First Nations and Métis in the NWT.

Aboriginal people comprise more than half of the population of the NWT (Statistics Canada, 2013a). The largest Aboriginal group is First Nations, representing 63.1% of the Aboriginal population. This Aboriginal group is primarily comprised of the Dene, a linguistic group speaking Athapaskan languages who live collectively in a region referred to as 'Denendeh' (Dene Nation, n.d.). The Dene are comprised of five groups each with their own territory and language: the South Slavey Chipewyan, Dogrib/ Tłı̨chǫ Sahtu, and Gwich'in. The Métis represent approximately 15.4% of the Aboriginal population (Statistics Canada, 2013d). They live throughout the NWT but are concentrated largely in the communities of Fort Resolution, Fort Smith, Hay River and Yellowknife (Métis Nation NWT, n.d.).

The methodology used to identify relevant literature and research

related to the nutritional health of First Nations and Métis in the NWT involved a search of academic databases and Google Scholar. Combinations of the following search terms were used: food/diet/nutrition/nutritional status/health promotion/obesity/cardiovascular/diabetes/food security & Dene/First Nation/Aboriginal & Northwest Territories. In addition, the bibliographies of relevant literature were perused to identify additional sources. All literature published between 1980 and August 2014 was included if it met the search criteria. Relevancy was determined based on the population of interest (whether it provided a specific focus on either or all of First Nations, Dene or Métis populations); the topic of interest (extent of nutrition transition, dietary intakes, traditional and market food consumption, food security, health impacts, health promotion, etc.); and the type of publication (letters-to-the editor, news items, editorials, and draft/not for circulation documents were excluded).

Review of the literature

This section of the report focused exclusively on the literature deemed relevant to the nutritional health of First Nations and Métis in the NWT that was identified in the literature search. The search resulted in the identification of 103 pieces of relevant literature. Many of these were produced by colleagues associated with the Centre for Indigenous Peoples' Nutrition (CINE) and Environment at McGill University.

Their work made groundbreaking contributions to the literature and generated large databases of information which informed later studies.

The relevant literature spanned from 1983 to 2014. Based on five-year publication intervals, a steadily increasing trend in publications is revealed; however it is not known whether this reflects increasing interest in research related to the nutritional health of First Nations and Métis in the NWT or whether it reflects changes in the research priorities and funding levels of funding agencies.

There was a tendency of the relevant literature to focus on broad population groups, be they all northern residents, all Aboriginal peoples collectively, or all Dene/Métis people. Proportionally, very few studies focused on differences in the nutritional health of specific sub-populations, be they linguistic-based, age-based or geography-based. There were also no studies that examined differences based on socio-economic status. As a result, the diverse experiences of Aboriginal peoples with respect to their nutritional health continue to be largely ignored, making it difficult to implement effective health promotion activities in such a broad context. There may be significant differences in the experiences of various First Nations and Métis communities based on geography, including access to country food, the affordability of store bought food, household income, and cost of living. Most of the current literature and research on the nutritional health of First Nations and Métis in the NWT is also focused on adults rather than on infants, children and youth. Addressing the nutritional deficiencies in young people is a key component of stemming an emerging public health crisis.

The relevant literature was coded for main topics of interest based on the criteria that at least one paragraph was devoted to discussing that topic. The

most predominant topic related to food insecurity, including prevalence and the socio-economic and environmental factors that affect food insecurity. This was followed by nutrient assessments and food consumption patterns, benefits of a traditional diet, determinants of food use, and the health impacts of the nutrition transition. Most of these publications focused on identifying nutritional health issues and the underlying factors that affect them. To date, there has been very little research on health promotion initiatives and their effectiveness. This is a noticeable research gap that must be addressed so that effective strategies can be put in place to address the looming public health crisis arising from the nutrition transition.

Current knowledge about the nutritional health of First Nations and Métis in the NWT

This section draws on some of the key findings from the 103 pieces of relevant literature on the nutritional health of First Nations and Métis in the NWT, as well as on broader sources of information, including literature focused on Inuit or general northern populations, to the extent that this broader literature has relevance for First Nations and Métis in the NWT. The purpose of this section is to identify what is currently known about the nutritional health of this population as well as any specific gaps in knowledge.

The nutrition transition

There have been varying thoughts about how the nutrition transition has manifested in First Nations and Métis populations of the NWT. Szathmary, Ritenbaugh and Goodby (1987) conclude that dietary acculturation manifested as the addition of new foods to a stable traditional diet rather than a replacement of traditional foods;

while others describe it as involving the consumption of fewer types and smaller quantities of traditional food species and a greater quantity and diversity of market foods (Batal, 2001; Kuhnlein & Chan, 2000; Kuhnlein, Receveur, Soueida, & Berti, 2007). While the nutrition transition has resulted in significant changes in the collection, use and consumption of traditional food sources and attitudes towards them, consumption of them continues to remain high among Aboriginal people in the NWT (Kuhnlein & Soueida, 1992; Condon, Collings, & Wenzel, 1995).

A wide variety of factors (social, economic and environmental) influence food choices and preferences. Kuhnlein and Receveur (1996) identify a number of factors related to ecology and culture that have contributed to less engagement in traditional subsistence activities. Sharma (2010) adds the role of social changes such as settlement into stationary communities and forced attendance at residential schools in eroding Indigenous culture with respect to traditional harvesting practices. Perceptions about the positive and negative attributes of traditional and market foods; the cultural, social and spiritual contributions that food harvesting and gathering activities can provide to the health and well-being of individuals and communities; and the health and safety of food choices can affect food choice as well. These perceptions are not static but can be changed through education and media influences. In addition, variables like age, gender, seasonality and geographic location can also influence food consumption patterns. Older people consume more traditional foods than younger ones, men consume more than women, and communities in closer proximity to urban locales and in more southern latitudes consume less than those in remote locales or northern latitudes. Seasonal variations affect the quantities of traditional foods being consumed, and there are variations in



preference of traditional foods based on age, gender, and geographic location. Finally, for many Aboriginal people residing in the NWT, socio-economic barriers may exacerbate dietary change towards less healthy food choices, particularly when these are combined with the high cost, poor quality and limited variety and availability of healthy market foods in northern and remote regions.

Importance of traditional foods in First Nation and Métis diets

There are few longitudinal studies that track traditional food (TF) consumption patterns over time, leaving an unclear picture of the extent of the dietary transition in First Nation and Métis diets in the NWT. This section focuses

on what is known about the importance of traditional foods in the diets of these populations, including the types of TFs consumed, frequency of TF consumption, the proportion that TFs comprise in daily diets, and changes in TF consumption patterns over time.

The majority of the diets of First Nations and Métis people in the NWT is comprised of market foods (MFs), with TF consumption ranging from a low of 5% of dietary energy intake (Berti, Soueida, & Kuhnlein, 2008) to a high of 33% (Kim, Chan, & Receveur, 1998; Berti, Receveur, Chan, & Kuhnlein, 1998b). Northern communities had higher TF consumption compared to southern communities, men had higher consumption of TFs than women, and adults had higher TF

consumption than children. Of the types of TFs consumed, animal species far outweigh plant species. Caribou and moose are the leading TFs consumed across northern communities, and not surprisingly, in some communities, First Nations and Métis exceed the Canada Food Guide's daily recommended servings of protein (Kuhnlein et al., 2013). There is very little research focused on the contribution of traditional plant species to the diets of First Nations and Métis in the NWT. The research seems to indicate that while the consumption of TFs continues to remain important in the diets of First Nations and Métis in the NWT, the diversity of TFs being consumed has been declining (Kuhnlein et al., 2004).

While a number of studies examined the most frequently consumed traditional foods, fewer studies examined the most frequently consumed market foods. The limited research in this area seems to indicate that daily servings for fruits and vegetables, as well as for milk and alternatives, fall below the portions recommended in Canada's Food Guide; and that more than half of the energy intake of First Nations and Métis in the NWT comes from less nutrient dense foods that are highly processed, low cost, and high in sugar and carbohydrates (Kuhnlein et al., 2013). This is especially concerning for children who derive a high proportion of their dietary energy from fats and sweet foods.

Few studies report changes in TF consumption over time. These studies seem to indicate significant declines in some harvesting activities, though the evidence has been contradictory. While some studies show reduced harvesting of traditional animal species (for example Tracy and Kramer, 2000; McDonald, 2009); others seem to indicate shifting preference for harvesting certain animal species over time (see for example, Sahtú Renewable Resources Board, 2004), such as replacing caribou with moose. Still others show considerable increases in the consumption of TFs (see for example, Armstrong et al., 2007; Van Oostdam et al., 2009 which show increases in the consumption of fish amongst pregnant women). Nevertheless, these studies provide a snapshot of TF consumption patterns over selected periods of time; they are generally short in duration and rarely track individuals' food consumption patterns over time. We therefore have an unclear picture of the extent of the nutrition transition within First Nations and Métis. It is not simply enough to acknowledge that TF consumption is low among children and that this will translate into permanent poor eating habits as adults which will result in poorer health outcomes. Studies that

track food consumption patterns of children as they become adults are needed to provide a clearer picture of the extent of the nutrition transition.

Other gaps were also identified in the literature on patterns of traditional and market food consumption among First Nations and Métis in the NWT. Gates et al. (2014) noted that most literature on the diets of Aboriginal youth was focused on isolated or remote communities. Research on food consumption patterns of off-reserve First Nations and Métis living in or near urban locales and on the impacts of poverty on food choice are required to address these gaps in knowledge. Gates et al. also noted that for health promotion efforts to be effective, barriers to healthier diets must be overcome; this requires a greater understanding of why individuals eat what they do and what constitutes a healthy diet. In addition, despite widespread recognition of the impact of poverty on nutritional health, there was a gap in knowledge with respect to the impact of poverty on food choices and on the motivations and influences behind individual food choices.

Assessment of nutrient intakes and deficiencies

Dietary assessments have been a strong focus of investigations into the nutritional health of First Nations and Métis in the NWT. Most of the research in this area has been undertaken by researchers associated with the CINE. Their findings generally reveal that TFs have high nutrient densities for a number of nutrients and as a result, would serve as suitable alternatives for addressing some of the nutritional deficiencies they identified in the diets of First Nations and Métis people in the NWT.

TFs were found to have numerous nutritional benefits. These include lower fat content and polyunsaturated to saturated fatty acids ratio; and high

nutrient densities for iron, B vitamins, vitamin D, dietary fibre, zinc, copper, and magnesium. First Nations and Métis diets were generally considered deficient in vitamin A, D, and calcium; this is attributed to a lack of access to or availability of market foods that are considered high in these nutrients. Nutritional deficiencies vary across genders, ages, communities and seasons (Doolan, 1991; Egeland et al., 2004; Kuhnlein et al., 2006; Curren, Davis, & Van Oostdam, 2014).

A body of literature also examines the potential of TFs to address specific nutrient deficiencies in First Nations and Métis populations. Specifically, sea mammal fats and organ meats were high in vitamin A, D, and E (Kuhnlein et al., 2006); rabbit liver, loche liver, and Canada goose meat was high in Vitamin A (Simoneau, 1997); conchie eggs, rabbit flesh, and caribou were generally high in calcium (Simoneau, 1997); and raw fish eggs, raw whale skin, kelp, caribou liver, ringed seal liver, and blueberries are rich in vitamin C (Fediuk et al., 2002). Given that many of these traditional food sources are organ meats, where high levels of environmental contaminants can often accumulate, addressing issues related to the food security of these foods and communicating the safety of them to Aboriginal people will be paramount to any health promotion strategy involving the promotion of traditional foods as a way of addressing nutritional deficiencies.

The research clearly highlights the nutritional benefits of traditional foods and their potential to address nutrient deficiencies in First Nations and Métis in the NWT. However, substantive evidence is generally lacking for why certain nutrients are deficient in the diets of First Nations and Métis and more research is needed with respect to differences in the adequacy of nutrients in the diets of First Nations and Métis sub-populations, including socio-economic and geographic differences.

Food security

Definitions of food security typically emphasize the access, availability and utilization dimensions of food security. These definitions are often developed in non-Aboriginal contexts and fail to take into consideration the unique cultural dimensions of food security related to the harvesting, sharing and consumption of country or traditional foods. In conceptualizing and measuring food security in the context of Aboriginal peoples, both market and traditional food systems must be considered (Lambden et al., 2007; Power, 2008). This section provides a summary of current knowledge on the prevalence of food security in First Nations and Métis of the NWT, and the socio-economic and environmental factors that affect food security for this population.

No single study captures the prevalence of food insecurity among First Nations and Métis peoples of the NWT. To draw our conclusions we must utilize information from a few local community studies, studies on Aboriginal people in the NWT based on Canadian Community Health Survey (CCHS) data which exclude the on-reserve population, or studies of the general population of the NWT (including both Aboriginal and non-Aboriginal populations). The data seem to suggest that the prevalence of food insecurity for Aboriginal residents of the NWT is considerably higher than the national average, and that it would be even higher for First Nations living on-reserve. However, food insecurity seems to vary considerably across regions. There are numerous barriers to accessing both traditional and market foods, including socio-economic and environmental challenges.

Living in northern and remote regions has negative impacts on the cost, availability, and quality of healthy market foods. When coupled with

higher rates of poverty, First Nations and Métis peoples of the NWT are at increased risk of vulnerability to food insecurity. Food expenditures in the NWT are the second highest in the country behind only Nunavut, and while food subsidy programs exist, only four Dene communities were eligible for full subsidy in 2013 (Nutrition North, 2013). First Nations and Métis people have a higher prevalence of socio-economic risk factors for household food insecurity, including reliance on social assistance for income, having larger families, being below the Low Income Cut-off, having lower levels of education, not owning their own homes, or being lone-parent households. The high price of hunting equipment, gas and lack of access to a vehicle also impact First Nations and Métis peoples' ability to access traditional food sources. Women were more likely to report food insecurity compared with men, and older individuals were less able to afford fishing and hunting equipment and engage in traditional harvesting activities.

Several recommendations were made for addressing food insecurity in northern Aboriginal communities, including First Nation and Métis. These recommendations emphasized that solutions aimed at reducing food insecurity must address the broader issues of poverty and the negative aspects of acculturation, which affect many Aboriginal people's ability to hold down jobs and deal with addictions.

The safety of traditional or country foods through the bioaccumulation of chemical contaminants also has an impact on food security. There is a general perception among Canadian Aboriginal people that there is a considerable health risk associated with eating TFs because of concerns over levels of contaminants. The research evidence suggests that high levels of contaminants are found only in select TF sources and that these sources are

primarily consumed by Inuit rather than First Nations and Métis people. They tend to be higher in organ meats, marine animals, fish, and fish-eating birds. The evidence also highlights the need to address the high rates of smoking among Aboriginal people in the NWT, as smoking contributes high levels of cadmium into the blood stream.

Given the potential health risks associated with chemical contaminants in fetuses and newborns, there is a considerable body of research focused on exploring levels of exposure to organochlorine and metal contaminants in Aboriginal mothers and their newborns in the NWT and in northern Canada. The research evidence suggests that while health risks are not as high for First Nations and Métis mothers and newborns as they are for Inuit, levels of some contaminants are sufficiently high to warrant concern, especially methylmercury, lead, and cadmium. Nevertheless, several studies noted an encouraging trend of decreasing levels of contaminants in northern Aboriginal populations and in traditional food sources.

The central theme that emerged from the literature is that First Nations and Métis people in the NWT are not continually consuming dangerous levels of chemical contaminants and that TFs should not be avoided out of fear of chemical contamination. While some individuals may consume higher than tolerable levels of contaminants from certain foods during certain times of the year, these levels are generally not considered usual intake levels. The benefits of consuming traditional foods far outweigh the risks. There is therefore a need for effectively communicating health risks associated with consuming TFs, including consideration of seasonal use and portion size, so as to avoid confusion over food safety. However, this requires additional research on the health consequences of eating contaminated TFs (an area of research



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that is generally lacking), continued monitoring of contaminant levels in TFs and in Aboriginal populations, and on how to effectively communicate risk.

Climate change is another environmental factor that affects food security. There is general agreement that climate change has been occurring in the Canadian Arctic and that it will have greater impacts on the North, particularly for Aboriginal peoples who have a close connection to the land and limited resources to adapt to changing conditions. These changes have the potential to increase uncertainty with respect to the availability and predictability of the range of TFs as well as the quality of these foods (Paci et al., 2004). Most of the emphasis to date has been on impacts to Inuit

populations rather than First Nations and Métis populations. A strong focus of the research and literature has been on community adaptation to climate change, with a lesser focus on documented impacts as they relate to food security in the NWT. Only three studies focused on documenting impacts of climate change on the acquisition of TFs by First Nations and Métis people in the NWT. These impacts include changes to distribution and health of animal species, and effects to land, water and ice that have implications for traditional food harvesting activities. Several studies tracked the population of animal species over time, explored the impacts of a decline in animal species for food security, and/or offered suggestions for adapting to species decline.

There is a dearth of literature and research focused on the impacts of climate change on food security and on the health implications of a warmer and more unpredictable climate, especially in the context of First Nations and Métis populations in the NWT. Clearly more research is required in this area, especially more location specific assessments of climate change impacts (Ford & Pearce, 2010).

Health impacts of the nutrition transition

Researchers have noted that changing diets and lifestyles within Indigenous communities have contributed to increased prevalence of many diseases and illnesses, including diabetes, certain cancers, dental disease, cardiovascular

disease, fetal alcohol syndrome, and a wide range of illnesses associated with mental health and poor cultural morale (Kuhnlein, 1995, p. 766). Despite these assertions, few studies have explored the impacts of the nutrition transition on the health of First Nations and Métis people living in the Northwest Territories. Most of the current information is focused on the general NWT population, on Aboriginal people in the NWT, or on the northern territories combined. This leaves us with an unclear picture of the impacts of the nutrition transition on the health of First Nations and Métis people in the NWT.

The limited evidence seems to suggest that the prevalence of chronic illnesses associated with diet and nutrition is rising and they may be emerging as health concerns for First Nations and Métis peoples in the NWT. While prevalence of diabetes, cardiovascular diseases, and hypertension have traditionally been considered low for Aboriginal people living in the NWT, when one considers that the current research evidence largely excludes on-reserve First Nations populations and that there is evidence that First Nations and Métis in the NWT are at greater risk of diabetes and cardiovascular disease because they have higher rates of many of the risk factors for these diseases, including rates of obesity and overweight (which are especially alarming in children), there is a reasonable expectation that prevalence rates of these chronic diseases will increase into the future. In order to gain an understanding about the extent of health impacts associated with diet and nutrition in these populations, further research is required.

Health promotion

There is a noticeable gap in knowledge with respect to health promotion. Most of the information on this topic focuses on identifying and describing health

promotion programs and initiatives, which are generally targeted at broader populations in the NWT rather than focused specifically on First Nations or Métis populations in the territory. This information was primarily derived from a search of Google rather than from the research literature, as only five of the 103 relevant articles explored health promotion initiatives. While some offered suggestions for health promotion initiatives, none undertook evaluations on the effectiveness of initiatives. Such research is essential so that knowledge can be shared and communities can learn from what works well in other places.

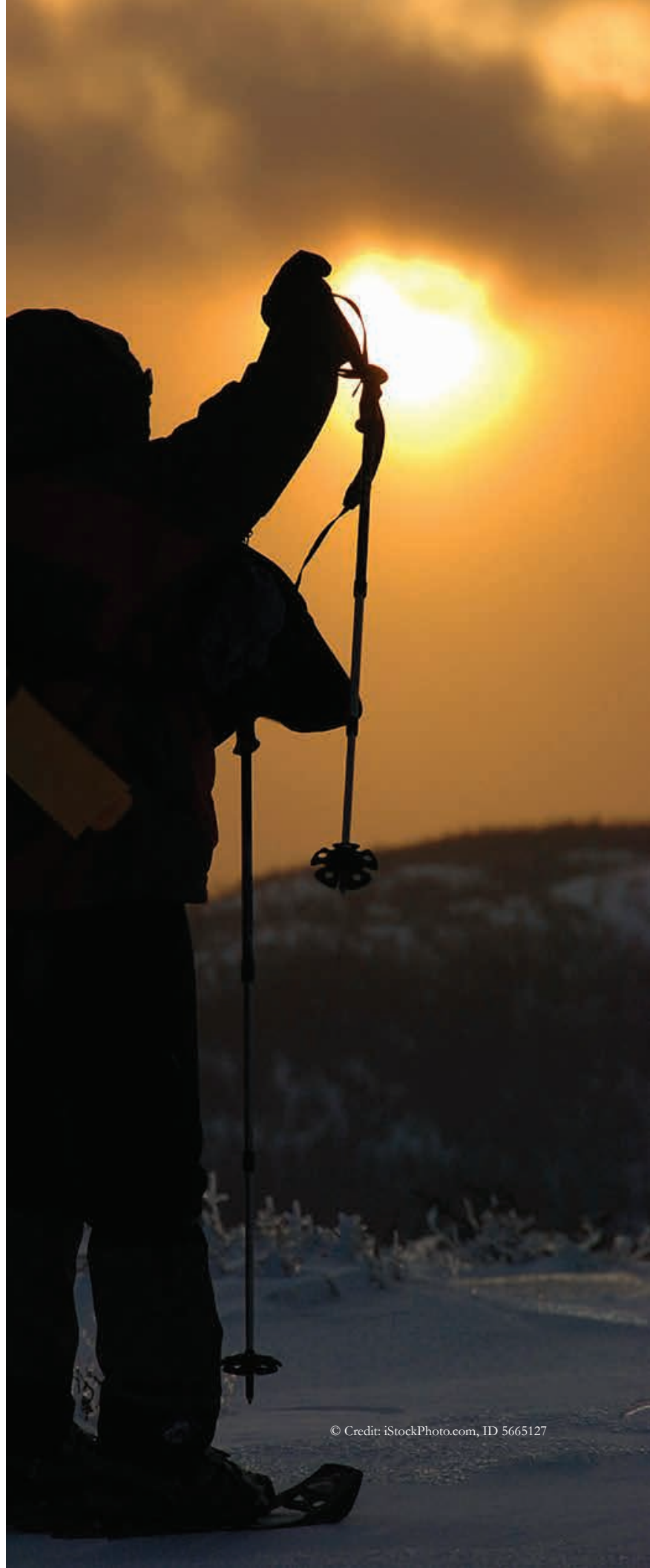
A diverse range of health promotion initiatives was identified using Google's search engine. These initiatives were multi-level and multi-sectoral approaches, targeting either the general population or the Aboriginal population in the NWT, and specific age groups (infants, children, youth or adults) or all generations. Some of the initiatives are short-term, temporary solutions while others involve organizational change or policy response. Although initiatives could be organized into multiple categories, for the purposes of this report they are organized into the seven categories utilized in the *Expert Panel on the State of Knowledge of Food Security in Northern Canada's* (2014) framework. Programs or initiatives aimed at improving the availability and affordability of high quality foods include: the Healthy Foods North Initiative and Nutritious North Canada. Health and education programs include the: Canada Prenatal Nutrition Program, Brighter Futures program, Baby Friendly Initiative, Healthy Children Initiative, Aboriginal Head Start, and a fact sheet series on the types of traditional foods and what vitamins they are rich in. Kuhnlein et al. (2013) also show that individual communities are engaged in developing their own culturally relevant health promotion initiatives. Community wellness and

intergenerational knowledge sharing programs include: food sharing and community food programs, as well as health promotion initiatives aimed at reducing the prevalence of chronic disease, including the Aboriginal Diabetes Initiative, the Chronic Disease Management Model, the Diabetes Self-Management Pilot Program and Diabetes Capacity Building Project, and the Government of the NWT's Health Promotion Strategy Fund. There are several programs that provide harvester support and focus on sustainable wildlife management including the: Commercial Harvest Program, Traditional Harvest Program, Western Harvester's Assistance Program, community organized hunts, and wildlife monitoring programs. Only one program could be identified that would fall under the 'poverty reduction and community economic development category; Arctic co-operatives provide a mechanism for building capacity among Aboriginal people as well as helping to reduce the cost of foods. Programs or initiatives that could be categorized as 'Innovation in infrastructure, transportation and local food production' include the Growing Forward Initiative which is comprised of the Small-Scale Food Program and the Northern Agri-Food Program, as well as the harvester's assistance programs identified earlier for their goal of improving food security through the promotion of traditional harvesting. Programs and initiatives aimed at building capacity and empowering youth with knowledge related to food security include: Drop the Pop, Sip Smart, Healthy Food for Learning, Kids in the Kitchen, Jump Rope for Heart, and Take a Kid Trapping.



Conclusion

Improving the nutritional health of First Nations and Métis in the NWT has been a health priority and research focus for decades. The research clearly shows a trend towards increasingly substituting traditional foods with market foods by younger generations, and highlights the role that age, gender, geography, socio-economic status and individual food preferences play in this. It shows the existence of some nutritional deficiencies in First Nations and Métis, and the nature and extent of food insecurity. Nevertheless, there remains a considerable gap in knowledge related to patterns of traditional and market food consumption, determinants of nutrient deficiencies, levels of contaminants in traditional food sources over time and across space, the impact of climate change on the quality and availability of specific traditional foods, the prevalence of chronic diseases associated with diet and nutrition, and the effectiveness of various health promotion programs and initiatives. In particular, the research needs to more clearly respond to the diversity of Aboriginal peoples, including the impact of socio-economic status and location of residence, so that more targeted and effective health promotion programs and initiatives can be implemented.



1.0 INTRODUCTION



There is a growing crisis of chronic diseases associated with unhealthy weights resulting from low levels of physical activity and poor nutrition in children and adults. In Canada, the prevalence of chronic diseases, especially obesity and diabetes, has reached epidemic proportions in some Aboriginal¹ communities (Liu et al., 2006; Young, Reading, Elias, & O’Neil, 2000). Much of this public health crisis can be attributed to the rapid social, cultural and environmental changes Aboriginal peoples have undergone through colonization. While traditional foods continue to be an important part of their diets, Aboriginal people have been undergoing a nutrition transition whereby a greater proportion of their daily diets is being comprised of market foods, many of which are nutrient poor. The factors contributing to this transition are wide-ranging and include socio-economic, cultural, and environmental dimensions. The research evidence shows that traditional foods are not only more nutritious than market foods, they also provide numerous cultural, economic, social and health benefits. In fact, “[f]or all Indigenous peoples, food is at the heart of culture and health, and is considered to be part of the environmental whole

in which families live” (Kuhnlein, Receveur, Soueida, & Egeland, 2004, p. 1452). Promoting the consumption of traditional foods should therefore be an important component of any strategy to improve the health and well-being of Aboriginal peoples.

This report is meant to engage First Nations and Métis people residing in the Northwest Territories (NWT) in conversations about healthy food, nutrition and eating, with an overall intent to support them in achieving optimal health and well-being. The First Nations and Métis, despite comprising the majority of the Aboriginal population in the NWT, are often overlooked in research related to diet, nutrition, and their association with health and well-being. While a group of researchers associated with the Centre for Indigenous Peoples’ Nutrition and Environment (CINE) at McGill University have undertaken fairly extensive research related to nutritional deficiencies, the extent of traditional and market food (MF) consumption, and levels of contaminants found in traditional food (TF) sources in Arctic Indigenous peoples, there remain considerable gaps in knowledge pertaining to the nutritional health of

First Nations and Métis people in the NWT. Most of the research focuses on Inuit and Inuvialuit² populations rather than First Nations and Métis, especially research on the impacts of climate change and environmental contamination on traditional food systems, on food security, and on health. Other research related to the impacts of diet and nutrition on health and well-being tends to be more broadly focused on the general NWT population (including Aboriginal and non-Aboriginal populations), or on Indigenous populations in either the NWT or the North. This research thus fails to capture the unique circumstances and conditions of the First Nations and Métis people.

This report aims to summarize current knowledge about the nutritional health of First Nations and Métis people in the NWT and identify knowledge gaps. The report will begin in Section 2 by providing a demographic profile of the Aboriginal population of the NWT. Section 3 will provide an overview of the methodology used to identify the peer and non-peer reviewed literature published up to August 2014 on the nutritional health of First Nations and Métis in the NWT. Section 4 will

¹ The term ‘Aboriginal’ will be used to denote the Indigenous peoples of Canada as defined by the Constitution Act of Canada 1982, Section 35, 2 as First Nations (including status/non-status Indians, and on/off reserve Indians), Inuit and Métis peoples.

² The Inuvialuit people are Western Canadian Inuit living primarily in their homeland, the Inuvialuit Settlement Region, which extends along the Arctic Ocean coastline from the Alaskan border east through to Beaufort Sea, and includes the Mackenzie River delta, the northern portion of the Yukon, the northwest portion of the Northwest Territories, and the western Canadian Arctic Islands (*Wikipedia*, <http://en.wikipedia.org/wiki/Inuvialuit>).

summarize the relevant literature on the nutritional health of this population. Specifically, it will identify publication trends over time, as well as the priority topics and sub-populations that are of interest. This will be followed in Section 5 by a summary of current knowledge about the nutritional health of the First Nations and Métis population, including the importance of TFs, food preferences, factors that impact the types and quantities of TFs consumed, the extent of the nutrition transition among this population, nutritional deficiencies, issues related to food security, the impacts of diet and nutrition on health, and health promotion programs and initiatives aimed at improving the nutritional health of First Nations and Métis people in the NWT. This section will draw on the relevant literature identified in the literature search, as well as information from broader sources, including research related to all Aboriginal populations in the NWT, the North and nationally, where it has relevance for First Nations and Métis people residing in the NWT. This will allow us to gain a better understanding about what is currently known about their nutritional health and where there may be research gaps.



2.0 BACKGROUND



Aboriginal people comprise much of the population of the NWT. According to the National Household Survey³, 51.9% of the approximately 21,160 residents are Aboriginal (Statistics Canada, 2013a). The largest Aboriginal group is First Nations, representing about 63.1% of the Aboriginal population, followed by Inuit⁴ (15.6%) and Métis (15.4%). With the exception of the Cree who live close to the Alberta border, the First Nations population consists primarily of the Dene, inhabitants of an area that stretches from Hudson's Bay through the NWT and the Yukon to the interior of Alaska, and from northern Alberta to the Arctic Ocean.

The Dene speak northern Athapaskan languages and live collectively in a region referred to as 'Denendeh' (Dene Nation, n.d.). They are comprised of five groups, each with their own territory and dialect (Figure 1). The five groups are the Gwich'in (Mackenzie Delta Region), North Slavey (Sahtu Region), South Slavey (Dehcho Region), Chipewyan (South Slave Region), and Dogrib/Tłıchǫ (North Slave Region). Table 1 shows the main First Nations bands within each group and the approximate proportion that each group comprises of the total Dene population. The largest group, as calculated by the author, is the South Slavey (comprising approx. 24.9% of the Dene population),

followed by the Chipewyan (24.5%), the Dogrib/Tłıchǫ (21.2%), the Sahtu Dene (15.3%), and the Gwich'in (14.1%).

The Métis live throughout the NWT but can be found in large concentrations in the communities of Fort Resolution, Fort Smith, Hay River, and Yellowknife (Métis Nation NWT, n.d.). While no information on the number of Métis

living within each of these communities is readily available, at present, according to Statistics Canada 2011 National Household Survey, 3250 people in the NWT self-identified as Métis (Statistics Canada, 2013d). They represent approximately 15.4% of the total population (Statistics Canada, 2013c).

FIGURE 1: ABORIGINAL LANGUAGE GROUPS IN THE NWT



Source: DOBES: Documentation of Endangered Languages (n.d.), <http://dobes.mpi.nl/wp-content/uploads/2013/02/map-1.jpg>

³ The 2011 National Household Survey (NHS) replaced the 2006 long-form census and has raised concerns for quality and comparability over time (Sheikh, 2013). Statistics Canada has identified potential limitations to the NHS data due to incomplete enumeration of 36 Indian reserves and low response rates among certain populations (Statistics Canada, 2013b). Due to the limited data available from the 2011 NHS, this report relies heavily on data obtained from the 2006 Canadian Census.

⁴ Usually described as the Inuvialuit.

TABLE 1: DENE POPULATION IN THE NORTHWEST TERRITORIES⁵

Language Group	Approx. 2013 Statistics Canada population	Approx. percentage of NWT's First Nation population ⁶	First Nations	Tribal Group Affiliation
South Slavey	4531	24.9	Acho Dene Koe First Nation, Deh Gah Gotie Dene First Nation, Jean Marie River First Nation, Ka'a'gee Tu First Nation, K'atlodeeche First Nation, Liidlili K'ue First Nation, Nahanni Butte First Nation, Pehdzeh Ki First Nation, Samba K'e Dene First Nation, West Point First Nation	Deh Cho Tribal Council
Chipewyan	4450	24.5	Deninu K'ue First Nation, Lutsel K'e Dene First Nation, Salt River First Nation, Yellowknives Dene First Nation	Akaitcho Territory
Dogrib/ Tłı́chǫ	3848	21.2	Dogrib Rae First Nation, Wha Ti First Nation, Gameti First Nation, Dechi Laot'l First Nation	Dogrib Tribal Council and the Tłı́chǫ Self-Government
Sahtu Dene	2785	15.3	Behdzi Ahda First Nation, Deline First Nation, Fort Good Hope First Nation, Tulita Dene First Nation	Sahtu Dene
Gwich'in	2569	14.1	Aklavik, Gwichya Gwich'in, Inuvik Native, Tetlit Gwich'in	Gwich'in Tribal Council

Total First Nations Population: 18,183

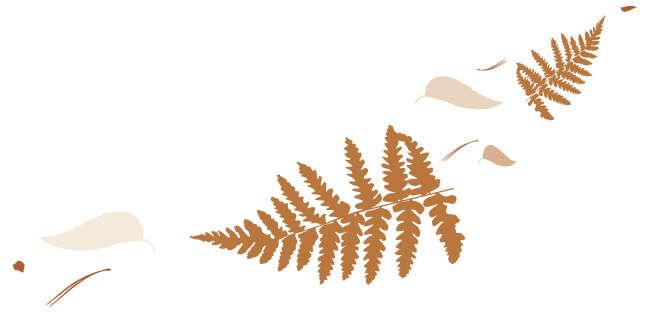
Source: Aboriginal Affairs and Northern Development Canada, 2014.

⁵ Caution must be exercised in interpreting this data given that language group boundaries may not correspond absolutely with tribal group affiliations.

⁶ Percentages were calculated by the author using primarily data derived from Aboriginal Affairs and Northern Development Canada (2014). Two South Slavey communities did not identify the number of registered First Nations – K'atlodeeche and West Point. Populations from these two communities were derived from community websites, www.katlodeeche.com/kfn-community/kfn-reserve and http://www.dehcho.org/members/west_point.htm, using band membership numbers.



3.0 METHODOLOGY



The methodology described here relates to the search strategy utilized in Section 4 to identify relevant literature related to the nutritional health of First Nations and Métis people of the NWT. The literature was derived from a search of academic databases, including Academic Search Premier, Medline, PubMed, and Social Sciences indexes, as well as from Google and Google Scholar. The following combinations of search terms were utilized: food/diet/nutrition/nutritional status/health promotion/obesity/cardiovascular/diabetes/food security & Dene/First Nation/Aboriginal & Northwest Territories. In addition, the bibliographies of relevant literature were also perused to identify additional sources. All literature published up to August 2014 was included if it met the relevancy criteria.

The first relevancy criterion was the population of interest. Literature was considered relevant if it included a specific focus on either or all of First Nations, Dene or Métis populations in the NWT. Studies focusing exclusively on Inuit or Inuvialuit populations were excluded for three primary reasons. First, while a significant Inuit population resides primarily in the northern part of the Territory, they comprise a relatively small proportion of the Territory's Aboriginal population

in comparison to First Nations. Second, they differ considerably from First Nations from a cultural perspective (ie. the types of traditional foods consumed and the extent of the nutrition transition). Third, they also differ significantly from First Nations in terms of the impacts of the nutrition transition on their health. However, studies that included Inuit in addition to First Nations and/or Métis were included if they provided disaggregated data and analysis for First Nations and/or Métis populations in the NWT. While the majority of the Aboriginal population in the Territory is comprised of Dene people, the Métis are included in this report because they share many common cultural practices and values related to food and nutrition, and because in the literature they are often considered collectively with the Dene.

The second relevancy criterion was topic of interest. The topics considered relevant included: the extent of the nutrition transition; the importance of traditional harvesting activities and foods; dietary intake from either TFs or MFs; nutrient assessments in either TFs or MFs, food preferences and factors affecting food choice; food security from either a socio-economic or environmental perspective; the prevalence of chronic illnesses related

to diet and nutrition such as obesity, cardiovascular disease and diabetes; and health promotion initiatives. Given the importance of TFs in the diets of Aboriginal populations throughout the NWT, any general literature related to food security and environmental health (i.e. climate change or environmental contamination) in northern Canada (including the Yukon, NWT, and Nunavut) was included as long as this literature discussed impacts on the food security of Aboriginal populations. These topics have relevancy in the context of First Nations and Métis populations in the NWT.

Relevancy was also determined based on the nature of the publication. Letters-to-the-editor, news items, editorials, and documents marked 'not for circulation' or 'draft' were excluded, while reviews of the literature were included for their utility in helping to identify research gaps. To capture the widest range of publications, no publication start date was imposed and all publications up to August 2014 were assessed for relevancy.

It is important to note that while fairly comprehensive, this scan was not systematic. As a result, some relevant literature may not have been identified through the methodology used.



4.0 REVIEW OF THE LITERATURE



This section of the report provides a review of the literature published up to August 2014 on the nutritional health of First Nations and Métis in the NWT. Using the search terms noted in the methodology section, the search resulted in the identification of 103 relevant publications. An additional seven publications were excluded from this review because they related to chronic diseases among residents of the NWT generally, without providing disaggregated data or analysis for First Nations and/or Métis populations specifically. Given the prevalence of chronic diseases associated with diet and nutrition on Aboriginal people in Canada noted in the literature, the lack of disaggregated data makes it difficult to assess any health impacts of diet and nutrition on First Nations and/or Métis in the NWT. Nevertheless, given that more than 50% of the NWT's population is Aboriginal, some of the relevant findings from these

seven studies may be included in later discussions (Section 5) where current knowledge is summarized. This section examines the nature of only the 103 relevant publications identified in the literature search. Specifically, it assesses the number of studies published over time, the population group that is of interest to the study, and the main topics of interest covered in the study. For those who are interested, these publications can be identified in the Reference List (at the end of this report) through the use of an asterisk.

It is interesting to note that many of the publications identified in this literature search were produced by colleagues associated with the Centre for Indigenous Peoples' Nutrition and Environment (CINE) at McGill University who have undertaken several phases of research on diet and nutrition (levels of food consumption, nutritional assessments, and levels of contaminants

in food sources) in the NWT since the 1990s. Their early body of research made groundbreaking contributions to the literature in terms of identifying the factors that impact traditional food consumption (age, seasonality, location, etc.); the benefits and risks of traditional food consumption (nutrient content, quality, etc.); threats to traditional food systems; and the extent of the nutrition transition occurring among Aboriginal people in the NWT and in northern regions⁷ generally. Large databases of information were generated from this early body of work, much of which has informed later studies.

⁷ They have undertaken studies in Canada's three territories (Nunavut, Yukon, and Northwest Territories), the northern regions of provinces like Quebec, as well as Arctic regions internationally.

4.1 Peer- and non-peer reviewed publications over time

The relevant literature spanned from 1983 to 2014. Table 2 shows the number of relevant publications identified by five year intervals. No literature published prior to 1983 and only a few items of literature published prior to 1990 could be identified through the methodology utilized. It is not known whether this reflects a lack of published literature prior to the 1990s or a lack of updating electronic databases to include older publications prior to the rapid expansion of the electronic technology age. Of the publications identified in this search, there is a temporal trend of a steadily increasing volume of publications related to the nutritional health of First Nations and Métis in the NWT over successive five-year intervals. It cannot be ascertained, however, whether this increase reflects greater interest by researchers in topics related to the nutritional health of this population or whether it reflects changes in the research priorities and funding levels of funding agencies.

4.2 Population group under study

Table 3 summarizes the population group that is the focus of the literature identified in this search. These categories have been developed on the basis of whether there was separate analysis and discussion for specific population groups. For example, all literature that focused exclusively on Dene populations was categorized as Dene. However, all literature with a northern Aboriginal population focus that provided separate and distinct analysis or discussion about the Dene population (in addition to other population groups like the Inuit) were also categorized as “Dene” rather than as “General Northern Aboriginal”, a

TABLE 2: PUBLICATIONS BY YEAR OF PUBLICATION, FIVE YEAR INTERVALS

Interval	Number of publications
1980s	4
1990-1994	12
1995-1999	18
2000-2004	22
2005-2009	23
2010-August 2014	24

TABLE 3: PUBLICATIONS BY POPULATION GROUP

Population Group	Number of publications*
Dene/Métis collectively	33
General northern population (incl. both Aboriginal/non-Aboriginal people in the North generally or the NWT specifically)	17
Northern or Arctic Aboriginal	11
Dene only (within a specific community or across the NWT)	10
General Aboriginal	10
Sahtu/Métis (across the NWT or within a specific community)	7
Dogrib	9
Gwich'in	8
Chipewyan	3
Sahtu only	3
Deh Cho	2

* Since several publications provided data disaggregation for multiple language groups, n does not equal 103.



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category reserved for those publications that never deviated from a general focus on the general Aboriginal population.

Most of the relevant publications were focused on broad populations rather than specific sub-populations. Publications focused on combined Dene/Métis populations, either in a specific community or across the NWT generally, comprised the largest proportion of the relevant literature (32%). The second largest population group of interest was the general northern population, including both Aboriginal and non-Aboriginal people living in either the northern territories (Nunavut, Yukon and NWT) collectively or in the NWT specifically (nearly 17% of the literature). Eleven publications (10.7%) were focused on northern or Arctic Aboriginal people in Canada. Ten percent of the literature focused on the Dene population exclusively, and a further 10% focused on the general Aboriginal population (across Canada or internationally). This latter category was included despite its general focus because the literature focused primarily on food security issues resulting from climate change or environmental contamination, issues that are of particular importance to the

Aboriginal people in northern Canada. The remainder of the publications focused on single Dene language groups. None of the studies included a specific focus on only Métis people.

In addition, most studies focused broadly on all ages, genders and geographies. Of the 103 relevant publications, more than half (53.4%) focused on the general population, regardless of age or gender. Of the publications that focused on the nutritional health of a specific segment of the population, the focus was more often on females compared to males (79% compared with 60.4% respectively), and adults (72.9%) compared with children (20.8%), infants (10.4%), or youth (6.3%). Further research is needed with respect to First Nations and Métis young people as addressing their nutritional deficiencies is critical to stemming an emerging public health crisis. Further research is also needed to capture the diverse experiences of First Nations and Métis communities based on geography. There may be considerable differences based on where one lives, including the ability to access country food, the affordability of store bought food, household income, and cost of living. While several studies

examined differences in the nutritional health of Aboriginal communities near to and remote from urban centres, none examined the nutritional health of First Nations and/or Métis living in urban locales. Health promotion initiatives are more effective in changing health behaviors when they are tailored to specific audiences (Kreuter & Wray, 2003; Kreuter, Oswald, Bull, & Clark, 2000; Noar, Benac, & Harris, 2007), and this requires accurate information for sub-sections of the population.

Overall, the data reveals a tendency to focus on broad population groups, be they all northern residents, all Aboriginal peoples collectively, or all Dene/Métis people. Proportionally, very few studies focused on differences in the nutritional health of specific sub-sections of the population, be they linguistic-based, age-based or geography-based. As a result, the diverse experiences of Aboriginal peoples with respect to their nutritional health continue to be largely ignored, which will make it difficult to implement effective health promotion activities in such a broad context.

4.3 Research topics

This section focuses on the main research topics discussed in the relevant literature. Since publications can include discussion on multiple topics, they may be categorized into more than one topic area. As a result, the totals will not add up to 103. In order for a publication to be categorized under a specific topic, there must be at least one paragraph devoted to discussion of that topic. Passing mentions were excluded. Table 4 summarizes the predominant topics found in the relevant publications.

The most predominant topic found in the literature related to food security, addressed by nearly 60% of all relevant literature. Of these publications, nearly

66% were focused on the impact of environmental contaminants on food security; 26% addressed socio-economic and cultural factors, including the impact of household status, age, poverty, and traditional sharing practices among others, on food security; and 25% addressed climate change impacts on food security. The next most prevalent topics were nutrient assessments and patterns of food (traditional and/or market) consumption, each comprising approximately 28% of all relevant publications. Nutrient assessment studies typically involve analyzing nutrients found in particular food sources (be they traditional or market-based foods) and determining whether any nutrients are inadequate in diets. Food consumption pattern

studies typically involve assessing how frequently certain foods (be they market or traditional) are consumed or the proportion of the diet that is comprised of traditional/market foods, which is often expressed as a percentage of total energy intake. The benefits of a traditional diet, determinants of food use (including season, age, gender, geography, etc.), and the health impacts of the nutrition transition (obesity, cardiovascular disease, hypertension, etc.) are the next most common topics, comprising 22.3%, 21.4%, and 18.4% of relevant publications respectively. Given the prevalence of literature focusing on the impact of environmental contaminants on food security, it is somewhat surprising that only 16.5% of the literature focused on analyzing

TABLE 4: PUBLICATIONS BY MAIN TOPICS

Research themes	Number of publications
Food security	61
• Environmental contamination	40
• Socio-economic and cultural aspects	16
• Climate change	15
Nutrient assessments	29
Food consumption patterns	29
Benefits of traditional diet	23
Determinants of food use	22
Health impacts of nutrition transition	19
Food preferences	17
Analysis of contaminants in food	17
Seasonal changes in diet	11
Food/health beliefs	8
Health promotion	5



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levels of contaminants in food sources. These studies could involve assessing contaminant levels in traditional food sources or assessing the levels of contaminants found in populations. Seasonal changes in diet, food/health beliefs, and health promotion were topics of lesser concern.

The main topics covered in the literature focused primarily on identifying issues related to the nutritional health of First Nations and Métis in the NWT and the factors that affect their nutritional health. Given that diet and nutrition have been identified as contributing to the rising rates of obesity and diabetes in Aboriginal populations, it is surprising that only five publications focused on health promotion as a topic. This is a noticeable gap in the research that must be addressed so that viable and effective strategies can be put in place to address this emerging public health crisis.

4.4 Summary of literature findings

From the relevant literature, we can see a clear trend of increasing publications over time on topics related to the nutritional health of First Nations and Métis people in the NWT and in the north generally. However, much of this research encompasses broad population groups (northern residents, Aboriginal people in the NWT, all Dene/Métis people), with little research examining differences between specific population groups (be they differences among language groups, between genders, across age groups, and geographies). As a result, the current research fails to adequately capture the diverse experiences of specific First Nations and Métis groups in the NWT. These are research gaps that must be addressed so that health promotion activities can be implemented effectively and lead to positive changes in diets.

The literature identified in this search also showed that while there has been a fairly balanced coverage of topics related to the nutritional health of First Nations and Métis people in the NWT, the focus of these topics has primarily been on identifying nutritional health issues and the underlying factors that affect them. To date, there has been little research on health promotion activities and their effectiveness. The sharing of lessons learned from public health initiatives implemented in particular contexts would be tremendously beneficial as Aboriginal people work to address this public health issue in their own communities.



5.0 CURRENT KNOWLEDGE



This section will summarize some of the key findings from the literature with respect to the nutritional health of First Nations and Métis people in the NWT. However, while Section 4 drew from only the 103 relevant publications identified in the literature search, this section will draw on broader sources of information, including literature focused on Inuit or general northern populations, to the extent that this broader literature has relevance for First Nations and Métis people in the NWT. The purpose of this summary is to identify what is currently known about the nutritional health of this population and any specific gaps in knowledge.

This section begins with a discussion on how the nutrition transition is defined and manifested, and the factors that underlie dietary change for First Nations and Métis people in the NWT. This will be followed by an examination of how frequently they consume traditional and market foods, and a comparison of the nutrients contained in both traditional and market food sources. This should provide the reader with an overview of how adequate diets are for this population. The section will then move to a focus on food insecurity among First Nations and Métis people, including discussion on the prevalence of food insecurity and the socio-economic and environmental challenges to improving the nutritional health of First Nations and Métis people in the

NWT. This section will conclude with an examination of the health impacts resulting from this nutrition transition, including obesity, diabetes, and cardiovascular disease, and a discussion on health promotion activities geared at addressing these health impacts.

5.1 The nutrition transition

There are varying definitions of ‘nutrition transition’ in the literature. It has been defined by Damman, Eide, and Kuhnlein (2008) as “changes in diets, patterns of work and leisure, accompanied by and resulting from industrialization, urbanization, economic development and globalization of markets” (p. 135). Sharma (2010) characterizes the nutrition transition as a shift from traditional eating patterns to processed, shop-bought foods. In the case of Aboriginal communities in the NWT, most have undergone some level of nutrition transition over the past 60 years (Damman et al., 2008; Sharma, 2010). This process has been gradual and generally involves a shift towards a less healthy diet resulting from decreased reliance on traditional foods (TFs) and increased reliance on market-based foods (MFs) that are often preprocessed and high in refined carbohydrates and saturated fat (Kuhnlein et al., 2004; Popkin, 2006; Popkin & Gordon-Larsen, 2004).

Changes resulting from a transition away from a traditional lifestyle have been associated with the emergence of previously unknown chronic diseases such as hyperglycemia and diabetes (Ritenbaugh, Szathmary, Goodby, & Feldman, 1995), obesity and anemia (Kuhnlein & Receveur, 1996), and a higher prevalence of teeth deterioration (Kuhnlein et al., 2004).

There have been several thoughts about how this nutrition transition has manifested. In 1987, Szathmary, Ritenbaugh, and Goodby examined dietary change among adult Dogrib Dene. They found stability in the traditional food base across communities but differences in the quantity and variety of consumed market foods, leading them to conclude that dietary acculturation manifested as the addition of new foods to a stable traditional diet rather than a replacement of traditional foods. As a result, total energy intake has increased. Others describe it as involving the consumption of fewer types and smaller quantities of traditional food species, while the diversity and quantities of commercially produced market foods have increased (Batal, 2001; Kuhnlein & Chan, 2000; Kuhnlein, Receveur, Soueida, & Berti, 2007). The nutrition transition has seen significant changes in the collection, use and consumption of traditional food sources, and in attitudes towards them (Kuhnlein &

Souieda, 1992; Condon, Collings, & Wenzel, 1995). Despite this dietary shift, consumption of traditional foods continues to remain high among Aboriginal people in the NWT.

A wide variety of factors (social, economic, and environmental) influence food consumption preferences and patterns. Kuhnlein and Receveur (1996) identify a number of factors related to culture and ecology that have contributed to less engagement in traditional subsistence activities, including the number of plant and animal species, the transfer of cultural knowledge to youth, the time and energy for harvesting due to wage-based employment, environmental contamination, climate change, the density of species, and land use and harvesting practices. They argue that the quality of the environment for plant and animal wildlife foods has decreased and with an increased emphasis on a wage-based economy, there has been less time and interest in traditional food pursuits (Kuhnlein & Receveur, 1996; Kuhnlein, 1995). Simoneau and Receveur (2000) note that lack of equipment and having no hunter/fisher in the household are attributes that limit the intake of traditional foods. These factors have resulted in diminishing knowledge about traditional foods and traditional food systems. Sharma (2010) also adds the role that social changes, such as settlement into stationary communities and the residential school system, have played in eroding Indigenous culture with respect to traditional harvesting practices.

Perceptions about the positive and negative attributes of traditional and market foods may play a role in food choice and preference. The costs associated with MFs and the availability of TFs play a major role in food choice and preference (Wein, Henderson Sabry, and Evers, 1989, 1991a; Kuhnlein, Dickson, Armstrong, & Paci, 2003a). When there is a diversity of foods

available, other factors such as taste, quality, and convenience affect food choice and preference. Kuhnlein and Receveur (1996) suggest that the flavor, color, texture and aroma of foods play an important role in defining food preferences culturally. Traditional meats are generally preferred over store-bought meats because they are considered healthier, inexpensive, natural, clean, free from chemicals, and superior in taste (Nakano, 2004). Wien et al. (1989) also show a higher rating for traditional snack foods like dried meat and fish over modern snack foods, a finding reinforced by Batal, Gray-Donald, Kuhnlein, and Receveur's (2005) study showing that one-third of the land animal meat being consumed in the winter and summer was being dried. The consumption of animal organs is noted as likely subject to cultural preferences and restrictions (taboos) (Simoneau & Receveur, 2000; Simoneau, 1997). On the other hand, market foods are generally valued for fresh produce, the provision of staples, and for their convenience, ease of preparation, availability, accessibility, and variety (Nakano, 2004).

Perceptions about the cultural, social and spiritual contributions that food harvesting and gathering activities can provide to the health and well-being of individuals and communities can lead to increases in the consumption of TFs. Nakano (2004) notes that obtaining TFs contributes to many aspects of life such as physical fitness, saving money, and providing education on the natural environment and survival skills. Kuhnlein, McDonald, Spigelski, Vittrekwa & Erasmus (2013) add additional benefits including opportunities for outdoor recreation, keeping people 'in tune with' nature, maintaining culture, providing a means for adults to display responsibility for children, bringing respect from others, building pride and confidence, gaining survival and food preparation skills, and providing opportunities to learn

patience and other personal qualities. Harvesting activities can contribute to the maintenance of sharing networks, which provide a means for elders and individuals in need to access traditional foods when they would otherwise be unable to (Condon, Collings, & Wenzel, 1995; McMillan & Parlee, 2013; McMillan, 2012). Food preferences are also affected by other social and personal elements such as whether the food will be shared, whether it is for a personal event, or whether it is used to express individual, family, and group identity with a culture (Kuhnlein & Receveur, 1996).

Perceptions about the health and safety of food sources also affect food choice. In their study assessing the benefits of traditional foods among three cultural groups of women in the Arctic, Lambden, Receveur, and Kuhnlein's (2007) survey among Dene/Métis women revealed a concern by many about the health and safety of TFs. Women were asked whether they noticed any recent changes in the quality or health of traditional plants or meats of land animals, birds or fish. Approximately 38% noticed changes that included physical deformities, decreased accessibility, contamination of TFs, reduced animal size, taste and other sensory changes. When asked whether there were any TFs they thought were especially good for their health, the women identified caribou, fish, moose, and meat among the TFs considered especially healthy (Lambden et al., 2007). Negative perceptions about the appearance of traditional foods like the ones identified by Lambden et al. may inhibit people from consuming them. Some of these negative perceptions may be attributed to the ways in which human health risks associated with environmental contaminants in traditional food systems are communicated to the public (Furgal, Powell, & Myers, 2005; Bocking, 2001).

Food perceptions are not static; they can be changed through education and media influences (Kuhnlein & Chan, 2000). These influences likely played a role in the nutrition transition away from TFs. Indigenous peoples have been introduced to new foods such as sugar, refined grain flour and bread, and they have been exposed to nutrition education programs and advertisements that emphasize the food of the dominant culture rather than the nutritional and cultural benefits of TFs (Kuhnlein & Receveur, 1996). Such messages are particularly influential among children and youth (Neumark-Sztainer, Story, Perry, & Casey, 1999; Larson, & Story, 2009; Taylor, Evers, & McKenna, 2005) and can contribute to unhealthy food choices. However, educational and media influences can also change perceptions back in favour of TFs. Van Oostdam, Donaldson, Feeley, & Tihonov's (2009) finding that Dene/Métis pregnant women in Inuvik had doubled their fish consumption over an 8 year period seems to suggest that public health messages about the nutritional benefits of consuming fish and the general safety of most fish species are being heard.

In addition to food preferences and perceptions, variables like age, gender, seasonality and geographic location can also influence food consumption patterns (Batal et al., 2005; Kuhnlein & Chan, 2000; Kuhnlein & Receveur, 2007; Kuhnlein et al., 2004). Older Dene/Métis consume more TFs than younger ones, and men consume more than women (Kuhnlein, 1995; Kuhnlein & Receveur, 1996; Ritenbaugh et al., 1995; Kuhnlein & Receveur, 2007; Kuhnlein et al., 2004). These differences are highlighted by Wein et al. (1991a) in their study of Dene/Métis near Wood Buffalo National

Park who note that for each additional year, the frequency of country food⁸ consumption increased by a factor of 0.1, while being female accounted for a decrease of 43.80 grams of country food per day. Age and gender also appear to influence food preferences, with youth consuming more milk, fruits and fruit juices compared with their elders (Wein et al., 1991a); men consuming greater quantities of bird flesh compared to women (Batal et al., 2005); women consuming more rabbit compared to men; and younger women being more likely to prefer fish over moose than older women (Lambden et al., 2007).

A number of studies note seasonal variations in traditional food consumption. The accessibility of TFs during certain times of the year is an important determining factor (Kuhnlein & Chan, 2000). In their study of two Sahtu Dene/Métis communities, Morrison, et al. (1995) reveal that fish and berries are more commonly consumed in the summer, land animals are more commonly consumed in the winter, and birds are more commonly consumed in the spring (see also Wien et al., 1991a). Doolan (1991) highlights differences between two Dene communities in terms of the variety of TFs consumed in each season and the proportion of TFs consumed. Kuhnlein, et al.'s (1995a) study also reveals seasonal variations in TF consumption, with some TFs being consumed in only 30% of the days in summer but 90% of the days in winter.

Several geographic variables also impact levels of TF and MF consumption, including proximity to urban areas, accessibility to roads, and northern latitudes. Sharma (2010) highlights the role of transportation improvements in increasing the availability of MFs, while

Receveur, Boulay, and Kuhnlein (1997) show some correspondence between latitude and the consumption of MFs, with those living in communities further south and closer to food distribution networks consuming more MFs. Kuhnlein and Receveur (2007) found that consumption of TFs varied from 6%-40% of daily dietary energy depending on the remoteness of the community from commercial centres. Ritenbaugh et al. (1995) note that among Dogrib Dene, those living in the main village were more likely to include non-traditional foods in their diet compared with those living in smaller, more dispersed communities. Geography also affects food availability, which in turn affects the extent that food sources might be consumed in particular regions (Kuhnlein & Receveur, 1996; Receveur et al., 1997). Traditional foods that are available in large quantities (which for the Dene include caribou and whitefish) tend to be preferentially used (Batal, 2001; Kuhnlein et al., 2013).

Socio-economic barriers (such as low income/education) may exacerbate dietary change towards less healthy food choices, particularly when these are combined with the high cost, poor quality, and limited variety and availability of healthy MF choices. In northern latitudes and remote regions, the costs of shipping food can be considerably higher than in other regions (Slater et al., 2013). Under these circumstances, many Aboriginal people may turn to cheap and filling MFs that are low in mineral and vitamin content (Kuhnlein, et al., 2004; Batal, 2001). Kuhnlein and Receveur (1996) note that the delocalization of the food supply (the processes by which food species and varieties, production techniques, and use patterns disseminate throughout the globe) can benefit those who can

⁸ The terms 'country foods' and 'traditional foods' will be used interchangeably throughout this report, based on the terms utilized in the source literature.

afford to purchase foods brought in from distant locations, providing them with greater diversity of food products. For Aboriginal people, many of whom live in poverty or reside in rural areas where they may lack access to these foods, this delocalization of the food supply may in fact have the opposite effect of decreasing the diversity of foods consumed as individuals rely less on traditionally harvested foods and more on limited kinds of market foods. Socio-economic disparities may also prevent many from taking up or continuing hunting because of the high costs of purchasing equipment like snowmobiles, firearms, ammunition and fuel (Lambden, Receveur, Marshall, & Kuhnlein, 2006; Condon, Collings, & Wenzel, 1995; Chan, et al., 2006; Chiu, 2013).

5.2 Importance of traditional foods in First Nations and Métis diets

While most researchers believe that a dietary transition has been taking place, there are few longitudinal studies that track TF consumption patterns over time, leaving an unclear picture of the extent of the dietary transition. What is clear in the literature, however, is that TFs continue to remain important in the diets of First Nations and Métis people. This section summarizes what is known about the importance of TFs in the diets of First Nations and Métis in the NWT. Specifically, it will provide an overview of the types of TFs consumed, how often they are consumed in a given period of time, the proportion that TFs comprise in daily diets, usually expressed as a percentage of total energy intake, and any changes in TF consumption over time.

In recent years, market foods have comprised the majority of the diets of First Nations and Métis people in the NWT. TF consumption has ranged from a low of 5% of daily energy intake (Berti, Soueida, & Kuhnlein, 2008) to a

high of 33% (Receveur et al., 1997), with approximately 63-65% of the population consuming these foods on a daily basis (Kim, Chan, & Receveur, 1998; Berti, Receveur, Chan, & Kuhnlein, 1998b). Of the 16 Dene/Métis communities that the CINE has been studying since the 1990s, northern communities have been found to have higher TF consumption compared with southern (Kuhnlein et al., 2013; Nakano, 2004; Nakano, Fediuk, Kassi, Egeland, & Kuhnlein, 2005a, 2005b). TF consumption has also been found to be higher among men compared with women, and adults compared to children (Kuhnlein et al., 2013; Nakano et al., 2005a, 2005b). The highest community average of TF use for Dene/Métis children was found in the northern Gwich'in community of Tetlit Zheh at 5.9% (Kuhnlein et al., 2013).

In terms of the types of TFs consumed, animal species far outweigh plant foods (Morrison et al., 1995; Murray, Boxall, & Wien, 2005). There are numerous examples in the literature that highlight the importance of animal species in the diets of First Nations and Métis people. For example, Batal (2001) found that approximately 92% of Dene/Métis women and 95% of the men consumed traditional land animal meat on any given day, while Kuhnlein et al. (2013) found that 60% of households in the Gwich'in community of Tetlit Zheh consume most or all of their meat or fish as traditional food (Kuhnlein et al., 2013). Morrison et al. (1995) found that land mammals and fish comprised 68% of the TFs consumed by Dene/Métis adults, while Nakano (2004) found that for children, 87% of TFs was derived from land animals, 9% from fish, 2% from birds, and another 2% from berries. Caribou and moose are the leading TFs consumed across northern communities, in terms of quantities consumed daily and in terms of their contributions to total energy, fat, and nutrient intakes (Chiu, 2013; McMillan, 2012; Kuhnlein & Receveur, 2007). Whitefish, salmon, char,

inconnu, loche and trout are among the most commonly consumed fish (Kuhnlein & Receveur, 2007; Kuhnlein et al., 2013). Given the importance of traditional meats in diets, it is not surprising then that some studies show First Nations and Métis people in the NWT exceeding the daily servings of protein recommended in Canada's Food Guide (Kuhnlein et al., 2013). Only one study could be found that focused specifically on traditional plant use among First Nations and Métis in the NWT. This study revealed that wild berries, including cloudbberries, cranberries and blueberries, as well as Labrador tea leaves, were the most frequently collected plant products (Murray et al., 2005). The literature also seems to indicate that while TFs remain important in the diets of First Nations and Métis people, the diversity of TFs being consumed has been declining (Kuhnlein et al., 2004).

While a number of studies identified the most frequently consumed TFs, fewer studies examined the most frequently consumed MFs. Kuhnlein and Receveur (2007) identified tea, sugar, white bread, biscuits, lard, crystal powdered drinks, instant coffee, evaporated milk, corn flakes, soft drinks, butter and eggs as the most commonly consumed MFs. Healthier MFs such as fruits and vegetables, milk and alternatives are often lacking in variety, quality and availability in northern and remote communities, and they generally cost considerably more than they do in southern communities (Kuhnlein et al., 2013). Not surprisingly then, several studies have shown that for many First Nations and Métis people, daily servings of fruits and vegetables, as well as milk and alternatives, fall well below the portions recommended in Canada's Food Guide (Kuhnlein et al., 2013). Nakano et al. (2005a/b) found that more than half of the energy intake from MFs came from less nutrient dense food items, while Kuhnlein et al. (2013) note that of the top 20 market foods consumed, most were highly processed

While most researchers believe that a dietary transition has been taking place, there are few longitudinal studies that track TF consumption patterns over time...



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and least-cost foods containing a lot of sugar and carbohydrates. The decreased nutrient density from MFs is especially concerning for children who have been shown to derive a high proportion of their dietary energy from fats and sweet foods (Kuhnlein et al., 2013; Nakano et al., 2005a/b).

Few studies report on changes in TF consumption over time. Nakano (2004) reports that 60% of Dene/Métis respondents from 16 communities in the NWT consumed less TFs compared to five years ago, while 18% consumed more and 22% remained the same. Tracy and Kramer (2000) found a two- to four-fold decrease in caribou consumption over a period of 20 years. Several studies estimated total harvest of animals, birds, and fish for Dene and Métis hunters, trappers, and fishers in order to provide support for Comprehensive Land Claim processes, including the Sahtú Settlement Harvest and Gwich'in Harvest studies (Sahtú Renewable Resources Board, 2004; McDonald, 2009). These studies show some significant declines in some harvesting activities, especially for caribou which is generally considered

to be the most significant TF for First Nations and Métis people in the NWT. The CINE has been assessing dietary intake from numerous Aboriginal communities in three cultural areas of Canada, including in the NWT, for more than 20 years. Their studies highlight the success of public health messages regarding the safety of some TF species which in the past had been considered by many as unsafe for consumption. In particular, these studies showed relative stability in consumption levels by pregnant women and mothers for most TF sources over the study period, but considerable increases in the consumption of fish (Armstrong, Tofflemire, Myles, Receveur, & Chan, 2007; Van Oostdam et al., 2009). Nevertheless, while these studies provide a snapshot of TF consumption patterns over selected periods of time, these periods are generally short in duration and rarely track individuals' food consumption patterns over time.

Several gaps in knowledge were identified in the literature regarding the consumption of TFs and MFs. Gates, Skinner, & Gates (2014)

in their systematic review of the literature related to diet and nutrition of Aboriginal youth identified only three studies focusing on the NWT and noted they were primarily from isolated or remote communities. Little research has been conducted to date on Métis populations or on those living off-reserve or in urban centres like Whitehorse. Gates et al. also note that eating healthier foods is not always a feasible option given the barriers to accessing these foods. These barriers must be overcome before health promotion efforts can be effective, and overcoming them requires a greater understanding of why individuals eat what they do, including parental influences on the diets of children and youth, and perceptions about health and nutritious diets, the importance of traditional foods, body weight and obesity, and what constitutes a healthy diet. Improving this knowledge would allow for more culturally relevant initiatives to promote dietary adequacy. In addition, despite widespread recognition of the impact of poverty on nutritional health, there was also a gap in knowledge with respect to the impacts of poverty on food choices.

5.3 Assessment of nutrient intakes and deficiencies

Given the trend towards increasingly substituting TFs with MFs, coupled with the poor selection and availability of quality MFs in remote and northern locales, dietary assessments have been a strong focus of investigations into the nutritional health of First Nations and Métis of the NWT, as well as other northern Aboriginal populations. Dietary assessments have inherent limitations, including the fact that there is no means of obtaining 'usual' intake data; that preparation techniques, storage conditions, and seasonal and biological variations can influence the nutrient composition of food items; and that nutrient requirements vary among individuals (Doolan, 1991). Most of the research in this area has been undertaken by researchers associated with the CINE who have compiled data from 44 communities (involving three cultural groups, including the Dene/Métis) into a vast nutrient database (Kuhnlein et al., 2004; Kuhnlein, Egeland, Receveur, & Berti, 2003b). Their work began early in the 1990s and has continued through to the current decade, with studies focused on determining the nutritional content of both TFs and MFs to assess nutritional benefits and deficiencies within diets. Their findings generally reveal that TFs have high nutrient densities for a number of nutrients, that there are some nutritional deficiencies in the diets of First Nations and Métis people, and that some TFs would be suitable alternatives for high-cost market-foods as the primary source of some of these deficient nutrients.

Numerous nutritional benefits have been found in TF sources. Appavoo, Kubow and Kuhnlein's (1991) analysis of fat and fatty acids in TFs consumed by the Sahtu Dene/Métis revealed that these foods were generally healthier, with lower fat content and polyunsaturated to saturated fatty acids ratio, making them very beneficial for maintaining cardiovascular health. The consumption of traditional meats also provides many essential vitamins and minerals, including iron, B vitamins, and vitamin D, as well as dietary fibre, protein and essential fatty acids (Kuhnlein, et al., 2004; Hidioglou, Peace, Jee, Legge, & Kuhnlein, 2008; Doolan, 1991; Receveur & Kuhnlein, 1998a). Traditional foods are seen as being extremely important for ensuring high dietary quality for both adults and children (Kuhnlein & Receveur, 2007; Nakano, Fediuk, Kassi, Egeland, & Kuhnlein, 2005a; Hidioglou et al., 2008).

Nutrient deficiencies can be attributed partially to the "extent of market food consumption, and food choice patterns dependent on cost and availability of good food sources" (Kuhnlein et al., 2006, p. 504). Some of the nutrient deficiencies noted in the literature are identified in Table 5. Vitamin A deficiencies are attributed by Kuhnlein et al. (2006) to the high cost and low availability of foods such as fortified milk and dark coloured vegetables. Vitamin D deficiencies are attributed to the long dark periods of winter and the lack of and purchase of Vitamin D rich foods (Calvo and Whiting, 2003; Slater et al., 2013). Slater et al. (2013) also note that while some TFs are good sources of Vitamin D (see for example Receveur et al., 1997; Kuhnlein et

al., 2004; and Kuhnlein & Receveur, 1996), consumption of these foods may vary widely due to the high cost of hunting and fishing, and concerns about environmental contamination of TFs. Inadequate calcium consumption can be attributed to the fact that it is lacking in many TF sources⁹ (Wein, Henderson Sabry, & Evers, 1991b) and must therefore be largely obtained through higher cost and less available market-based foods. Nevertheless, substantive evidence for why certain nutrients are lacking in the diets of First Nations and Métis people is generally lacking and much more research is needed to determine the motivations and influences behind individual food choices.

It must be noted that nutritional deficiencies are not uniform across all genders, ages, communities, or seasons. Receveur et al. (1997) highlighted generational and gender differences in nutrient intakes that are pronounced during periods of peak TF consumption. Doolan (1991) found that Vitamin A intakes were lower for women aged 50 years and older in both of her study communities, as well as for women between the ages of 19-49 in one community. Egeland et al. (2004) found variations in Vitamin A intake by gender and age group, with younger women having lower intakes of Vitamin A. Kuhnlein et al. (2006) found that older Dene/Métis adults, who generally consume more TFs, had greater adequacy for Vitamin A. Intakes of fibre, folate, vitamin A, C, D and calcium have been found to be a concern for Aboriginal youth, especially for those living in remote or isolated communities (Curren, Davis, & Van Oostdam, 2014).

⁹ Batal et al. (2005), however, note that animal organs can be important sources of nutrients such as calcium.

TABLE 5: NUTRIENT DEFICIENCIES IDENTIFIED IN THE LITERATURE FOR FIRST NATIONS AND MÉTIS PEOPLE OF THE NWT

Nutrient deficiency	Population	Source
Vitamin A	Children	Nakano et al., 2005a; Nakano, 2004
	Adults	Kuhnlein et al., 1995a; Kuhnlein, Soueida, & Receveur, 1996; Wein & Wein, 1995; Wein et al., 1991a/b; Receveur, Boulay & Kuhnlein, 1997; Receveur & Kuhnlein, 1998a; Kuhnlein, et al., 2007; Kuhnlein et al., 2006; Simoneau, & Receveur, 2000; Simoneau, 1997
	Women (including pregnant and lactating women)	Doolan, 1991; Berti et al., 2008
	Men	Kuhnlein, 1995
Vitamin C	Adults	Kuhnlein et al., 2007; Simoneau, 1997; Calvo & Whiting, 2003; Wein et al., 1991a/b
	Women (including pregnant and lactating women)	Berti et al., 2008
Vitamin D	Children	Nakano et al., 2005a; Nakano, 2004; Kuhnlein & Receveur, 2007
	Adults	Kuhnlein et al., 2006; Wein et al., 1991a/b; Receveur et al., 1997
	Women (prenatal)	Waiters et al. (1998)
Vitamin E	Children	Nakano et al., 2005a; Nakano, 2004
	Adults	Kuhnlein et al., 2007; Kuhnlein et al., 2006; Receveur et al., 1997
	Women (including pregnant and lactating women)	Berti et al., 2008
Omega 3 fatty acids	Children	Nakano et al., 2005a; Nakano, 2004
Omega 6 fatty acids	Children	Nakano et al., 2005a; Nakano, 2004
	Adults	Kuhnlein et al., 2007
Calcium	Children	Nakano et al., 2005a; Nakano, 2004
	Adults	Receveur et al., 1997; Wein et al., 1991a/b; Kuhnlein et al., 2007; Kuhnlein et al., 1995a; Receveur & Kuhnlein, 1998a; Kuhnlein et al., 2004
	Women (including pregnant and lactating women; & new mothers)	Berti et al., 2008; Waiters, Godel, & Basu, 1998
	Men	Kuhnlein, 1995

TABLE 5: NUTRIENT DEFICIENCIES IDENTIFIED IN THE LITERATURE FOR FIRST NATIONS AND MÉTIS PEOPLE OF THE NWT (CONTINUED)

Nutrient deficiency	Population	Source
Folate	Adults	Kuhnlein et al., 2007; Wein et al., 1991a/b
	Women (including pregnant and lactating women)	Berti et al., 2008
Folic acid	Adults	Receveur et al., 1997
Iron	Adults	Wein et al., 1991a/b
Magnesium	Children	Nakano et al., 2005a; Nakano, 2004; Kuhnlein & Receveur, 2007
	Adults	Kuhnlein et al., 2007
	Women	Berti et al., 2008
Phosphorous	Children	Nakano et al., 2005a; Nakano, 2004
Zinc	Women (including pregnant and lactating women)	Berti et al., 2008
Dietary fibre	Children	Nakano et al., 2005a; Nakano, 2004
	Adults	Receveur et al., 1997; Wein et al., 1991a/b; Kuhnlein et al., 2007
	Women	Walters et al., 1998



The literature search also revealed a body of research which highlights the potential of TFs to address specific nutrient deficiencies in the First Nation and Métis populations. This research identified the food sources that specific nutrients are primarily derived from (be they traditional or market foods), and explored alternative sources for these nutrients. The nutrient assessment studies revealed that calcium, Vitamin A, and Vitamin C are primarily derived from market-based foods (Doolan, 1991; Kuhnlein, 1995; Receveur et al., 1997; Fediuk, Hidioglou, Madère, & Kuhnlein, 2002). However, a number

of TF sources are rich in these and other vitamins and promoting them would be one way of addressing these nutrient deficiencies in the diets of First Nations and Métis people. For example, Kuhnlein et al. (2006) found that sea mammal fats and organ meats are excellent sources of Vitamins A, D and E. Simoneau (1997) found that rabbit liver, loche liver, and either smoked or dried Canada goose meat are generally high in Vitamin A, while connie eggs, rabbit flesh, woodland and barrenland caribou are generally high in calcium. Fediuk et al. (2002) also found that raw fish eggs, raw whale skin, kelp, caribou

liver, ringed seal liver and blueberries are rich in Vitamin C. Given that many of these traditional food sources are organ meats, where high levels of environmental contaminants can often accumulate, addressing issues related to levels of contaminants in food sources and how to communicate the safety of these foods to Aboriginal people will be paramount to any health promotion strategy which involves encouraging traditional food consumption as a means of addressing nutritional deficiencies.

The research highlights the considerable nutritional benefits of traditional foods and their potential to address nutrient deficiencies in First Nations and Métis populations in the NWT. However, gaps in knowledge remain about the impact that living in poverty or living in urban compared to rural or remote locales have on the adequacy of nutrient intake in First Nations and Métis people in the NWT.

5.4 Food security

In 1996, the World Food Summit defined food security as existing “when people at all times can acquire safe, nutritionally adequate, and culturally acceptable foods in a manner that maintains human dignity” (as cited in Beaumier & Ford, 2010, p. 196). This definition emphasizes the access, availability and utilization dimensions of food security. However, such definitions of food insecurity are developed in non-Aboriginal contexts and are generally based on the assessment of monetary access to MFs (Egeland & Harrison, 2013; Power, 2008). As Power (2008) argues, “they do not take Aboriginal food practices into full account, nor do they reflect Aboriginal perspectives” (p. 95). Power argues that there are unique food security considerations for Aboriginal people related to harvesting, sharing and consuming country or traditional food, and that because food obtained from traditional food systems is key to cultural identity, health and survival, this cultural dimension must be considered in Aboriginal public health. A more recent definition proposed by the FAO Committee on World Food Security in 2013 better encompasses some of these unique considerations and emphasizes the importance of nutrition in food

security. Within this definition, food and nutrition security exists “when all people at all times have physical, social and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life” (Kuhnlein et al., 2014, p. xiv).

Both market and traditional food systems must be considered in conceptualizing and measuring food security in the context of Aboriginal peoples (Lambden et al., 2007; Power, 2008). For traditional food systems to be secure, “there must be a patterned and predictable supply and reserve of a range of foods” (Kuhnlein et al., 2003 as cited in Paci, Dickson, Nickels, Chan, & Furgal, 2004, p. 5). This includes considering access to food on the basis of levels of traditional food knowledge, access to traditional food systems, and safety of traditional/country food, in addition to socio-economic factors like poverty. This section provides a summary of current knowledge on the prevalence of food insecurity among First Nations and Métis people of the NWT, and on the socio-economic and environmental factors that affect food security for this population.

Prevalence of food insecurity

Food insecurity has been measured consistently since 2005 (Tarasuk, Mitchell, & Dachner, 2014). To date, the primary source of data on food insecurity has been the Canadian Community Health Survey (CCHS). This data has been analyzed at the regional/territorial level and at the national level comparing Aboriginal and

non-Aboriginal populations. No single study captures the prevalence of food insecurity among the First Nations and Métis population of the NWT, and we are left to draw our own conclusions based on these more general studies.

Food insecurity is considered to be generally high for residents of the NWT and for Aboriginal populations. Ledrou and Gervais’ (2005) analysis of 2000/01 CCHS data showed that 28% of NWT residents reported food insecurity compared with 15% nationally. Tarasuk et al. (2014) analyzed CCHS 2011 data and reported similarly high rates of food insecurity in the NWT at 20.4%.¹⁰ They also noted an overall increase in food insecurity in the Territory since 2005. Willows, Veugelers, Raine, & Kuhle (2008) utilized 2004 CCHS data to identify factors associated with food insecurity and found a strong association with Aboriginal status. Nationally, 33% of Aboriginal households were found to be food insecure compared with only 9% of non-Aboriginal households. While all three of these reports identified Aboriginal people as being at-risk for food insecurity, none of them focus directly on First Nations and Métis in the NWT. Other factors found to be associated with food insecurity include number of children in the household, lone-parent households, not having home ownership, educational attainment of secondary school or less, gender (females), being middle-aged (35-64), unemployment, income from sources other than wages or salaries, and low income (Tarasuk et al., 2014; Rosol et al., 2011; Willows et al., 2008; Kuhnlein et al., 2013). Food insecurity has also been found to be slightly more prevalent in urban rather than rural areas (Tarasuk et al., 2014). In all three

¹⁰ Differences in the methodology used to calculate food insecurity between these two surveys prevent any direct comparisons from being made. The Ledrou & Gervais (2005) study reported on food insecurity among those aged 12 and older, while Tarasuk et al. (2014) reported on all members of a household. In addition, Tarasuk et al. included marginally food insecure households in their calculations while Ledrou & Gervais (2005) utilized only those who lived in moderate or severely food insecure households.

of these studies, a significant proportion of the Aboriginal population has been excluded from the analysis as CCHS data does not include people living on First Nations reserves.

Aside from these general studies, only two studies could be identified that reported on food insecurity among First Nations in the NWT specifically. These studies do not assess food insecurity using CCHS data, but rather draw on information collected using the researchers' own survey tools. Kuhnlein et al. (2013) found that 55% of households in Tetlit Zheh were considered food insecure, with 6% reporting severe food insecurity. This food insecurity extended to both traditional and market foods, with 28% of women in the community reporting difficulty accessing their favorite TFs and 43% reporting difficulties accessing their favorite MFs. The study also identified barriers to accessing traditional and market foods. Barriers to accessing TFs included lack of transportation, equipment, and/or storage; lack of a hunter in the household; reliance on others to provide TFs; and time constraints. Barriers to accessing MFs were primarily lack of affordability and availability. Lambden et al. (2006) examined food insecurity among women in Yukon, Dene/Métis and Inuit communities across Arctic Canada and found considerable regional variation. Inuit women were the least likely to report being able to afford adequate amounts of food, while Dene/Métis women were most likely to report being able to afford adequate amounts of food. Seventy percent of Dene/Métis women aged 20-40 years and 65.4% of Dene/Métis women aged 41-60 years reported their families were able to afford to buy all the food they need from the store.

Socio-economic and demographic factors affecting food security

There are a range of socio-economic and demographic factors that affect food security for First Nations and Métis residing in the NWT. Some of these affect all northern residents, such as the higher cost of living and lack of availability of affordable quality MFs, and some are factors that are more acute for First Nations and Métis people specifically, such as higher rates of poverty which contribute to the increased rates of food insecurity¹¹ (NCCAH, 2012; Kuhnlein & Receveur, 1996). As noted earlier, the cost, availability, and quality of healthy MFs are negatively impacted by the distance and accessibility of getting foods to market in northern and remote communities. In 2009, the NWT had the second highest food expenditures in the country behind only Nunavut, with an annual household average of \$9,509 compared to a national average of \$7,262 (Statistics Canada, 2010). Food expenditures in more remote communities in the NWT would be

expected to be considerably higher than this. The Canadian government has worked to offset some of the high costs of food expenditures in these communities through the Nutrition North Canada Program. Only four Dene communities were eligible for full subsidy through this program in 2013, including Deline, Fort Good Hope, Norman Wells, and Tulita (Nutrition North Canada, 2013). The cost of a Northern Food Basket (what it costs to feed a family of four on a healthy diet for one week) in these communities ranged from \$386.28 in Deline to \$427.16 in Fort Good Hope.

Aboriginal people have a higher prevalence of socio-economic risk factors for household food insecurity, including reliance on social assistance for income, having larger families, being below the Low Income Cut-off determining poverty, having lower levels of education, not owning their own homes, or being lone-parent households, especially those headed by females (NCCAH, 2012). Table 6 presents several selected socio-economic

TABLE 6: SOCIO-ECONOMIC INDICATORS IN THE NORTHWEST TERRITORIES (2006 CENSUS)

Indicator	First Nations	Métis	Non-Aboriginal
Unemployment rate	23.2%	10.1%	4.0%
Education • No high school • Bachelor's degree	58.86% 1.81%	35.81% 5.52%	14.07% 18.5%
Average employment income – full time full-year	\$51,242	\$64,954	\$71,137

Source: Statistics Canada (2006). Data products – topic based tabulations, catalogue #97-564-XCB2006002, Northwest Territories

¹¹ For more information on the impact of social determinants on poverty, please refer to the NCCAH's fact sheet series on social determinants.

indicators for First Nations and Métis people in the NWT. First Nations people in the NWT are more likely to be unemployed compared to Métis, and both groups are significantly more likely to be unemployed compared to their non-Aboriginal counterparts. First Nations are also more likely to have lower levels of education, which translates as well into a lower average employment income for those who worked full time for the full preceding year. However, the diversity of Aboriginal peoples in Canada complicates an understanding of what food security means even further, since there may be differences by age, gender, and geographic location.

Given the high costs of food in northern communities, access to safe, accessible and affordable TFs is even more important. However, Ford et al. (2013), in their study of community food program use in Inuvik and Iqaluit, found that there was a lack of availability of TFs and the costs of obtaining them were high, despite the fact that approximately 50% of survey participants had a hunter in the family and 87% reported having a hunter in the extended family through which some access to TFs could be obtained. Ford et al. noted the high price of hunting equipment, gas, and lack of access to a vehicle or snowmobile as factors limiting the availability of TFs for chronic food program users. In addition, some food program users indicated a loss of knowledge on how to prepare TFs as a barrier to accessing them.

Several studies found associations between age and food insecurity. Ford et al. (2013) found that there was a predominance of middle aged (35-64 years) people who were chronic food program users, which they attribute to the fact that most general food programs are targeted towards children and pregnant women and that Elders are more often supplied with food by

others in the community (a finding also noted by McMillan & Parlee, 2013 and McMillan, 2012). They also suggest that this predominance of middle-aged food program users may be associated with residential school experience and trauma, which has resulted in addictive behaviours and an inability to hold down a job, thus creating challenges in accessing sufficient food. Lambden et al. (2006) found that older Aboriginal women and their families from Yukon, Dene/Métis, and Inuit communities in the Arctic were less able to afford to buy all the food they needed from the store. Age was found to also play a significant role in the ability of Dene/Métis women and their families to afford and access fishing and hunting equipment, with Elders having less ability to engage in these activities (Lambden et al., 2006).

Several other socio-economic and demographic variables were associated with household food insecurity. Women are more likely to report food insecurity in the household compared to men (Ford et al., 2013; Tarasuk et al., 2014). Matheson & McIntyre (2013) suggest this may be because female survey respondents are more likely to report having more children and lower household income, “suggesting insufficient material resources to feed the family” (p. 45). They also argue that women have more information about household food needs and may experience inequitable access to household resources, and thus have different perceptions from their male partners about food security in the household. Lone-parent households are more likely to be food insecure and, as noted by Willows et al. (2008) and Tarasuk et al. (2014), these households are more likely to be headed by women. Tarasuk et al. (2014) found that households with children under the age of 18 were at greater risk of food insecurity than those without children (15.6% compared with 11.4%). In fact, household insecurity increased from 20.4% to 31.6% in the NWT when

only households with children were considered. Household food insecurity was also associated with housing insecurity. In Ford et al.’s (2013) study examining characteristics of community food program (CFP) users in Inuvik and Iqaluit, homelessness was found to be a contributing factor in food insecurity, especially in Inuvik where CFP users were twice as likely to report being homeless compared with those in Iqaluit. Willows et al. (2008) and Tarasuk et al. (2014) also note that those who rent homes are more likely to report being food insecure compared with those who own their own homes. Pardhan-Ali et al. (2013) also highlight the role that socio-economic status can play in ensuring the safety of foods in that poor housing conditions can facilitate exposure to and spread of salmonella and other pathogens, including inadequate food storage and preparation, poor water supply and sanitation, all of which can impact food security.

Given the multitude of socio-economic and demographic factors impacting food security, several recommendations were made in the literature for addressing food security in northern Aboriginal communities, including First Nations and Métis. The high rate of poverty in these communities is a significant barrier to accessing both nutritious traditional and market foods. Access to both types of foods must be made more affordable. One approach is to subsidize the cost of certain foods, such as milk, to levels found in southern communities (Slater et al., 2013). Programs such as Healthy Foods North and Canada’s Food Mail aim to increase the affordability, availability, and quality of MFs; however, Kuhnlein et al. (2013) note that such programs have been inactive in some Dene/Métis communities, like the Tetlit Zheh community, for several years. Ford et al. (2013) remind us that given the financial constraints of procuring TFs, “health messages focusing on TF

consumption are of little value to those who do not have access to these foods and are at times a source of frustration” (p. 11). Harvesters’ assistance programs (described in greater detail later) are one tool for making the costs of traditional harvesting more affordable. Ford et al. (2013) also argue that food policy must be more broadly integrated into wellness initiatives so that the challenges many Aboriginal people face in holding down jobs and dealing with addictions can be overcome. Solutions aimed at encouraging a more nutritious diet must therefore address the broader issues of poverty and the negative aspects of acculturation (Slater et al., 2013; Ford et al., 2013; Pakseresht et al., 2014).

Environmental contamination

The safety of traditional or country foods through the bioaccumulation of contaminants such as cadmium, lead and mercury in the food chain has been a major concern in the Canadian North and a focus of research for decades. It has been proven that measurable pesticides, heavy metals and radionuclides have been brought to the north by wind and ocean currents, where they have accumulated in Arctic biota and are magnifying as they move up the food chain (Furgal et al., 2005). Use of lead bullets in harvesting TFs may also be a factor contributing to environmental contamination of TFs (Tsuji et al., 2008a/2008b; Tsuji, & Nieboer, 2008; Johansen, Asmund, & Riget, 2004; Tsuki, Nieboer, Karagatzides, Hanning, & Katapatuk, 2001). The consumption of contaminants can have deleterious effects on human health, particularly during early development (Ayotte, Roy, Belles-Isles, Wagner, & Bailey, 2003; Bailey et al., 2003; Chu et al. 2003). For example, Kuhnlein and Chan (2000) highlight studies that identified neurobehavioral deficits, developmental delays, and endocrine disruption on children exposed to PCBs and other organochlorines. However, the research

on the health impacts of exposure to chemicals in traditional food systems is generally lacking.

There is a general perception among Canadian Aboriginal people that there is considerable health risk associated with eating TFs because of concerns over levels of contaminants (Berti et al., 1998a/b). This perception is reinforced by findings of higher levels of organochlorines in blood and breast milk among consumers of large amounts of fish, marine mammals, and fish-eating birds, TF sources that have been shown to have high concentrations of contaminants (Dewailly et al., 1993; Dewailly et al., 1996; Dewailly, Nantel, Weber, & Meyer, 1989). Yet the reality is that the evidence of substantial health risks associated with consumption of contaminants is as yet unproven (Kuhnlein & Chan, 2000) and as such, must be weighed against the sociocultural, nutritional, economic, and spiritual benefits they can provide (Van Oostdam et al., 1999; Van Oostdam, Donaldson, Feeley, & Tremblay, 2003).

This section will examine what is known about the impacts of environmental contamination of TFs on the food security of First Nations and Métis people in the NWT. The literature reviewed in this section will be organized into two categories. The first category summarizes studies that undertake assessments of the level of contaminants found in TF sources without assessing the degree to which these contaminants are being consumed. This information is summarized in Table 7. Information about the contaminants found in TFs consumed by Inuit in the NWT are included here as well, as it is assumed that First Nations and Métis people living in the same regions might also be consuming these food sources.

The research appears to suggest that high levels of contaminants are found only in select TF sources and that these

sources are more likely to be consumed by Inuit rather than First Nations and Métis people. They also tend to be higher in organ meats, marine animals, fish, and in fish-eating birds.

A second category of research on environmental contaminants in TFs involves studies which assess dietary exposure to selected organochlorines, heavy metals or other contaminants. The research seems to indicate that while exposure to contaminants is generally elevated for First Nations and Métis in the NWT, they are at much lower health risk from consuming TFs than Inuit because of differences in their traditional diets. Kuhnlein’s (1995) study of the dietary intakes of contaminants by Inuit and Sahtu Dene/Métis men in the NWT highlighted considerable individual variability in TF use and contaminant intakes. She found that on average, while many Inuit men exceeded tolerances for toxaphene, PCBs, s-cBZ, chlordanes, and dieldrin, only chlordane tolerances were likely exceeded by some Sahtu Dene/Métis men. She attributes this finding to the greater consumption of fats (where contaminants often accumulate) from TFs by Inuit men compared with Sahtu Dene/Métis men. Wheatley and colleagues found that 20% of Dene men and women exceeded Health Canada’s 20 µg/L guideline for blood methylmercury levels compared to 57% of Inuit men and women (Wheatley et al., 1979; Wheatley and Paradis, 1995). They found sea mammals contributed the highest mean blood Hg levels, followed by fish. Kuhnlein, Receveur, Muir, Chan, & Soueida’s (1995b) study assessing the exposure of Sahtu Dene/Métis women to polychlorinated biphenyls and organochlorine pesticides found that the foods that contributed the most organochlorine contaminants were caribou, whitefish, inconnu, trout and duck. Berti et al. (1998b) also found that arctic char, beluga maddock, loche liver, and cisco flesh contributed high concentrations of contaminants.

TABLE 7: CONTAMINANTS FOUND IN TFS

Description of study	Contaminants identified	Study
Analysis of cadmium, lead and mercury in TF sources of the Inuit on Eastern Baffin Island	Relatively high concentrations of cadmium and lead found in ringed seal liver, mussels, and kelp. Elevated concentrations of mercury found in ringed seal liver, narwhal mattak, beluga meat, and beluga mattak	Chan, Kim, Khoday, Receveur, & Kuhnlein, 1995
Assessment of dietary exposure to selected organochlorines in 16 Dene/Métis communities	Foods with concentrations of contaminants high enough to exceed tolerable levels if consumed regularly included arctic char, loche liver, trout flesh, and cisco flesh	Berti et al., 1998b
Risk assessment of arsenic levels near Yellowknife	Levels of arsenic found in produce grown in Yellowknife residential gardens found not to exceed the provisional maximum daily intakes, but that grown in the former gold mining area would exceed safe levels	Koch, Ollson, Potten & Reimer, 2003; Galloway et al., 2012; Koch, Wang, Ollson, Cullen, & Reimer, 2000
Bioaccessibility of arsenic in hares, plants, edible mushrooms and wild berries from Yellowknife in 2000, 2004 and 2010	Arsenic concentrations ranged from 0.06 to 21 mg/kg in berries, 1.9 mg/kg in Labrador tea, 46 mg/kg in mushrooms, but only 0.007 to 0.6 mg/kg in hare muscle tissue; toxic forms of arsenic in country foods vary widely, with lowest bioaccessibilities ¹² observed from plants and berries	Koch et al., 2013
Analysis of mercury, methyl mercury and selenium in TF sources for Inuit in Holman, NWT	Positive and significant correlations of mercury content associated with age and body weight, with larger and older mammals and fish having higher levels	Smith & Armstrong, 1978
Assessment of PCBs in TFs	Levels of contaminants generally below the maximum residue limit with the exception of beaver flesh, caribou and moose liver, moose flesh, and ptarmigan flesh	Doolan, 1991
Analysis of cadmium in TF sources in Fort Resolution; compared against equivalent market foods	In general, mean cadmium concentrations in traditional foods were found to be comparable with market foods. Highest level of cadmium concentrations found in moose kidney and other animal organs	Kim et al., 1998

¹² Bioaccessibility refers to "the amount of contaminant that is absorbed into the body where it can cause toxic effects" (Koch et al., 2013, p.2).

TABLE 7: CONTAMINANTS FOUND IN TFS (CONTINUED)

Description of study	Contaminants identified	Study
Exposure to polychlorinated biphenyls and organochlorine pesticides for Indigenous women	Foods important to Sahtu-Dene/Métis that contributed organochlorine contaminant were caribou, whitefish, inconnu, trout and duck	Kuhnlein, Receveur, Muir, Chan & Soueida, 1995b
Organic contaminants (OC) and metals in fish species in the Great Slave Lake and Slave River ecosystem	Toxaphene the predominant OC in fish tish, followed by PCBs, DDT, CBz and HCH. Highest OC concentrations found in Burbot liver	Evans, Stern, & Muir, 2003
Perfluorinated compounds in the Canadian Arctic	Perfluorooctane sulfonate concentrations high in polar bear liver; also detected in mink, arctic fox, and lake trout	Martin, Mabury, & Muir, 2003
Persistent organic pollutants and metals in ringed seals	Significant declines in mercury and other POPs in ringed seal samples collected from 7 of 9 locations over the 1970-1990s period; shows regional differences in POPs	Muir & Kwan, 2003
Lead and mercury in Arctic lakes in a number of regions across the north	Decline in mercury deposition in the Arctic	Muir, Jackson, Halliwell, & Cheam, 2003
Organochlorines and heavy metals in beaver and muskrats	Levels of PCBs, DDT and chlordane very low and well below available guideline levels. Levels of cadmium found in beaver livers and kidneys but consistent with other terrestrial wildlife levels.	Snowshoe, 2003
Organochlorine contaminants, mercury, selenium and arsenic in burbot near Fort Good Hope	Increase in mean mercury concentrations in burbot muscle over 16 year time period; muscle mercury levels below the recommended guideline level for commercial sale but above the guideline level for fish used for subsistence; levels of most major OC groups in burbot liver has declined over a 13 year period	Stern & Ikononou, 2003
Organochlorine concentrations in freshwaters of the Arctic, including toxaphene, PCBs and chlordane, mercury; radionuclides	Mercury found in muscle of fish from Arctic freshwaters up to 0.5 ppm; radionuclides widespread at levels below those acceptable in food	Lockhard, Wagemann, Tracey, Sutherland, & Thomas, 1992

The literature reveals considerable variability in TF use and contaminant intakes among First Nations and Métis people and that, in general, few are at increased risk of exposure to environmental contaminants. Differences in levels of environmental contamination depend on a variety of factors including: 1) local mineralogy and mining, military radar sites, and proximity to heavy industrialization in different regions; 2) the ages and genders of animals; 3) the type of species and where it fits within the food chain (biomagnification results in higher concentrations of contaminants); and 4) food preparation techniques (ie. reducing levels of fat will help reduce organochlorine contaminant levels) (Kuhnlein and Chan, 2000). They also depend on taste preferences and the availability of certain foods at certain times of the year. Berti et al. (1998b) undertook an assessment of dietary exposure to selected organochlorines and heavy metals at the request of 16 Dene/Métis communities who were concerned about food contamination from heavy metals. They noted considerable variation in contaminant intake levels between seasons, genders, ages and communities. They concluded that the intake of almost all individuals was less than the tolerable/acceptable levels for DDT, HCH, Dieldrin, Cbz, and PCBs, with some individuals occasionally exceeding tolerable levels of certain contaminants on certain days (depending on whether they consumed marine based foods such as beluga mackerel, arctic char, lake trout, and cisco flesh which are considered to have large concentrations of contaminants). In addition, Koch et al. (2003) noted that while arsenic levels were 10 times higher in residential gardens near Yellowknife compared to than the national average, produce from these gardens was safe to eat, while produce from lake and mine gardens should not be consumed. Kim et al. (1998) found that the average weekly cadmium intakes from TF for both men and women were much lower than the

Provisional Tolerable Weekly Intake of 400-5500 µg/week as defined by the World Health Organization. However, cadmium levels increase in correlation with tobacco use (Butler Walker et al., 2006).

In addition to assessing dietary intakes of Dene/Métis for nutrient inadequacies, the CINE also compiled a database for environmental contaminants in TFs (Chan, 1998). This database includes results from a review of the levels of four major contaminants (chlordane, mercury, polychlorinated biphenyls, and toxaphene) in 81 species of marine mammals, terrestrial mammals, birds, fish and plants consumed by northern Indigenous populations. Chan (1998) utilized this data to determine whether these contaminants were a concern for Dene and Inuit populations. He found that once data from northern Quebec (where mercury levels are high) was excluded, only 2% of the fish data exceeded Health Canada's guidelines for mercury, while marine mammal blubber had the highest levels of PCBs, chlordane and toxaphene. He then estimated the intake level of PCBs and mercury in Dene and Inuit diets using previous dietary intake data and concluded that the intake levels for all contaminants, with the exception of toxaphene, were within the tolerable intake levels for the Dene diet but exceeded the tolerable intake levels for the Inuit diet (Chan, 1998).

Given the potential health risks associated with chemical contaminants in fetuses and newborns, there is a considerable body of research exploring levels of exposure to organochlorine and metal contaminants in Aboriginal mothers and newborns in the NWT and in northern Canada. This body of research seems to indicate that while health risks are not as high for First Nations and Métis people in the NWT as they are for Inuit, levels of some contaminants are sufficiently high to warrant ongoing monitoring and continued "international efforts

to reduce the movement of global contaminants into the North" (Butler Walker et al., 2003, p. 50). In 2003, Butler Walker et al. established a baseline for exposure to organochlorine and metal contaminants for Dene/Métis, Inuit and Caucasian mothers and their newborns in the NWT and Nunavut and found PCBs and pp-DDE to be present in all cord samples, and HCB in almost all samples. Like similar studies in the adult population, levels of contaminants were higher in Inuit samples compared with Dene/Métis and Caucasian samples. Butler Walker et al. (2006) continued their investigation of chemical contaminants in maternal and umbilical cord blood. They reported that 5% of Dene/Métis cord samples exceeded the US Environmental Protection Agency's benchmark dose of 5.8 µg/L for mercury concentrations compared with 56% of Inuit, and that the Geometric mean (GM) for lead (Pb) was significantly higher in Dene/Métis (30.9 µg/L) and Inuit (31.6 µg/L) participants compared with Caucasian participants (20.6 µg/L). They also expressed concern for the high levels of cadmium among smokers; 48% of Dene/Métis participants reported being a smoker, and GM blood Cd in moderate and heavy smokers was found to be 7.4- and 12.5-fold higher respectively than in nonsmokers. Van Oostdam et al. (2009) explored the presence of POPs and metals in Indigenous mothers in the Arctic and found that none of the Dene/Métis mothers from Inuvik exceeded Health Canada's level of concern for PCBs or mercury, while 6% of Dene/Métis mothers exceeded the Tolerable Daily Intake for one or both of chlordane and toxaphene. They also found that 4.8% of Dene/Métis mothers exceeded the lead guidelines for intervention of 100 microg/L compared with 3.2% of Inuvialuit mothers. They argue that some individuals will need to reduce their intakes of the most contaminated food items to reduce exposure to OCs. Armstrong et al. (2007) correlated food intake levels with maternal blood

levels of contaminants and found moderate to strong correlations for a broad range of contaminants in Dene/Métis and Inuvialuit mothers in Inuvik, with mercury showing the strongest correlation. While Armstrong et al. note that most contaminants were present in higher levels in Inuvialuit compared to Dene/Métis mothers, the mean levels of lead were similar in both groups, with 4.8% of Dene/Métis mothers exceeding the lead guidelines for intervention of 100 microg/L. Despite these somewhat high rates of exposure to environmental contaminants in Dene/Métis mothers and newborns, Van Oostdam et al. (2009) found a positive trend of a decreasing level of contaminants over the period 1998-2006. In Dene/Métis mothers, all the contaminants tested during this period showed decreases with the exception of cadmium, reflecting increased smoking rates among this population. Lead showed the greatest decrease, from 35 to 13 microg/L.

This encouraging trend in decreasing levels of contaminants in northern Aboriginal populations over time was found in other studies as well. Curren et al.'s (2014) temporal and spatial analysis of two previous northern biomonitoring studies noted evidence of declining concentrations of POPs in Arctic biota and "contaminant concentration decreases in the range of 20 to 50%, depending on the chemical" in blood concentrations of POPs (p. 3). Wheatley and Paradis (1995) noted a downward trend in Hg levels in community residents over a 20 year period from 1972 to 1992, but undertook no research to determine whether this decline was the result of falling Hg levels in fish or because less fish was being eaten by people. A more recent study indicated that at least among pregnant Dene/Métis women in Inuvik, fish consumption had in fact doubled over the 1998 to 2006 period, indicating that public health messages about the health benefits of consuming fish and

avoiding only certain species are being heard by this population (Van Oostdam et al., 2009). Despite these declines, Donaldson et al. (2013) argue for the continued need for biomonitoring of POPs and metals, and indeed, expansion of monitoring to include new emerging chemicals.

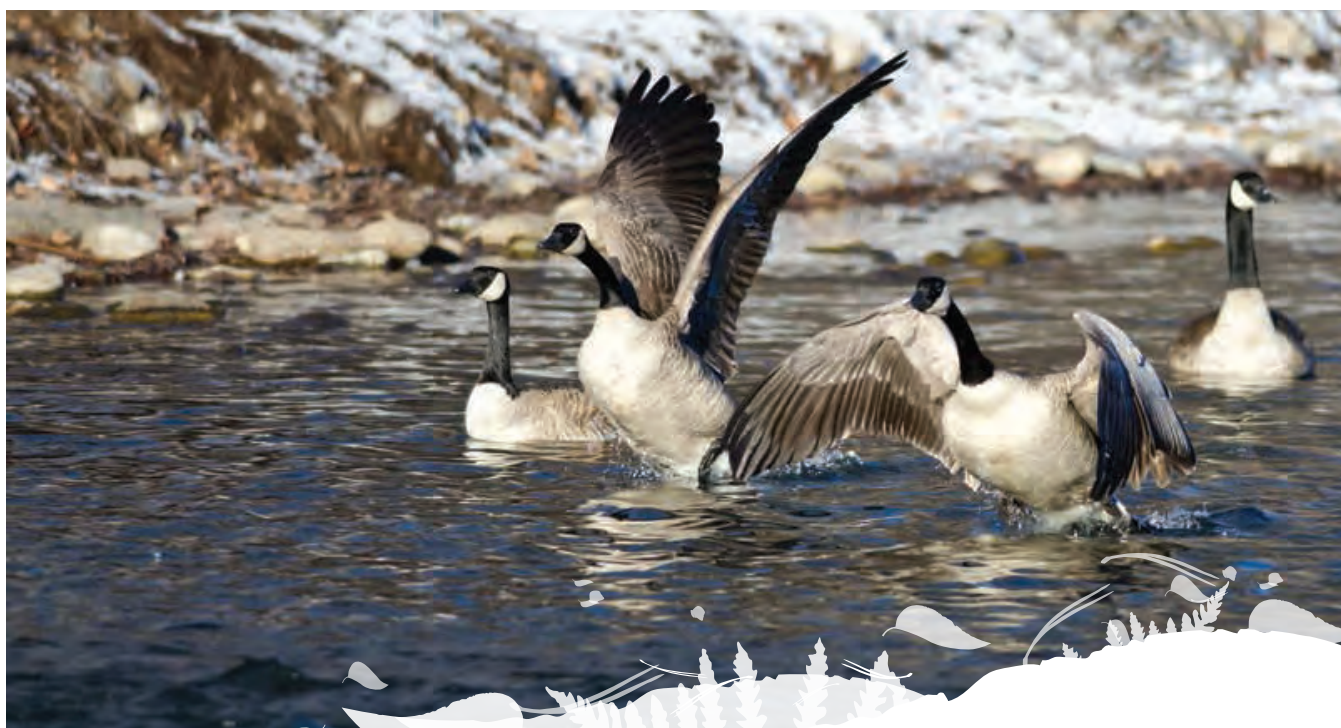
The central theme that emerges from the literature is that in general, First Nations and Métis people in the NWT are not continually consuming dangerous levels of chemical contaminants and therefore should not avoid consuming TFs out of fear of chemical contamination. While some individuals may consume higher than tolerable levels of contaminants from certain foods during certain times of the year, these levels are generally not considered usual intake levels, either because these foods are consumed in large quantities for only a short period during the year or because the foods containing the highest levels of contaminants are typically consumed by only a few individuals (Berti et al., 1998b). Kuhnlein and Chan (2000) argue that advisories should take into account seasonal use and portion size. There are also ways of reducing the levels of lead consumed from game meat by removing and discarding the tissue immediately surrounding lead bullets (Tsuiji, Wainman, Jayasinghe, VanSpronsen, & Liberda, 2009). Nevertheless, research on the health consequences of eating contaminated TFs is generally lacking and there continues to be confusion about the safety of TFs. Consumption of TFs is a key component of food security and healthy lifestyles for northern Indigenous peoples. It is also very important to their cultural and spiritual life (Myers, Fast, Kislalioglu Berkes, & Berkes, 2005). Given this importance, the confusion about the safety of TFs must be resolved to prevent unnecessary shifts in food consumption patterns towards more market based foods (Berti, 1998b; Myers

et al., 2005). It is clear that much more research is needed to determine the levels of organochlorines and metals in TFs, human dietary exposure to contaminants across regions, changes in consumption patterns of TF, the impacts of exposure to chemicals on health, and how to effectively communicate risk.

Impacts of climate change

Climate change refers to the "most recent period of warming, precipitated by increased emissions of greenhouse gases, namely carbon dioxide (CO₂), resulting from industrial development" (Paci et al., 2004, p. 3). There is general agreement that climate change has been occurring in the Canadian Arctic and that it will have greater impacts on the North, particularly on Aboriginal peoples who have a close connection to the land and limited resources to adapt to changing conditions (Ford et al., 2008; Simeon, 2008; Prowse & Furgal, 2009; Duerden, 2004). Evidence that it has been occurring includes "significant warming, increased precipitation, alterations in sea-ice dynamics, and a change in climatic variability and the occurrence of extremes" (Ford et al., 2008, p. 45). These changes have the potential to create greater uncertainty with respect to the availability and predictability of the range of TFs, as well the quality of these foods (Paci et al., 2004). For northern Aboriginal peoples, whose culture and livelihoods are deeply interconnected with the land, food security may be seriously impacted. However, "the extent of these impacts on the nutritional well-being of individuals and communities is not yet well understood" (Guyot, Dickson, Paci, Furgal, & Chan, 2006., p. 404).

A strong focus of the current literature has been on community adaptation to climate change. The ability of communities and individuals to adapt varies. While it is beyond the scope of this paper to summarize the literature



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related to climate change adaptation, understanding how climate change impacts food security and health is necessary so that communities can develop health-related adaptation plans and communication strategies (McClymont Peace & Myers, 2012). Health Canada's Climate Change and Health Adaptation Program has played an important role in this process by funding climate change research related to northern First Nation and Inuit communities. During the period 2008-2011, the program funded 36 projects on a range of topics, including "loss of traditional foods; water quality and safety; erosion/loss of permafrost, changes in traditional medicines; relationship with ice through ice monitoring; landslides; and numerous climate change and health research and education projects" (McClymont Peace & Myers, 2012, p. 3). These projects have resulted in the development of a wide range of knowledge tools that communities can use to assist them in understanding climate change and health issues.

The current body of research highlights a number of documented impacts of climate as they relate to food security in the NWT. These include changing distribution and health of animal species, and effects to land, water and ice that have implications for traditional food harvesting (Guyot et al., 2006; Guyot, 2006; Krcmar, van Kooten, & Chan-McLeod, 2010). While some of these impacts are positive, others are detrimental. Warming temperatures are expected to produce a longer growing season, leading to the potential for expanded agriculture and shifts in natural plant and animal distributions further north (White, Gerlach, Loring, Tidwell, & Chambers, 2007). Larger periods of open water over extensive areas are constraining the movement of land animals such as caribou, moose, arctic fox and wolves, while drier conditions are contributing to a decrease in the habitat for polar bear, ringed and bearded seal populations, as well as mink, otter and likely beaver populations (Fast & Berkes, 1998). The destabilization of permafrost

and vegetation has been shown to detrimentally affect goose populations (Fast & Berkes, 1998). In addition, changes in water temperature and circulation patterns are expected to affect fish populations, with coldwater fish species (such as arctic char) expected to decline in population, while arctic cisco and marine mammals such as beluga, bowhead whales, harbor and harp seals and walrus are expected to increase in numbers (Fast & Berkes, 1998). Climate change is also making harvesting more dangerous and access to hunting areas more difficult and unequal (Ford, Smit & Wandel, 2006; Ford et al., 2008). Impacts to the timing of freeze-up and breakup, and the creation of more weather extremes, are placing the safety of hunters at risk and reducing their access to certain hunting areas (Ford et al., 2008; Furgal, & Seguin, 2006). As well, climate change can impact Arctic food chain contamination, with increases in temperature possibly resulting in an increased degree of volatilization of contaminants presently stored in



For those living in poverty, financial constraints may prove insurmountable barriers to participating in traditional harvesting activities...

soils and oceans (Fast & Berkes, 1998). Rising temperatures can also increase the frequency of food poisoning by altering meat fermentation for specialized dishes (Ford, 2009).

Three studies could be identified that focused on documenting the impacts of climate change on the acquisition of TFs by First Nations and Métis people in the NWT. The first study by Guyot et al. (2006) explored the effects of climate change on the diet of people living in two northern Aboriginal communities, the Deh Gah Got'ie First Nation from Fort Providence and the community of Beaver Creek in the Yukon. They documented local traditional knowledge and observations of change in the local environment and traditional food harvest, as well as current adaptive strategies. The documented changes to the accessibility of TF sources identified by Deh Gah Got'ie participants included increases in some existing animal species like deer and beaver; introduction of new bird

species such as eagles; a later arrival of geese which shortens the spring goose hunt; the presence of spruce needles in the stomachs of ducks suggesting a later spring thaw affecting their normal food sources; and the arrival of new plant species. In addition, participants noted more pronounced water fluctuations that were having an effect on food availability and accessibility, such as higher levels of precipitation in the spring resulting in floods and unusual weather changes, with more extreme weather events and a trend of warmer winters and strong storms in summer. These issues raised community concerns about the availability of berries later in the summer, the ability of fish to spawn, safe travel to hunting and gathering areas, and impacts on food preservation methods. However, community participants also noted some benefits from drier conditions overall, including changes in the mode of transportation towards more land-based transportation which allowed for easier travel to harvesting areas

for moose, as well as changes to the migration of moose which brought them closer to the community. These changes were described as gradual, allowing people from the community to easily adapt. Overcoming such changes in access to or availability of TF resources is "significantly influenced by an individual's access to economic resources and technology" since there will need to be investment in additional tools and equipment (Furgal & Seguin, 2006, p. 1968). Community participants in this study also identified a need for additional funding and enhancements to existing initiatives to support hunters and trappers. For those living in poverty, financial constraints may prove insurmountable barriers to participating in traditional harvesting activities that may make a vulnerable population even more vulnerable to poor diet and nutrition.

The second study by Parlee, Goddard, and Lutsël K'è Dene First Nation (2014) draw on traditional knowledge

from the Łutsël K'è Dene First Nation to explore the health of caribou and moose populations. They compared data from research in 1998-2002 with data from interviews conducted in 2010 and noted that while few changes were observed in the condition of these two animal species, there were some changes to their distribution. Caribou were observed moving further east from key hunting areas and declining in population, while moose were observed expanding their range and increasing in abundance. Using data triangulated from multiple sources, including harvest and consumption data, the researchers suggest these changes are indicative of ecological change.

The third study was undertaken by Kuhnlein et al. (2013) with Gwich'in survey participants. They found that the majority of survey respondents (68%) felt that climate change had affected their intake of TFs. Changes observed by survey respondents included: changes in the appearance and availability of fish species, changes in the temperature and cleanliness of water; declines in the numbers of caribou and moose which they attributed to "climate-related changes in migration patterns caused by warming temperatures, increased forest fires, and reduced access to food sources" (p. 116); and changes in weather conditions which affected the ability of hunters to travel to and access harvesting areas. As a result of these changes, 36% of respondents felt they did not eat as much TF as they wanted to and that access to these foods was made more difficult because of the impediments of rising fuel costs and lack of time.

Several additional studies track the population of animal species over time, explore the impacts of a decline in animal species for food security, and/or offer some strategies for adapting to species decline. Harvest studies like McDonald (2009) and McMillan (2012) show declines in the harvesting

of caribou over time, but increases in the harvesting of other species like moose. Chie (2013) outlines some negative impacts of a decline in caribou populations, which she states will particularly impact communities with older populations, those with lower employment rates, those with lower incomes, and those who lack access to community stores. She argues that a decline in caribou population will result in higher 'caribou prices' (the costs of procuring caribou when it is scarce), which will result in further substitution of a traditional meat source with high priced MFs and further consequences for those who are already food insecure. Finally, McMillan (2012) and McMillan & Parlee (2013) examine how hunting strategies and food sharing networks contribute to social-ecological resilience towards decreased availability of TF sources. They highlight the potential of community organized hunts as a means of allowing communities to adapt to the socio-economic and ecological challenges arising from declining caribou populations.

McClymont Peace and Myers (2012) note that the "health implications resulting from a warmer and more unpredictable climate are not distributed evenly: current health status, age, genetics, gender, geography, and economics, are all key variables affecting the ability of individuals and communities to adapt and reduce the effects of climate change" (pp. 1-2). Yet, there is currently a dearth of literature focusing on the impacts of climate change on food security and on the health implications of a warmer and more unpredictable climate. This dearth of literature is even more pronounced when the focus is specifically on the First Nations and Métis populations of the NWT. Given that the circumpolar north is a region where global processes and changes in atmospheric gases or temperatures are more acutely experienced (Paci et al., 2004), not surprisingly, most literature to date has

been focused on the impacts of climate change on Inuit peoples specifically and on their ability to adapt. Of this body of literature, the dominant focus has been on biophysical systems, followed by vulnerabilities, socio-economic impacts of climate change, and the health impacts of climate change (Ford & Pearce, 2010). Clearly, more research is required in this area. In particular, Ford and Pearce highlight the need for location specific assessments of climate change impacts, and for studies on the effectiveness, durability, and long-term viability of adaptations.

5.5 Summary

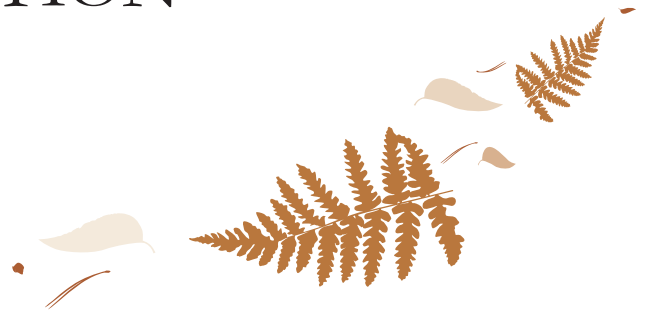
The benefits of consuming traditional foods extend far beyond simply higher nutrient density and the availability of key essential nutrients. They also include "physical activity during harvesting, lower food costs, the prevention of chronic disease by consumption of more nutritious food, and multiple sociocultural values that contribute to mental health and cultural morale" (Kuhnlein & Chan, 2000, p. 615). As well, fishing, hunting, and gathering of traditional foods can provide educational value, economic benefits and a place in the social fabric of community life (Kuhnlein & Receveur, 1996; Kuhnlein & Chan, 2000).

Given these benefits, it is essential that traditional food sources be promoted to improve the health and well-being of Aboriginal peoples generally, and the First Nations and Métis peoples of the NWT specifically. This will entail effective communication about the safety of traditional food sources and the implementation of additional supports to overcome the impacts of climate change on the accessibility and availability of traditional food sources. In addition, further research is required to assess the safety of specific traditional food sources and the impacts of climate change on food security and on health.





6.0 HEALTH IMPACTS OF THE NUTRITION TRANSITION



Researchers have noted that changing diets and lifestyles within Indigenous communities have contributed to increased prevalence of many diseases and illnesses, including diabetes, certain cancers, dental disease, cardiovascular disease, fetal alcohol syndrome, and a wide range of illnesses associated with mental health and poor cultural morale (Kuhnlein, 1995, p. 766). However, few studies have explored the health impacts of the nutrition transition on First Nations and Métis people living in the Northwest Territories. This section will summarize what is currently known about chronic illnesses associated with diet and nutrition in First Nations and Métis, specifically obesity, Type 2 diabetes, cardiovascular and other heart-related chronic diseases.

The literature and data related to the prevalence of obesity, diabetes, cardiovascular disease and other heart-related chronic illnesses among First Nations and Métis peoples in the NWT is extremely limited. Most of the current information focuses on the general

NWT population (Aboriginal and non-Aboriginal populations combined), or compares Aboriginal people with non-Aboriginal people in either the NWT or in the northern territories combined, leaving an unclear picture of the health impacts on First Nations and Métis people specifically. One reason for the lack of data may be the small sample sizes for these chronic diseases, given the relatively small proportion of the Canadian population living in the NWT and previous findings that show lower rates of cardiovascular diseases and diabetes among people living in northern latitudes compared with southern latitudes (Filate, Johansen, Kennedy, & Tu, 2003; Hu et al., 2006; Young, 1993, Young, Szathmary, Evers and Wheatley, 1990). Nevertheless, the evidence, albeit limited, suggests that the prevalence of chronic illnesses associated with diet and nutrition is on the rise and these illnesses may be emerging as health concerns for First Nations and Métis people in the NWT. Further research specific to these populations is required.

In Canada, rates of diabetes have been rising rapidly and are considered to have reached epidemic levels in some communities (PHAC, 2011b). However, there is a considerable degree of diversity within and between First Nations, Métis, and Inuit communities. Diabetes has been found to be highest among First Nations living on-reserve and lowest among Inuit (Table 8). One of the common explanations for the high rates of diabetes found among Aboriginal peoples is the thrifty gene hypothesis. This hypothesis stipulates that Aboriginal peoples have an inherited susceptibility for “a biological incapacity to adapt to a modern sedentary lifestyle with a consistent supply of energy” (Egeland & Harrison, 2013, p. 14). However, this explanation is considered to be generally too simplistic. Emerging data suggests there are possible epigenetic effects whereby there are changes in gene expression that can be transmitted intergenerationally but do not involve the alteration of DNA base sequences (Ibid., p. 15).

Research on diabetes within First Nations and Métis people living in the NWT is more limited; nevertheless, there is evidence of an increasing trend in prevalence and some association between diabetes and acculturation. In the past, diabetes diagnoses were very rare within the First Nations and Métis people in the NWT. Early studies by Szathmary and colleagues focused on the effects of acculturation and dietary change in the Dogrib population (Szathmary, 1989, 1990, 1994; Szathmary & Holt, 1983; Szathmary, Ritenbaugh, & Goodby, 1987). They reported that no cases of diabetes existed until about 1981 when oral glucose tests revealed that approximately 10% had glucose levels exceeding the international criteria for diabetes (Szathmary & Holt, 1983). However, when the test was repeated in 1985, only approximately 2% of the same Dogrib population had glucose levels exceeding the criteria for diabetes. These studies highlight the occurrence of a shift in the glucose tolerance of normal adults (Szathmary, 1993). While the evidence derived from these studies did not support the notion that fasting hyperinsulinemia

is an innate trait in the Dogrib, it did demonstrate that genetic factors played a role in carbohydrate and lipid metabolism (Szathmary, 1993). In 1987, using National Survey data for known cases of diabetes, Young (1993) noted that Aboriginal people living in the NWT had the second lowest number of diabetes cases in Canada, with only Inuit living in the NWT having lower rates (p. 26).

Szathmary and colleagues also explored whether there were any associations between dietary factors and the prevalence of diabetes in the Dene/Métis population of the NWT. In 1987, Szathmary et al. investigated differences in the mean glucose levels in four Dogrib settlements to determine whether there were any associations between more acculturated or less acculturated settlements and the prevalence of non-insulin dependent diabetes mellitus (NIDDM). They found very low prevalence of diabetes and no association between acculturation and NIDDM, despite significant differences in the intake components derived from non-

TABLE 8: PREVALENCE (CRUDE) OF SELF-REPORTED DIABETES AMONG FIRST NATIONS, INUIT AND MÉTIS INDIVIDUALS IN CANADA

	Source	Age	Age-standardized prevalence
Non-Aboriginal	2009-2010 CCHS	12+	6.0
First Nations (on-reserve)	2008-2010 Regional Health Survey	18+	15.3
First Nations (off reserve)	2009-2010 CCHS	12+	8.7
Inuit	2006 Aboriginal Peoples Survey	15+	4.0
Métis	2009-2010 CCHS	12+	7.3

Source: PHAC, 2011b



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traditional foods by community and by age. However, in 1990, Szathmary and Ferrell (1990) found significant elevations in centripetal obesity and significantly higher long-term circulating plasma glucose levels and fasting triglyceride levels in the most acculturated Dogrib community.

More recent data suggests that rates of diabetes in First Nations and Métis in the NWT may be rising. Data from Statistics Canada's Canadian Community Health Survey (CCHS) reveals that between 2007 and 2010, the age-standardized rate of diabetes among Aboriginal people living in the NWT was 2.9% compared with 6.1% of Aboriginal people in Canada, 3.6% of non-Aboriginal people living in the NWT and 4.5% of non-Aboriginal people in Canada generally (Statistics Canada, 2013b, 2013c). However, this data excludes First Nations people living on reserve. Diabetes data collected by the Public Health Agency of Canada (which includes both Aboriginal and non-Aboriginal populations) seems to indicate warning signs that diabetes is emerging as a public health concern

for Aboriginal people in the NWT, especially for First Nations. This data shows age-standardized prevalence of diagnosed diabetes for the NWT as a whole to be between 5.5 and 6.0%, which is mid-range when compared with all other provinces and territories (PHAC, 2011b). When coupled with the data from CCHS which excludes on-reserve First Nations people, these rates seem to indicate that the prevalence of diabetes may in fact be much higher for on-reserve populations. The fact that Aboriginal Canadians are being diagnosed with diabetes at a younger age than non-Aboriginal individuals (PHAC, 2011b) further hints at an emerging public health crisis. Sarkar, Lix, Bruce & Kue Young (2010) also noted some negative shifts over time in their comparison of self-report data for Aboriginal and non-Aboriginal respondents living in northern Canada across two cycles of the CCHS, including increases in the number of Aboriginal respondents reporting obesity, as well as increasing prevalence of a number of risk factors for chronic disease among Aboriginal respondents, including odds of daily smoking and

infrequent physical activity. This data suggest that the prevalence of chronic diseases may increase in the future.

The evidence seems to suggest that First Nations and Métis in the NWT are at greater risk of diabetes and cardiovascular illness because they have higher rates of many of the risk factors for these illnesses. Rates of obesity and overweight are generally higher in the NWT compared to the national average (PHAC, 2011a; Vanasse, Demers, Hemiri & Coureau, 2006; Pouliou & Elliott, 2009; Freeman, King, Briand, & Pickett, 2012), and they are also generally higher among First Nations and Métis people in the NWT compared with non-Aboriginal people (Kimery, Amirkhalkhali, & Amirkhalkhali, 2013; Kuhnlein et al., 2013, 2014; Nakano et al., 2005). The Public Health Agency of Canada (2011b) examined four risk factors for diabetes and found that prevalence rates for three of these factors (self-reported overweight and obesity, inadequate vegetable and fruit consumption, and daily tobacco smoking) were very high in the NWT (as well as in Nunavut) compared



with other provinces and territories in Canada.¹³ In particular, the NWT had the second highest prevalence of self-reported inadequate vegetable and fruit consumption, which again highlights the role that scarcity of fresh foods in northern latitudes plays in maintaining good health.

Researchers associated with the CINE examined the prevalence of obesity among Indigenous people from 44 communities in the Canadian Arctic (including Yukon First Nations and both Dene/Métis and Inuit in the NWT). They found that overall the rate of obesity for Arctic adults exceeded all Canadian rates (Kuhnlein et al., 2004). Furthermore, prevalence of obesity was higher for women compared with men, for Inuit compared with other Indigenous groups, and for older

adults compared with younger adults (Ibid.). Kuhnlein et al. (2013) expressed considerable concern about the extent of obesity among women, noting that 46% of the Dene women in their sample were considered obese based on body mass index (BMI), 57% were considered obese based on waist circumference, and 88% were at substantially increased risk of obesity-related health complications. They attributed these high rates largely to low physical activity expenditures. Nevertheless, this study found that hypertension was non-existent and pre-hypertension was present in only a small proportion of youth and young women. Geography is also a contributing factor in the prevalence of obesity. As noted by Egeland and Harrison (2013), “Indigenous peoples who live in remote areas with considerable biodiversity and who are engaged in traditional activities

with little reliance on market economies tend to be of normal weight” (p. 12).

The rates of obesity and overweight among First Nations and Métis children are particularly alarming. Kuhnlein et al. (2013) found that 24% of First Nations youth were above the 85th percentile for BMI and 20% and 18% were above the 85th percentile for waist circumference and body fat, respectively. Nakano et al. (2005) examined overweight among Dene/Métis (and Yukon) children aged 10-12 years, finding excessive prevalence, with 32% of children above the 85th percentile for BMI. The author noted that prevalence of obesity varied by region and gender, with rates 30% lower for boys compared with girls, and rates considerably higher in southern regions compared with central and northern

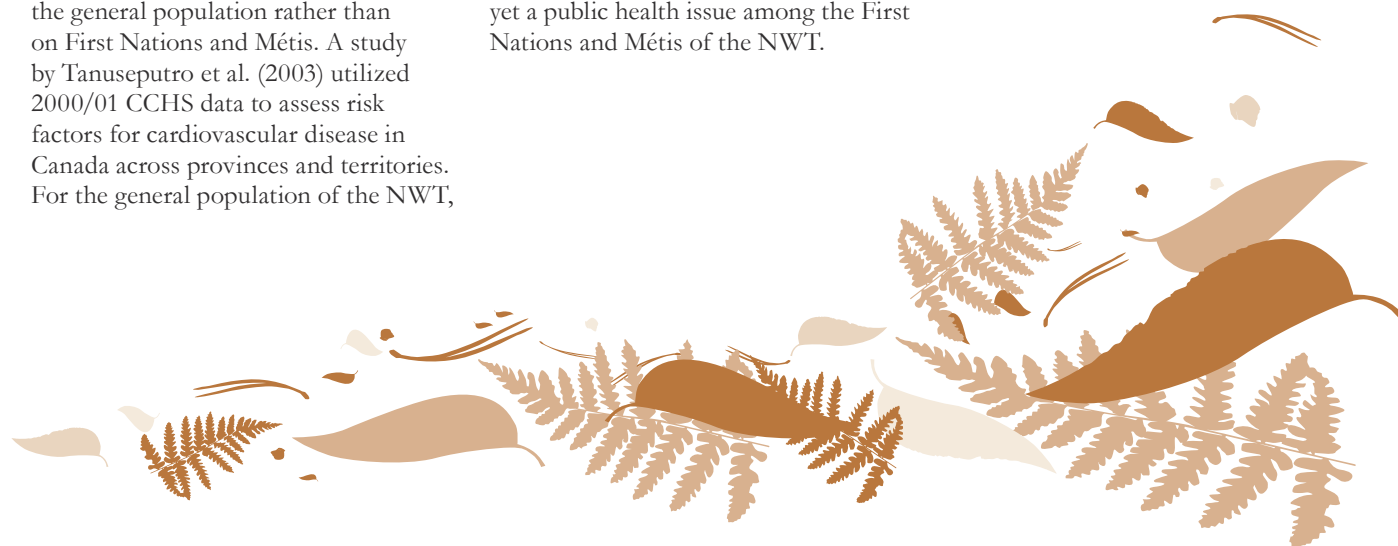
¹³ The fourth, physical inactivity, was in the mid-range.

regions. She warns, however, that caution should be exercised in using the CDC Growth Charts to assess obesity because of built-in assumptions about differences among racial and ethnic groups resulting from environmental factors such as socioeconomic status, poverty and the availability of health and nutrition services rather than genetic factors. Vanasse et al. (2006) suggest that the higher rates of obesity in the NWT are likely attributed more to low fruit and vegetable consumption rather than to physical inactivity by the substantial Aboriginal population living in the territory. Panagiotopoulos, Nguyen, & Smith (2014) found that nearly 50% of Aboriginal children from the Beaufort-Delta region of the NWT were obese or overweight, highlighting the need to address the barriers Aboriginal populations face in rural and remote regions in accessing high-quality nutritious foods and recreational programs.

The only literature related to cardiovascular or other heart-related illnesses in the NWT focused on the general population rather than on First Nations and Métis. A study by Tanuseputro et al. (2003) utilized 2000/01 CCHS data to assess risk factors for cardiovascular disease in Canada across provinces and territories. For the general population of the NWT,

they identified four risk factors (of a total of 6) that were above Canadian averages including percentage of survey respondents who were current smokers, who were obese (BMI equal to or greater than 30.0), who were physically inactive, and who were considered to be low income. Despite these risk factors, the percentage of NWT respondents who were hypertensive was considerably below the national average. This same methodology and data was used by Filate et al. (2003) and Chow et al. (2005) to assess regional variations in cardiovascular disease. In these studies, Filate et al. found that rates of mortality from cardiovascular disease were lowest in the NWT, while rates of mortality from ischemic heart disease were second lowest. Similarly, Chow et al. noted that self-reported prevalence of heart disease, myocardial infarction, angina and/or congestive heart failure was also the lowest in the Yukon/NWT/Nunavut collectively. While these data do not disaggregate Aboriginal from non-Aboriginal populations (and in some cases include all northern residents), it is likely that cardiovascular disease is not yet a public health issue among the First Nations and Métis of the NWT.

There is a need for additional research related to chronic diseases associated with diet and nutrition within First Nations and Métis in the NWT, in order to identify the prevalence of these diseases and the extent to which these populations are at risk of developing these chronic diseases. What limited data is available seems to suggest that the risk factors for diabetes and cardiovascular disease (including tobacco use, inadequate fruit and vegetable intakes, inadequate physical activity, and obesity and overweight) are generally high among First Nations and Métis, and that prevalence rates for these diseases will continue to increase. It is imperative that health promotion programs and initiatives target these risk factors in order to stave off this emerging public health threat. The following section will discuss current health promotion programs and initiatives.





7.0 HEALTH PROMOTION



This section will examine what is known about health promotion initiatives in the NWT. Since the population of the NWT is almost evenly split between Aboriginal and non-Aboriginal people, this section will include information pertaining to both populations. It will also draw on information gathered not only from the five articles identified in the literature search that focused on this topic, but also on information collected from a search of the Internet for health promotion initiatives in the NWT. This search involved using Google's search engine with the search terms "health promotion" and "Northwest Territories." However, not all programs or initiatives will be found on Google, especially those that are more community-based. Funding and time constraints prevented contacting various government staff directly to determine the availability of specific programs or initiatives. As a result, it is likely that some programs and initiatives will be missed. Nevertheless, the examples of programs and initiatives are diverse and should be considered representative of the programs and initiatives that are available in the NWT.

Of the five articles that discuss health promotion initiatives, none provide an evaluation of the effectiveness of initiatives. Instead, the focus is generally on identifying and describing various

health promotion initiatives. Several suggestions are offered in the literature pertaining to public health strategies. Given that many traditional foods are high in several essential nutrients, Kuhnlein et al. (2006) argue that these types of TFs should be promoted in public health initiatives. Others posit strategies aimed at overcoming some of the barriers to accessing healthy market foods, including increasing levels of Vitamin D and calcium, especially for new mothers and their infants, through vitamin supplementation (Walters et al., 1998), and subsidizing the cost of milk in northern communities to bring cost down to the levels of southern communities (Slater, et al., 2013). Some examples of current health promotion initiatives in the NWT show an effort to incorporate elements of these strategies.

Kuhnlein et al. (2014) argue that "because food insecurity is experienced differently at individual, household, community, and regional levels, it follows that strategies to mitigate food insecurity must be similarly diverse" (p. xxi). The diversity of these health promotion initiatives identified in the literature and from a search of the Internet is evident in terms of the partners involved in funding and administering the initiative, the population targeted by the initiative, and the nature of the initiative. The

examples involve multi-level and multi-sectoral approaches. Some target the general population of the NWT, while others target Aboriginal populations specifically. The target population may include all ages or focus specifically on infants, children, youth or adults. Some of the initiatives are short-term, temporary solutions aimed at addressing food insecurity, some aim to build capacity and develop skills, and some involve organizational change or policy responses. All of the initiatives convey the importance of community consultation and participation in health promotion initiatives (Kuhnlein et al., 2014). The examples found will be categorized according to a framework utilized by the Expert Panel on the State of Knowledge of Food Security in Northern Canada (Ibid.): 1) programs to increase the affordability and availability of healthy food; 2) health and education programs; 3) community wellness and intergenerational knowledge sharing; 4) harvester support and sustainable wildlife management; 5) poverty reduction and community economic development; 6) innovation in infrastructure, transportation and local food production; and 7) youth engagement. These categories are not mutually exclusive.



7.1 Programs or initiatives to increase the affordability and availability of healthy market foods

Programs or initiatives aimed at improving the availability and affordability of high quality foods help counteract the high costs of bringing nutritious foods to market, which when coupled with the lower socio-economic status of many Aboriginal people, act as significant barriers to accessing nutritious market foods in the NWT and the north generally. Two programs were identified through a search of the Internet which aimed to improve the accessibility and affordability of market foods.

The Healthy Foods North Initiative is an intervention program aimed at improving diets and reducing the risk of chronic disease in Aboriginal populations (Kuhnlein et al., 2014). The initiative was part of the Pan-Canadian Healthy Living Strategy. It was first introduced in 2008 by the Government of the NWT, Department of Health and Social Services (DHSS) with the Canadian Public Health Association as a pilot project in Inuvik and Tuktoyaktuk to make nutritious food more affordable (Epp, 2009). Working closely with local Inuit and Inuvialuit community groups, program leaders developed a multi-level intervention program that promotes traditional

foods and activities, improves peoples' diets, increases physical activity, and reduces the risk of obesity and chronic disease (PHAC, 2012). The program has been expanded to other northern communities, including Ulukhaktok, NWT. Several evaluations have been undertaken of this program; however, the focus has been on the effectiveness of this program on improving diet among Inuit and Inuvialuit populations rather than First Nations and Métis populations. These evaluations highlight the effectiveness of the program in improving the intakes of vitamin A and D among women of childbearing age, decreasing significantly the consumption of de-promoted foods, such as high fat meats and dairy products, and using healthier preparation methods (Bains et al., 2013; Kolahdooz, et al., 2014).

Nutritious North Canada is a northern food retail subsidy program initiated in 2010 to replace the previous Food Mail Program. The program, funded by the federal government, is designed to make healthy foods more accessible and affordable to all residents of isolated northern communities. Unlike the previous Food Mail Program, which also subsidized non-food items, most non-perishable foods, and some perishable foods with little nutritional value, the current program only subsidizes northern retailers and wholesalers of large volumes of nutritious and perishable foods (with

the exception of those communities without marine service). This includes fruits, vegetables, bread, fresh meats, milk and eggs, all of which receive the highest rate of subsidy. The expectation is that these subsidies will then be passed from retailers to consumers, making healthy market foods more affordable. The program also aims to improve access to commercially-produced traditional, northern foods, and provides funding for communities, working in partnership with Health Canada, to offer culturally-appropriate nutrition and health promotion activities, including information on the use, marketing and preparation of nutritious foods to support healthy eating (AANDC, 2010).

7.2 Health and education programs

Most health promotion programs and initiatives can be categorized as being health education programs. These programs are primarily aimed at improving maternal and infant nutritional health, or at improving the health of children and youth, through educating individuals about healthier diets and lifestyle choices. They are often funded by Health Canada and managed by the territorial government, though there are also some community-based initiatives.

The Public Health Agency of Canada implemented the Canada Prenatal Nutrition Program (CPNP) in the Northwest Territories in 1994 (PHAC, 2011b). This community-based program provides funding for the promotion of public health and support to improve the health and well-being of pregnant women, new mothers and babies facing challenging life circumstances. Currently, there are 28 programs in the NWT, supported by two regional CPNP dietitians based in Yellowknife and Inuvik (NWT Prenatal Nutrition Program, n.d.-a). A separate stream of the program is administered through Health Canada and serves Inuit and First Nations women living on-reserve. Main program activities include nutrition screening, education and counseling (for example, information sessions on nutrition, pregnancy and health, grocery store tours, baby food making activities, and physical activities); maternal nourishment (for example, cooking classes, healthy food hampers, meal bags, Good Food Boxes, food vouchers, healthy snacks provided during CPNP activities, food access activities and bulk food buying); and breastfeeding promotion, education and support (NWT Prenatal Program, n.d.-b).

The Brighter Futures program was introduced by the federal government in the early 1990s to “assist First Nations and Inuit communities to develop community-based approaches to better health” (Health Canada, 2007, para. 1). Brighter Futures offers funding for health promotion and ill-health prevention projects that offer learning-related activities focused on increasing awareness, changing attitudes, building knowledge and enhancing skills. The program consists of five components: mental health, child development, parenting, healthy babies and injury prevention. The Child Development and Healthy Babies components can include nutrition projects such as school based breakfast programs and education

about breastfeeding and the importance of healthy eating. The Initiative is administered by the Territory’s Health and Social Services Department.

The Baby Friendly Initiative (BFI) was initiated in Canada in 1991 as an integrated initiative for hospitals and community health services to provide optimal support for maternal-child health (Breastfeeding Committee of Canada, 2012). It was implemented and is administered by the Breastfeeding Committee for Canada (BCC), a volunteer not-for-profit volunteer organization established by Health Canada to protect, promote and support breastfeeding as the normal method of infant feeding. In recognition that the degree to which the BFI can be implemented across Canada varies and that it may be more difficult to implement in more rural, isolated and First Nations communities, a new work group with the BCC, the Provincial/Territorial BFI Committee, was initiated to explore ways for the BCC to assist and support the BFI in these communities (Ibid.). To date, there have been few activities related to the BFI undertaken in the NWT with the exception of making an Online Breastfeeding Course available to health care professionals, the hosting of the ‘NWT Supports Breastfeeding website’ by the NWT Health and Social Services Department, and sending a representative to attend the BCC P/T committee meetings (Ibid., p. 23).

Another federally funded but territorially administered initiative is the Healthy Children Initiative. This initiative was implemented in 1997 to support people, organizations and communities that create programs and services aimed at having “healthy children of healthy parents grow up in strong supported families in caring communities” (NWT, ECE & HSS, n.d., p. 1). In the NWT, the Education, Culture and Employment (ECE) and Health and Social Services

(HSS) departments collaborate on this initiative. Two different types of funding are available: Community Initiatives and Supporting Child Services. Of interest to this review is the first type of funding, which provides aid to existing programs or services that improve the development of early childhood intervention programs for children 0-6 years old and their families, including promotion and prevention programs that enable families and communities to make healthy choices. This might include enhancing community level parenting courses which assist parents in providing quality care for their children (NWT, ECE & HSS, n.d.).

The federal government provides funding for Aboriginal Head Start programs (for both on- and off-reserve populations) which focus on early child development and education. Among other things, these programs incorporate a health promotion component designed to “empower parents, guardians, caregivers and those involved with Aboriginal Head Start to increase control over and improve their health” (NWT, Aboriginal Head Start, n.d.). Aboriginal Head Start centres encourage practices for self-care, working together to address health concerns, and the creation of formal and informal social support networks to facilitate actions that contribute to holistic health. Specific actions undertaken within these centres include developing and undertaking physical activities and games that promote the development of gross motor skills and participation in an active lifestyle in children, and encouraging parents to participate in activities that promote a healthy and active lifestyle (Ibid.). The program is administered by the DHSS.

The Government of the NWT has promoted traditional foods in health promotion initiatives for at least a decade. In 2002, the HSS created a fact sheet series on traditional food

which continues to be available on the Internet. There are two fact sheet series for Dene/Métis traditional foods and two for Inuit traditional foods. Each series includes one fact sheet that identifies the types of traditional food sources consumed by each population group, the parts consumed, some optimal food preparation techniques for that food source, and the nutritional benefits of that food source (ie. whether it has high or low fat content); and one fact sheet that provides information on important vitamins, why they are important to health, food serving size, and tables showing which food sources (both traditional and market) are rich in those vitamins. Dene/Métis food sources identified in the first fact sheet include caribou, moose, fish (baked lake trout), muskrat, beaver, rabbit/hare, goose, duck, ptarmigan/grouse, and wild plant greens (such as dock, fireweed, dandelion greens and lamb's quarters). The vitamins included in the second fact sheet are Vitamins A, B (riboflavin, thiamine, niacin), and C, as well as calcium, iron, protein, and fat (from traditional food sources) (NWT, HSS, 2002).

While little information could be obtained regarding community-based initiatives to educate about healthy food choices, it is likely that many First Nations and Métis communities in the NWT are implementing their own culturally relevant initiatives. Kuhnlein et al. (2013) identifies a range of activities implemented in the community of Tetlit Zheh to promote knowledge of and access to healthy traditional and market foods, while Kuhnlein (2014) notes that nine of CINE's 12 Indigenous communities had implemented health promotion initiatives. Key components of these initiatives include: recognizing an inventory of available resources; reinforcing community-based knowledge sharing of available foods and harvesting methods; and using cultural knowledge to render foods

acceptable to all ages and genders. She attributes the success of these interventions to the fact that they combined Western scientific principles of good nutrition with traditional knowledge, and they built trust and commitment among community residents and their leaders.

7.3 Community wellness and intergenerational knowledge sharing

This category of programs and initiatives is broad, encompassing culture based programs that promote mental, spiritual, and physical well-being; programs that include practices that encourage family eating and sharing; programs that promote intergenerational knowledge and skills transmission; community led food assessments and asset mapping; and programs that target populations at higher risk of food insecurity. As noted in Kuhnlein et al.'s (2014) report, "[t]he extent to which [traditional] knowledge is transmitted to future generations plays an important role in determining the health and wellness of individuals and communities" (p. 162). Also included in this section are programs aimed at reducing the prevalence of chronic diseases for their focus on encouraging healthy lifestyles.

Food sharing networks and community food programs are short-term, temporary programs targeted at populations at higher risk of food insecurity. The only information that could be found on food sharing networks came from two articles identified in the literature search on the sharing of meat from community organized and household-organized hunts within a specific Dene community (McMillan, 2012; McMillan & Parlee, 2013). These two studies highlight the benefits of community hunt meat-sharing strategies in contributing to social-ecological resilience towards

decreased availability of traditional food sources (in this case caribou) and limitations on beneficiaries. McMillan & Parlee (2013) note that meat sharing comprises a substantial portion of the total harvest for community and household organized hunts. However, since there are more requests for meat from elders and those in need after a community harvest compared to individual household organized hunts, the portions of meat being shared tend to be smaller. McMillan (2012) also highlights the role of the community organized hunt in "bolstering traditional livelihoods within the community through teaching youth traditional skills" (p. 96).

Community food programs are widely depended on by users and are considered an essential service in the north (Ford et al., 2013). In fact, Ford et al. (2013) found that community food program users tend to be chronically food insecure. However, these researchers also highlight a contradiction in the way that some food programs are funded which in fact can lead to increased vulnerability to food insecurity. They note, for example, that the food bank in Iqaluit is funded through community events like bingo, a setting in which residents who are already food insecure spend what little money they have. This can contribute to a perpetuation of poverty. Ford et al. also indicate that additional research is needed, including the extent to which community food programs are utilized and effectively serve the needs of communities; policy research on the complexities of implementing policy to support food security in remote northern communities; policy research related to wildlife management which has direct implications for the availability of traditional foods; and enhancing the evidence base on successful interventions for policies aimed at strengthening the traditional subsistence sector and links to food security.

Community food programs are widely depended on by users and are considered an essential service in the north (Ford et al., 2013).

There have also been several programs that have focused on reducing the prevalence of chronic disease. A long-standing health promotion initiative has been the federal government's Aboriginal Diabetes Initiative. Established in 1999 with initial funding of \$58 million over 5 years, the initiative is now in its third phase, having expanded in 2005 with a budget of \$190 million over 5 years and then again in 2010 with a budget of \$50 million per year. The aim of the initiative is to support health promotion and primary prevention activities and services to reduce type 2 diabetes among Aboriginal people. This includes: "initiatives for children, youth, parents and families; diabetes in pre-pregnancy and pregnancy; community-led food security planning to improve access to healthy foods, including traditional and market foods; and enhanced training for health professionals on clinical practice guidelines and chronic disease management strategies" (Health Canada, 2012, para. 7). These programs and services are delivered in partnership with Tribal Councils, First Nations organizations, Inuit community groups, and Provincial and Territorial governments. The Initiative is administered by the Territory's Health and Social Services Department.

The Government of the NWT also recently set a priority to improve the health status of the population through the development of a culturally appropriate chronic disease management model that tracks outcome



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measures (NWT, HSS, 2011a). The Chronic Disease Management Model priority came out of recommendations resulting from a review of health programs by the Office of the Auditor General and sets the Department of HSS "to identify a core set of diabetes education, prevention and treatment programs and identify and collect data to measure program results and improve program delivery" (NWT, HSS, 2012, p. 15). Included in this priority are actions aimed at health promotion, physical activity and other preventative healthy choices. As part of this health priority, the government identified as an action for the 2012/13 fiscal year the need to "assist individuals to better manage their chronic disease and reduce complications and hospitalizations including the Diabetes Self-Management Pilot Program and the Diabetes Capacity Building Project" (Ibid., p. 31). As a first step in developing a territory-wide integrated chronic disease management strategy, the DHSS is collaborating with the Canadian Health Services Research Foundation on four improvement pilots focused on mental health, diabetes, renal disease and system level changes (Leith, Kirvan, Verma, Lewis, & Robertson, 2012). No further details about these programs can be located through internet sources.

In 2011, the Government of the NWT also established the Health Promotion

Strategy Fund, a community-based health promotion initiative meant to assist communities working on tobacco harm reduction and cessation, active living, healthy pregnancies and injury prevention. The fund supports new single year community-based projects that improve health and wellness, promote healthy lifestyles, and reduce preventable diseases (NWT, HSS, 2011b). Applicants must be non-government, not-for-profit organizations. Projects may focus in one or more of five areas: healthy pregnancies, active living and healthy eating, tobacco harm reduction and cessation, injury prevention, and sexual health. In the focus area of active living and healthy eating, these projects can be targeted at increasing awareness and health promotion activities about active living, healthy eating and being at a healthy weight; offering activities that cover both fitness and nutrition; teaching people how to choose, buy, and prepare healthy food; or providing nutrition education for families (Ibid., p. 2). Funding is provided to a maximum of \$10,000 per project for registered non-profit groups working to benefit the community. Projects are selected through a proposal writing process, with priority given to projects that have active and supportive partners which provide funding, space, resources or volunteer staff, or contribute in some other way to the project.

7.4 Harvester support and sustainable wildlife management

Strategies aimed at supporting traditional harvesting practices and the consumption of traditional/country foods, as well as sustainable wildlife management, are important for addressing food insecurity among Aboriginal peoples in northern Canada (Kuhnlein et al., 2014). These strategies encourage food sharing, increase the accessibility of healthy food options, and ensure long-term food security and food sovereignty.

Several initiatives are targeted at improving food security through the promotion of traditional harvesting. The Commercial Harvest Program is designed to assist First Nations, communities, organizations and governments to implement and conduct commercial harvests for a number of traditional food plant and animal species, while the Traditional Harvest Program is designed to assist community and regional organizations in harvesting local plant and animal species (NWT, Industry, Tourism and Investment, n.d.). Traditional food acquisition is also supported through the Government of the NWT's Western Harvesters Assistance Program, which "provides grants to Aboriginal organizations that promote renewable resource harvesting", and the Community Harvesters Assistance Program which "provides funding to Local Wildlife Committees to distribute to members to defray the operating costs of harvesting" (Epp, 2009, p. 18). In 2012, the Government of the NWT increased its funding to the program to over \$1 million dollars (NWT, Office of the Executive, 2012).

In the previous section, community hunts were discussed for their encouragement of meat sharing as a mechanism for fostering community well-being as well as for bolstering knowledge about traditional food

systems through the passing of traditional knowledge about hunting from one generation to the next. Encouraging community hunts is also a method of ensuring long-term food security as they incorporate an element of community-based ecological management directed at improving conditions related to declining animal populations (McMillan, 2012). In McMillan's First Nations study community in the NWT, the community hunt was organized with consideration for ensuring a sufficient harvest through the careful choosing of the hunt location, as well as consideration for encouraging participation in the hunt and minimizing travel costs (p. 94).

Several publications identified in the literature search presented results from community monitoring programs in the NWT. McDonald (2009) and McMillan (2012) undertook assessments of the most commonly harvested traditional meat, fish, and bird species for wildlife management purposes. In addition, Parlee et al. (2014), in response to community concerns about the spread of Chronic Wasting Disease (CWD) in local caribou populations, demonstrated how traditional knowledge can be used to monitor changes in the Arctic ecosystem in the absence of more formal monitoring processes. Specifically, they drew on the traditional knowledge of the Łutsël K'é Dene First Nation and data from previous research to determine whether there were any changes in the availability, range and condition of local caribou. Their study found few changes in the condition of caribou, only changes in terms of its availability and range, indicating that community concerns over the spread of CWD into the region were unwarranted at the present time. Such monitoring is essential, as is the need to exercise caution in communicating about such diseases, as concerns over the spread of infectious diseases in traditional food sources can trigger a greater avoidance of these foods. There is clearly a need for greater monitoring of wildlife populations.

7.5 Poverty reduction and community economic development

The programs included in this section focus on interventions to address poverty and diminish crowding in housing, as well as initiatives that build capacity and promote self-reliance in the long-term. As noted earlier, northern Canadians, and Aboriginal people in particular, generally experience higher rates of unemployment and poverty, lower levels of education, and poorer housing and health status. The role that these determinants play in food insecurity was emphasized in numerous studies (Egeland & Harris, 2013; Willows et al., 2008, 2011; Tarasuk et al., 2014; Slater et al., 2013; Ford et al., 2013). Despite the existence of social assistance programs in NWT communities to address poverty, little information could be found on programs with a poverty reduction focus; the research on poverty reduction programs and their association with food insecurity is noticeably lacking. However, Arctic co-operatives are an example of an initiative aimed at addressing food insecurity by building capacity and promoting self-reliance.

Food cooperatives are a form of community development which can provide social benefits (Kuhnlein et al., 2014, p. 177). Co-operatives in Canada's north "share a vision of people working together to improve ... social and economic well-being" (Arctic Co-operatives Ltd., 2007, para. 1). Some of the objectives of Arctic co-operatives are to provide merchandise services in the most economical and efficient way to members and to provide an environment for promoting capacity building through the recruitment, development and training of northern people in employment and management positions. Arctic Co-operatives provide a range of services to its members, but the majority of their business is focused on providing retail services which aim to help reduce the cost of buying groceries. One of

the attributes identified as contributing to the success of co-operatives in the north is a culture of sharing (Arctic Co-operatives Ltd., Canada's North, 2007). Most members of co-operatives in the NWT are Dene (Arctic Co-operatives, Canada's North, 2007). According to the Arctic Co-operatives website, there are co-operatives in eight communities in the NWT: Fort Good Hope, Deline, Holman, Sachs Harbour, Colville Lake, Lutsel K'e, Fort McPherson, and Yellowknife.

7.6 Innovation in infrastructure, transportation and local food production

Barriers in transporting and storing foods in northern Canada contribute to food insecurity, translating into poorer quality nutritious foods at costs considerably higher than in southern Canada (Kuhnlein et al., 2014). Initiatives included in this category focus on overcoming these types of barriers. While no initiatives related to improvements in infrastructure or transportation could be identified in the review of literature (likely because the search terms utilized in the review would not have been broad enough to capture such initiatives), the literature did reveal some food sovereignty initiatives aimed at encouraging local food production.

The Government of the NWT has implemented the Growing Forward initiative aimed at promoting local agricultural production. Components of this initiative include the Small-Scale Food Program and the Northern Agri-Food Program (Kuhnlein et al., 2014, p. 172). These two programs involve partnerships with the Government of Canada and the Government of the NWT to develop the agricultural sector so as to improve healthy local food choices. The Small Scale Foods Program aimed to establish market gardens in communities across the NWT, while the Northern Agri-Foods

Program aimed to work with producers to establish, expand and develop land based initiatives to increase yields and efficiencies (NWT, Industry, Tourism and Investment, n.d.; Epp, 2009, 2011). While little additional information could be found on the Internet regarding the Northern Agri-Foods Program, more information is available regarding the Small Scale Foods Program.

The Small Scale Foods Program has shown considerable growth since it was initiated in 2006, from six to 30 community gardens (NWT, Industry, Tourism and Investment, 2011). This program provides funding for seeds and small tools, and assists in the selection and development of sites for community gardens in conjunction with groups of residents, Band Councils or local community governments. Youth are also targeted through the school system by bringing workshops into the school and having classes help with

spring planting or fall harvesting. In the case of Deline's community garden, in 2009 produce from the harvest became healthy snacks at snack time or were given to home economics classes to cook with (Ibid.). By 2011, all but three NWT communities had implemented some type of local production system with some moving to larger established sites and/or incorporating greenhouses (Ibid.). Table 9 identifies the communities involved in the Small Scales Foods Program, by region.

Several initiatives are also targeted at improving food security through the promotion of traditional harvesting, including the Commercial Harvest Program, Traditional Harvest Program, the Western Harvesters Assistance Program, and the Community Harvesters Assistance Program. These have been described in greater detail in a previous sub-section.

TABLE 9: COMMUNITIES INVOLVED IN THE SMALL SCALE FOODS PROGRAM, BY REGION

Region	Communities
Dehcho Region	Fort Liard, Fort Simpson, Jean Marie River, Nahanni Butte, Trout Lake, & Wrigley
Inuvik Region	Aklavik, Fort McPherson, Inuvik, Tsiigehtchic, & Tuktoyuktuk
North Slave Region	Behchok, Dettah, N'dilo, Gameti, Lutselk'e, Whati, Yellowknife, & Wekweeti
Sahtu Region	Colville Lake, Deline, Fort Good Hope, Norman Wells, Tulita
South Slave Region	Enterprise, Fort Providence, Fort Resolution, Fort Smith, Hay River, Hay River Reserve, & Kakisa

Source: Compiled from NWT Industry, Tourism and Investment and Health Canada, 2011. Small Scale Foods Program, pp. 6-8.



7.7 Youth engagement

Aboriginal people recognize the importance of building capacity and empowering youth with knowledge related to food security so that they will have the tools they need to adapt to the adverse changes affecting their people (Kuhnlein et al., 2014). This section will describe programs and initiatives aimed at providing education about nutrition and health to children and youth, as well as programs that pass knowledge about traditional foods and harvesting practices from older generations to children and youth.

The NWT Department of Health and Social Services (DHSS) collaborates with other departments in implementing a range of health promotion programs and initiatives under the umbrella of the Healthy Choices Framework. The Healthy Choices Framework is a joint plan for the health, education

and recreation sectors to address two of the Government's priority areas: active living and healthy eating, which links with the federal government's Pan Canadian Healthy Living Strategy (NWT, ECE, 2007, p. 2). Within this framework, the DHSS collaborates with Education, Culture and Employment (ECE) and with Municipal and Community Affairs to promote health within all grade levels in schools, health centres and communities (Ibid.). However, most of these programs/initiatives are implemented through the public school system, where healthy living curriculum is often incorporated at each grade level.

Schools are often the most effective means of instilling knowledge about good nutrition and healthy lifestyle choices in children and youth. The DHSS collaborates with other departments in implementing a range of health promotion programs and

initiatives, many of which fall under the umbrella of the Healthy Choices Framework. The first, Drop the Pop, is designed to encourage students and their families to consume healthier beverages and foster long-term healthy food intakes (NWT, HSS, 2011c; 2011d). The program is a partnership between Health Canada (Aboriginal Diabetes Initiative); Arctic Cooperatives Limited; the Canadian Public Health Association – NWT/Nunavut Branch; Co-op; the Government of NWT's DHSS, ECE, and Environment and Natural Resources departments); the Food First Foundation – NWT; northern grocery stores; the Northern Nutrition Association; the NWT/NU Public Health Association; NWT/NU Dental Association; and the NWT Medical Association (Joint Consortium for School Health, 2012). Funding for this program is based on school size, ranging from \$750 to \$2000 (proud2bnwt, 2011). The Sip Smart program is a partnership

between the HSS and ECE departments of the Government of the NWT and includes curriculum aimed at raising awareness among students in Grades 4 through 6 on the negative health effects associated with the consumption of sugary drinks and providing children with the knowledge and skills they need to make healthy beverage choices (Joint Consortium for School Health, 2012, p. 66). The Healthy Food for Learning grant is provided to schools in the NWT to assist in providing nutritious foods for students. Funds can be used for meal/snack programs, skill building programs, or kitchen supplies to support food programs. In addition, all health boards employ health promotion specialists who are involved in school health promotion. Kids in the Kitchen was initiated by the Food First Foundation in partnership with Health Canada's First Nations and Inuit Health Branch and schools in the NWT (Health Canada, 2010). The program is targeted at children aged six to 11 and focuses on healthy eating, nutrition education, and safe food handling and cooking skills. Students are provided with information about nutritious food choices and opportunities to practice food preparation techniques in an eight week program, delivered once per week either during or after school. An additional school-based health promotion program, Jump Rope for Heart, was initiated by the Heart and

Stroke Foundation in communities across Canada, including in the NWT. This initiative sees volunteers making presentations to students from Kindergarten to Grade 8 on topics such as healthy eating, active lifestyle and smoke-free living (Heart and Stroke Foundation, 2011).

One initiative is aimed at improving food security through the promotion of traditional harvesting among youth. The 'Take a Kid Trapping Program' encourages youth to learn traditional skills such as hunting, fishing, and trapping. The program is cost-shared by the federal and territorial governments through NWT's Industry, Tourism and Investment and Municipal and Community Affairs departments and the federal government's Growing Forward Program (NAHO, 2013). Funding is provided to schools that organize youth on-the-land skills training. In 2011, 2274 youth were involved from 49 different schools (NAHO, 2013). Youth are taken out on the land for up to two weeks and learn a wide variety of activities from hunting and gathering, to traditional food preparation and important lessons about proper preparedness for on-the-land excursions.

7.8 Summary

In the NWT, most health promotion programs/initiatives are targeted at the general NWT population rather than First Nations or Aboriginal populations specifically. Some of these are aimed specifically at health promotion, while others are broader in scope, with health promotion as only one of many aims. Incorporating a stronger emphasis on traditional foods in health promotion is a more recent phenomenon. However, the success of most of these programs/initiatives, with the exception of perhaps the Healthy Foods North program,¹⁴ has not been evaluated, especially not in the context of improving diet and nutrition within the First Nations and Métis population. This gap in knowledge with respect to health promotion must be addressed so that knowledge about what works well and in what contexts can be shared by communities.



¹⁴ The Healthy Foods North program has been evaluated by several researchers, however the focus has been primarily on Inuit and Inuvialuit populations.



8.0 CONCLUSION



Improving the nutritional health of First Nations and Métis of the NWT has been a health priority and research focus for decades. There has been a trend towards increasingly substituting traditional foods with market foods by younger generations. This, coupled with the poor selection, poor availability, and high costs of quality market foods in remote and northern locales, and high rates of poverty, has led to nutritional deficiencies. While impacts of these deficiencies on health status remain unclear, there are signs that a public health crisis may be looming. This makes it imperative that the gaps in knowledge related to the nutritional health of First Nations and Métis in the NWT be filled so that effective responses can be implemented. These gaps in knowledge relate primarily to patterns of traditional and market food consumption, determinants of nutrient deficiencies, the level of contaminants in specific food sources, the impact of climate change on the quality and availability of specific traditional foods, and the prevalence of chronic diseases associated with diet and nutrition. They also relate to the need to respond to the diversity of Aboriginal peoples. Clarifying our understanding of how the nutrition transition manifests in specific sub-populations is necessary to allow for targeted health promotion initiatives which are seen as being more effective than general approaches in improving the overall health and well-being of First Nations and Métis peoples.

The analysis of research conducted on the nutritional health of First Nations and Métis peoples in the NWT up to 2014 revealed a steadily increasing trend in publications over time, based on five-year intervals. Most of this research has been undertaken by the Centre for Nutrition and the Environment of Indigenous Peoples. The existing research clearly demonstrates the nutritional benefits of traditional foods, as well as additional benefits that promote healthy living and wellness. The research has also highlighted the considerable variability in traditional food consumption based on gender, age, geography, and seasonality of food sources. Despite this, there remain gaps in knowledge stemming from a tendency of most literature and research to focus on broad population groups at a specific point in time. Studies focused on differences between specific Aboriginal sub-populations or communities (including differences between urban and rural populations, between First Nations and Métis populations, and between lower and higher socio-economic status), that aim to identify motivations behind food choices, and that track food consumption patterns of individuals over time are needed in order to gain a clearer picture of the extent of the dietary transition for First Nations and Métis.

Food insecurity has been identified in the literature as a major impediment to improving diet and nutrition. Food

insecurity is considered generally quite high for residents of the NWT because of higher costs of living and lack of availability of affordable quality market foods. It is considered even higher for Aboriginal residents who have lower socio-economic status compared to non-Aboriginal residents. In the NWT, food security is also impacted by environmental contamination and climate change. The body of literature on these two topics is again quite limited. There have been few studies that have examined the levels of contaminants in traditional food sources, and few that track changes over time. Most of the literature and research focused on the food security of Inuit rather than First Nation and Métis populations. Of those that do focus on First Nations and Métis, findings show that there are no substantial health risks associated with consuming traditional foods. While some individuals may consume higher than tolerable levels of contaminants from certain foods during certain times of the year, these levels are generally not considered usual intake levels either because they are consumed in large quantities for only a short period of the year or because the food sources that contain the highest levels of contaminants are typically consumed by few individuals. Further, the food sources that show the highest levels of contaminants are more likely to be consumed by the Inuit rather than the First Nations and Métis. Clearly the benefits of consuming traditional foods outweigh the risks, yet there is a

Climate change impacts food security through changes in the local environment that affect the quantity, availability, and accessibility of traditional food sources.



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noticeable gap in the literature regarding how to effectively communicate these messages to First Nations and Métis in the NWT.

Climate change impacts food security through changes in the local environment that affect the quantity, availability, and accessibility of traditional food sources. There is currently a dearth of literature focusing on the impacts of climate change on food security, specifically on its impacts to the quality and availability of specific traditional foods. Most of this body of literature is very general, with biophysical systems, vulnerabilities, socio-economic impacts and health impacts of climate change being the dominant focuses. The literature is also primarily focused on impacts to Inuit and their ability to adapt. Clearly, more research is required in this area for First Nations and Métis, especially specific assessments of climate change

impacts and studies on the effectiveness, durability, and long-term viability of adaptations.

Also lacking are literature and data related to the health impacts of poor diet and nutrition for First Nations and Métis peoples. What exists is primarily related to residents of the NWT in general, rather than to Aboriginal populations. The limited data available seem to suggest that while prevalence of diabetes and cardiovascular diseases is generally lower for First Nations and Métis in the NWT compared to other Aboriginal populations in Canada, the risk factors for these diseases are generally high, suggesting that prevalence of these diseases will continue to rise.

Current health promotion programs and initiatives that incorporate a focus on diet and nutrition appear to target the risk factors for these chronic diseases.

Some have recognized the need to promote traditional food sources as a strategy for improving the health of First Nations and Métis peoples, while others emphasize physical activity or aim to instill knowledge about diet and nutrition. These programs and initiatives involve multi-level and multi-sectoral approaches and target a range of age groups. However, there is a noticeable gap in knowledge regarding the effectiveness of health promotion programs and initiatives in improving overall health within First Nations and Métis. There is a body of literature that highlights the need for health promotion to be culturally relevant so that uptake of key messages is maximized by Aboriginal populations. Given this, it is essential that health promotion programs and initiatives be put in place that target Aboriginal populations and communities specifically.

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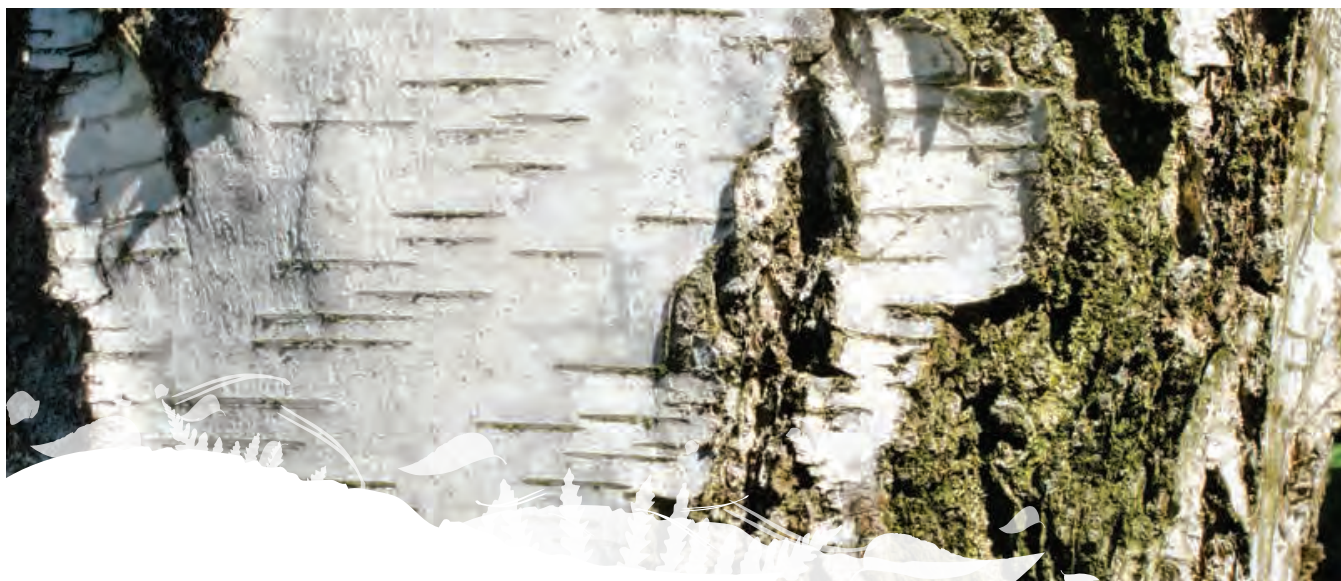
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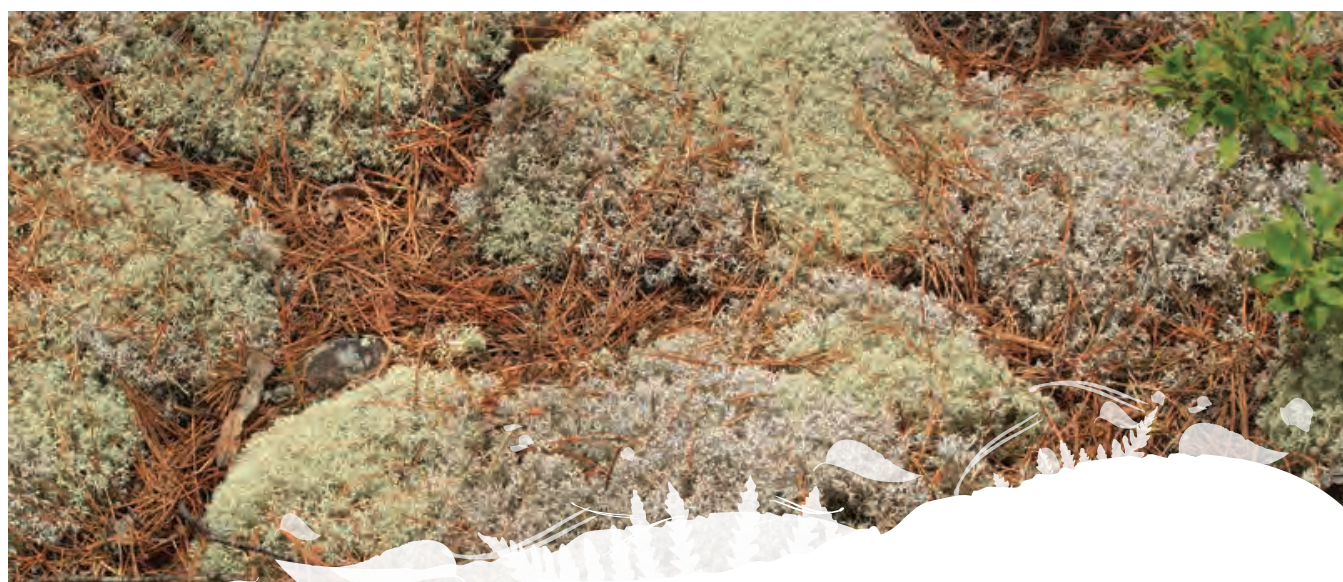
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